Government of the People's Republic of Bangladesh

Ministry of Local Government, Rural Development & Cooperatives

Local Government Division

AKKELPUR PAURASHAVA

MASTER PLAN: 2011-2031

FEBRUARY, 2015

Technical Assistance: Local Government Engineering Department (LGED)

Government of the People's Republic of Bangladesh

Ministry of Local Government, Rural Development & Cooperatives

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AKKELPUR PAURASHAVA MASTER PLAN: 2011-2031

STRUCTURE PLAN

URBAN AREA PLAN:

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

WARD ACTION PLAN

February, 2015

AKKELPUR PAURASHAVA

AKKELPUR, JOYPURHAT

AKKELPUR PAURASHAVA MASTER PLAN: 2011-2031

Published by:

AKKELPUR PAURASHAVA

Supported by Upazila Towns Infrastructure Development Project (UTIDP) of

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Preface

Bangladesh has been experiencing rapid urbanization in the last four decades where level of urbanization has reached from 7.6% to nearly 29% between 1970 and 2011. Multidimensional complex factors like; socio-economic, political, demographic and climatic are responsible for this higher growth of spatial transformation. The fast urbanization is putting pressure on the small towns' limited land, urban services and environment along with countries big cities. Whereas urbanization is also considered as an opportunity and an integral part of the development process. Proper development plans and guidelines with necessary legislative measures and appropriate institutional arrangement can help to achieve sustainable urban as well as rural development.

However, presently, the Paurashavas has the legal mandate to take initiatives of formulating development plans, providing infrastructure and other services and creating opportunities for people to initiate developments with sustainable and harmonic approach. In this regards, Akkelpur had initiated steps to frame its' Master Plan (Physical Development Plan) by taking technical assistance from the Local Government Engineering Department (LGED). LGED under the Local Government Division of the Ministry of Local Government, Rural Development and Cooperatives initiated a project titled 'Upazila Towns Infrastructure Development Project (UTIDP)' providing all sorts of technical assistances to prepare long term physical development plan titled 'Master Plan' for Akkelpur Paurashava.

Master Plan of Akkelpur Paurashava has been prepared following the pre-requisite of the Local Government (Paurashava) Act, 2009. To prepare the Master Plan, LGED engaged consulting firm named AQUA Consultants & Associates Ltd. and set up a Project Management Office (PMO) deploying a Project Director, Deputy Project Director, experienced Urban Planners as Individual Consultant and support staffs. Regular monitoring, evaluation and feedback from PMO had also accelerate the pace and quality of the master plan preparation tasks. During formulation of the Master Plan, the Paurashava authority along with the project & the Consultant ensure people's opinion, observation and expectation in various ways: conducting sharing meetings, Public Hearing etc. At the end of the formulation process, the Paurashava completed all procedures necessary for its approval as per the related clauses and sub-clauses of the Local Government (Paurashava) Act, 2009. Paurashava Authority has submitted this Plan to the Local Government Division of the Ministry of Local Government, Rural Development and Cooperatives for final approval and gazette notification.

This Master Plan comprises of three tier of plan in a hierarchical order, these are: Structure Plan for 20 years, Urban Area Plan for 10 years and Ward Action Plan for 5 years. Urban Area Plan also comprises of three components namely; Land use plan, Traffic & Transportation Management plan and Drainage & Environmental Management Plan. This Master plan will serve as guidelines for the future infrastructure development of Akkelpur Paurashava together with land use control and effective management of service facilities.

The Paurashava Authority acknowledges the full support and all out cooperation from the consultant team, the Project Management office of UTIDP, LGED, Local Government Division of the Local Government, Rural Development and Cooperatives Ministry, public representatives, other stakeholders and civil society with deepest gratitude for accomplishing this remarkable assignment.

Cooperation and participation from national to local authorities, all government institutions, private entities and people of Akkelpur Paurashava will be necessary to implement this Master Plan successfully and make this Paurashava developed and livable. I hope Akkelpur Paurashava will be a model Paurashava in Bangladesh through building itself green and sustainable by successful implementation of this Master Plan.

(Md. Alamgir Chowdhuri Badsha)
Mayor
Akkelpur Paurahsava.

Executive Summary

The Master Plan Report of Akkelpur Paurashava has been prepared and submitted by the consultant AQUA-SCPL-RCC consortium for the partial fulfillment of the requirements stated in the Terms of Reference (ToR) for Upazila Towns Infrastructure Development Project (UTIDP; package-9) being implemented by Local Government Engineering Department (LGED) under the Ministry of Local Government Rural Development and Cooperatives (LGRD&C) government of the People's Republic of Bangladesh. The Master Plan Report is the fourth of the series of the reports to be submitted as per the ToR of the project "Upazila Town Infrastructure Development Project-Preparation of Akkelpur Paurashava Master Plan (Structure Plan, Urban Area Plan and Ward Action Plan)".

Prior to starting the Master Plan report the consultant undertook a field visit and organized a meeting with the stakeholders to understand the growth pattern, problems and prospects in future developing aspects of the project area. Existing Paurashava boundary covering an area of 4243.27 acres or 17.17 sq. km. was delineated as a planning area for preparation of the Master Plan with due emphasis on local and regional development agenda for next 20 years.

The pattern of settlements in the Paurashava reflects that the Paurashava still possesses predominantly the semi-urban characteristics. No planned residential area exists in the Paurashava. Structures are established without any planning standard and in a haphazard manner. The Population density of the Paurashava area is found 1411/ sq. km in the year 2011. The Growth Rate of Akkelpur Paurashava is estimated to be 1.115 %. The projected population found in the year 2031 is 30242 which are 1.24 times higher than the present population (24227) of Akkelpur Paurashava. The gross density of the area will be 8 ppa (person per acre).People in this Paurashava mostly belong to middle and higher income groups. Only a small number of people belong to higher income group. According to BBS 2011, agriculture is the main economic activity of the majority of the people of this Paurashava. The percentage of the people in this occupation is 38.01%. The next highest occupation class observed is the business and other service. Other major occupations are day laborers, expatriate wage earners, and public and private services. Present socioeconomic condition of Akkelpur Paurashava is not very enthusiastic.

The project area is located on the bank of Tulshiganga River. This Paurashava has been intersected in west-east direction by Akkelpur-Santhahar Road and urban developments have taken place mainly along this highway. The Paurashava as well as the Upazila is connected within the region by Road Networks. The project area is one of the important centers of economic activities within the eastern region. It has long cultural and trading relation with Joypurhat and Santhahar. The average elevation of the land of the Paurashava area is 16.30 mPWD. The Mean elevation of different wards of Akkelpur Paurashava is very close to the mean value for the entire Paurashava except the areas in Ward Nos.2 & 4. Most of the area of the Paurashava lies above the normal flood level. For Akkelpur Paurashava mean spot height of Agricultural Land is found to be 16.30 mPWD whereas the mean spot height found for roads/Circulation network is about 17.57 mPWD and mean spot height found in residential is about 16.90 mPWD. Parts of Ward Nos. 2 and 6 are found to be at a relatively higher elevation. Comparable to overall land level and Ward No. 2 and 6 is higher than any other portion of this Paurashava. This Paurashava ward no 4 is the hub of commercial activities. The physical feature survey reveals that there are in total 7856 structures

exist in the Paurashava of which residential structures are the highest (86.60%) and commercial structures are second highest (7.71%). Maximum structures of the Paurashava (63.30%) is katcha while semi pucca structures are 32.86% and pucca structures are only 6.84% of the total structures of the Paurashava. In total the Paurashava has 58 small bridges/ culverts and 85.11 km of roads. The Paurashava has 336 ponds and 24 ditches as well. Among 85.11 Km road out of which 30.23 is Pucca, 28.94km is Katcha and 25.94km is Semi-Pucca road. In Akkelpur Paurashava in total 14.01 km of pucca drains.

The project area is predominantly semi-urban in character. A land use survey reveals that agriculture is the most dominant land use category of the Akkelpur Paurashava which comprises 73.99% of the total land area of the Paurashava. Residential (17.07%) is dominant second land use. The land under agriculture purpose use is mostly double cropped area, which are low-lying depressions and remain under water during the monsoon flood. Paurashava Commercial, educational and mixed use lands are very much negligible in percentage. Core areas (Ward Nos.3,4 and 7) of the town along this highway and its close vicinity developed with diversified land use without any proper planning guidelines causing many difficulties such as, traffic congestion, drainage problems and environmental degradations etc. for the town. The Existence of Tulshiganga River and quite a good number of canals in and around the Paurashava created opportunities for cultured fisheries in the Paurashava area. Good transportation linkage within the region and other parts of the country and potential for agriculture and fishery has created abundant scope for the establishment of agro-based industries with adequate forward and backward linkages in the Paurashava.

The structure plan (Part-A) area consist of different zones (Core Area,Fringe Area,Peripheral Area, New Urban Area, Agriculture, Water body and Major Circulation) and it covers 4243.27 acres of land in entire Paurashava. Agriculture (2827.36acres) is the highest percentage of land (66.63%), followed by fringe area 426.54 acres, Peripheral Area 304.47 acres, water body 194.75 acres and major circulation 245.66 acres. The core area covers only 137.10 acres of land and the percentage is 3.23.

Urban Area Plan is the mid-level plan that covers the existing Paurashava. It lays down the land use zoning plan and infrastructure development proposals at the town level. Land use planning is an important part of Master Plan ensuring that land is used efficiently for the benefit of economy, society and the environment of Akkelpur Paurashava. Urban Area Plan is the first phase illustration of the Structure Plan intended to be implemented over a time span of 10 years that includes 1st phase (1st-5th year) and 2nd phase (6th-10th year) of development programs.

The components of Urban Area Plan include Land Use Plan, Transportation and Traffic Management Plan, Drainage and Environmental Management Plan, Proposals for Urban Services.The future housing area estimates on a recommended planning standard of 100/150 persons per acre. With this standard, the maximum land required to accommodate total projected population (30242) in the year 2031 will be 242.77 acres. Total commercial land in 2031 has been fixed at 11.80 acres, Education 43.85 acres, open space 65.02 acres and transport 6.77 acres. But in the time of land use proposal of Akkelpur Paurashava it is not possible to maintain the all standard due to insufficient land. In land use proposal 530.39 acres of land is for Urban Residential Zone where 225.76 acres is for rural settlement. The commercial lands have been proposed 14.23

acres, Education & Research Zone 26.19 acres, Open Space 38.31 acres, Transportation Facilities 5.92 acres, Community Facilities 10.32 acres and Health Services 9.49 acres.

The Transportation and Traffic Management Plan covers the scope of improvement of the existing network and system and plan proposals for new development. The proposals for improvement and new development are made for the project area up to 2031. The existing circulation network of Akkelpur Paurashava is 72.47 acres and the proposed circulation network is 245.66 acres includes existing land. The primary roads (Akkelpur-Santhahar) have been proposed 80ft (ROW) and a minimum width of road 20ft (ROW) in entire Paurashava. The main intention of transport plan is to ensured proper functional linkage within other regional centres. One bus terminal, two tempo stand and one rickshaw stand are proposed to cover the whole area. It is also focused on parking facilities and built passenger shed.

The purpose of the Drainage Plan is to make an assessment of the present drainage facilities and to improve future development. This Plan shall be a planning tool and shall be used as a guideline for Akkelpur Paurashava that shall be responsible for the approval of drainage improvements. Natural canal in Akkelpur Paurashava is acting as a critical role in entire Paurashava. The natural drainage network is composed with 614 water bodies in Akkelpur Paurashava out of which 361are ponds and 251 are ditches and 02 khals. Total area devoted to water bodies in Akkelpur Paurashava is around 144.37acres excluding river. It can also be seen that the ward 8 possess highest area for water bodies. The proposed drain of Akkelpur Paurashava is about 3.95 km Primary Drain, 13.3 km secondary drain and 22.77 km tertiary drain. This will be designated up to 2031.

Akkelpur Paurashava is lacking for sewerage system and people are used to dispose household sewer to the surface drains and or surface water bodies. This Paurashava does not possess good solid waste management system. Only there are two vehicles and 2 vans for solid waste disposal although those are not properly functioning. In this Paurashava there are 28 permanent dustbins but no designated site for solid waste dumping. In proposed plan 6.81 acres of land is reserved for dumping ground and it is located in ward no 9. Total 02 waste transfer stations have been proposed in core area.

In Part-C of the report contains Ward Action Plan of each individual Ward and this Development Proposals will be implemented within 1st to 5th year of the planning period.The Ward Action Plans (Part-C) are prepared under the framework of the Structure Plan and Urban Area Plan. The Ward Action Plans contain details of development proposals at Ward level including the problems and opportunities existing therein and also include the proposals made in the upper level plan that is in the Urban Area Plan. The Ward Action Plans have been formulated for execution within a period of 5 years.

Finally, The Paurashava is self-sufficient neither in preparation of the plan nor in implementation of plan proposals; is dependence on central government for technical and financial assistance huge. This dependence might hinder the overall plan making and implementation process. Besides, plan implementation would require the Paurashava to have a good coordination among various stakeholders and with the line ministry (LGRD&C) in place. Therefore a right kind of Institutional arrangement, and implementation framework would be required for successful implementation of the plan proposals and its future updating. However, the current project regarding the Preparation

of Master Plan for Akkelpur Paurashava under “UTIDP” emphasizes on having proper guidelines and planning standards by the Paurashava for ensuring sustainability and planned development of the Paurashava.

Preparation of Master Plan for Akkelpur Paurashava under Upazila Towns Infrastructure Development Project (UTIDP)

Akkelpur Paurashava

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ACRONYMS

BM	Bench Mark
BTM	Bangladesh Transverse Mercator
CBD	Central Business District
CNG	Compressed Natural Gas
CS	Cadastral survey
DGPS	Differential Global Positioning System
DLRS	Directorate of Land Records and Survey
DPA	Demarcation of Planning Area
DPHE	Department of Public Health and Engineering
GCP	Ground Control Point
GIS	Geographic Information System
GPS	Global positioning system
K.P.H	kilometers Per Hour
K.M.	Kilometer
LGED	Local Government Engineering Department
MSL	MeanSea Level
O-D	Origin and destination Survey
PCU	Passenger Car Unit
PWD	Public Works Department
RHD	Roads and Highway Department
RTK-GPS	Real Time Kinematics Global Positioning System
SOB	Survey of Bangladesh
TCP	Temporary Control Points
TIC	Tentative points)
TS	Total Station
UTIDP	Upazila Towns Infrastructure Development Project

LOCAL WORDS

Khal	Canal
Tempo	Human hauler
Bazar	Trade Center
Hat	Weekly an occasional Market
Paurashava	Municipality

Chapter 1: Introduction

1.1 General

Urbanization in Bangladesh is moving at a rapid pace. Between1961 to 1981, the average urban growth rate was 8%. The present average growth rate is about 4.5%. According to the population census of 2001, the share of urban population was about 23.29% and at present it is approximately 25%. By the year 2015, the share of urban population will be about 37% of the national population. The importance of urban development is emphasized in terms of its role in the national economy. More than 60% of the national GDP is derived from the non-agricultural sectors that are mainly based in urban areas. Again, the most foreign exchange earning sectors, like, garment and knitwear enterprises are agglomerated in urban areas. These sectors earn over 70% of the foreign exchange. Remittance is also a major sector of foreign exchange earnings and a large share of the remittance goes into the purchase of urban land. Surplus remittance is invested in business and manufacturing located in urban areas. These phenomena indicate the increasing role of urban areas being played in the national economy. The expansion of urban economy leads to the growth of urban population and concomitant haphazard urban spatial growth without planning. The rapid urbanization is marked by the creation of Paurashavas, whose number at present stands at 318. Paurashavas are created not only to provide urban services to their citizens, but also to create a livable environment through development of planned and environmentally sound living space.

The present infrastructure provisions in the Paurashavas are in a precarious state. Drains are mostly clogged that cannot drain out water during heavy rains and 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 sub-standard road network cannot keep pace with the growing demand for movement. As a result, congestion becomes a common problem. Road networks are 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 environmental deterioration. Building Construction Rules are not effectively enforced in the Paurashavas mainly for want of a well formulated Master Plan and qualified planning professional.

Under the above circumstances, it is high time to think about solving the problems of the Paurashavas that might otherwise be emerged critically in the future. To overcome all likely problems to come in future, the Paurashavas should go for planned development through preparation and implementation of a Master Plan. 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 (UTIDP) aims to prepare Master Plan for 223 Upazila level Paurashavas and Kuakata Tourism center under 12 packages for a period of next 20 years. The project has provisions for separate plans for land use control, drainage and environment, traffic and transportation management and improvement. The project also aims to prepare a Ward Action Plan (WAP) to ensure systematic execution of future infrastructure development projects. There is

also aim to prepare proposals to enhance Paurashava revenue so that it becomes more capable to meet its own capital needs.

Of the total 223 Paurashavas Akkelpur is one of 20 Paurashavas within Joypurhat Region under Package 09. The location of Akkelpur within Bangladesh is shown in ***Map 1-1***.

Map 1-1: Akkelpur Paurashava within Bangladesh

Thus the Master Plan of Akkelpur Paurashava suggests for the development of urban infrastructure, such as new roads and bridges/culverts, drainage facilities, street lights, markets, bus stands, solid waste management, sanitation, water supply, community facilities and other such infrastructure in order to equip the Paurashava to face future challenges of urbanization and economic regeneration. The Master Plan will initially focus on growth and development, social integration and environmental improvement following principles of sustainable development.

1.2 Philosophy of the Preparation of Master Plan

The philosophy behind preparation of Master Plan of the Upazila level Paurashava lies in the very motive of providing community welfare through a process of spatial organization, socio-economic rejuvenation, environmental improvement and provision of amenities to the present and future generations. The Master Plan aims for rational use of scarce land resources for concentrated development at urban scale following the principles of sustainable development.

1.3 Objectives of the Master Plan

As per the Terms of Reference (TOR), the objectives of the preparation of Master Plan of Akkelpur Paurashava are to:

a) Find out development issues and potentials of the Akkelpur Paurashava and make a 20- year development vision for the Paurashava and prepare a Master Plan in line with the vision for the development;

b) Plan for the people of Akkelpur Paurashava to develop and update provisions for better transport and communication network, housing, roads, 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 better quality of life;

c) 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 the principle of sustainability;

d) Provide controls for private sector development, with clarity and security in regard to future development;

e) Provide guideline for development considering the opportunity and constrains of future development of the Upazila Town; and

f) Prepare a 20-year Master Plan to be used as a tool to ensure and promote growth of the Akkelpur Paurashava in line with the guiding principles of the Master Plan and control any unplanned growth by any private and public organization.

1.4 Approach and Methodology

The UTIDP Project is aimed for substantial development of infrastructure and services for the Paurashava with optimum provision of opportunities for Paurashava dwellers and making scope for extending services to surrounding areas.

The current project is preparing a Master plan of the Paurashava, where the existing condition and different problems are identified, studied and analyzed and the probable solutions are to be sought

to ameliorate the same. The study moves through a process of data collection-analysis and fixation of objectives for planning. The approach is based on field survey for data collection and collection of information from secondary sources. The data is presented through maps, text and tabular form. Then the survey report and maps are prepared and submitted. Analysis of collected data is carried out to identify the nature and extent of problems prevailing in the Paurashava in order to fix the objectives of the actions to be undertaken in the form of planning and the interim report prepared and submitted. Through the process, involvement of the stakeholders has been ensured to make the planning as much sustainable as possible. For this purpose, continuous formal and informal discussions and meetings have been carried out throughout the project period using participatory approach. The discussions serve two purposes, first, a sense of belongingness develops within the minds of the stakeholders, particularly among the citizens, about the master plan to be prepared, and secondly, identification of problems and finding their solutions become easier with the participation of stakeholders, as the local stakeholders are More knowledgeable about local problems and possible solutions of those problems.

After doing all these jobs thoroughly the Master Plan had been done based on a prepared planning standard for Paurashava level town and formulating future strategies for the corresponding area. Again after final consultation with the stakeholders on the prepared plan the Final Master Plan has to be completed.

1.5 Scope of Work

The scope of work under this consultancy services covers all aspects related to the preparation of Master Plan, which includes Land Use Plan, Transportation and Traffic Management Plan, Drainage and Environmental Management Plan and Ward Action Plan for the proposed Paurashava. In order to prepare these plans, the activities contain but not limited to the following:

1. Visits have been made to the Paurashava at different stages of work of the preparation of Master Plan of Akkelpur Paurashava.
2. Feasibility for preparation of Master Plan has been submitted to the office of the PD, UTIDP.
3. An Inception Seminar has been organized at the Paurashava level to inform the Paurashava about the scope and Terms of Reference for the preparation of Master Plan. A thorough investigation has been made based on potential scope and opportunities available in the Paurashava to develop a 20 year development vision to link the ideas and view of the Paurashava people.
4. Determination of the study area and planning area has been done based on existing condition, demand of the Paurashava and potential scope for future development. A detailed survey has been conducted on the existing conditions of socio-economic, demographic, transportation and traffic, physical features, topographic, and land use of the Paurashava area following the approved format and data have been collected from primary and secondary sources. Analysis of such data and information has been carried out to find out the possible area of intervention to forecast future population of the Paurashava (15-20 years), vis-a-vis assess their requirement for different services, such as physical infrastructure facilities, employment generation, housing, right of way and land requirement for the existing and proposed roads, drains, playgrounds, recreation centers

and other environmental and social infrastructure. The following major tasks have been accomplished:

a. Identification and investigation of the existing natural and man-made drains, natural river system, the extent and frequency of floods, area of planning intervention have been done. Other works include study of the contour and topographic maps produced by the relevant agencies and review of any previous drainage Master Plan available for the Paurashava.

b. A comprehensive (storm water) Drainage Master Plan for a plan period of 20 years has been prepared considering all relevant issues including discharge calculation, catchments areas, design of main and secondary drains along with their sizes, types and gradients and retention areas with preliminary cost estimates for the proposed drainage system.

c. Recommendations have been made on planning, institutional and legal mechanisms to ensure provision of adequate land for the establishment of proper rights of way for (storm water) drainage system in the Paurashava.

d. Collection and assessment of the essential data relating to existing transport Land Use Plan, relevant regional and national highway development plans, accident statistics, number and type of vehicles registered for each Paurashava have been made.

e. Assessment has been made on the requirements of critical data and data have been collected through reconnaissance and traffic surveys, which should estimate present traffic volume, forecast the future traffic growth, identification of travel patterns, areas of traffic conflicts and their underlying causes.

f. Study has been conducted on the viability of different solutions for traffic management and development of a practical short term traffic management plan has been accomplished, including one way systems, restricted access for large vehicles, improved signal system, traffic islands, roundabouts, pedestrian crossings, deceleration lanes for turning traffic, suitable turning radius, parking policies and separation of pedestrians and rickshaws etc.

g. Assessment has been done on the non-pedestrian traffic movements that are dominated by cycle rickshaw. Special recommendations should be made as to how best to utilize this form of transport without causing unnecessary delays to other vehicles. Proposals should also consider pedestrians and their safety, with special attention for the children.

h. Assessment has been made on the current land use with regard to road transportation, bus & truck stations, railway stations etc, and recommendations to be provided on actions to optimize this land use.

i. Preparation of a Road Network Plan based on topographic and base Map prepared under the Project. Recommendation has been made on the road development standards, which serve as a guide for the long and short term implementation of road. Also Traffic and Transportation Management Plan and traffic enforcement measure have been suggested.

j. Preparation of the Master Plan with all suitable intervention, supported by appropriate strategic policy, outline framework, institutional arrangement and possible source of fund for effective implementation of the plan.

k. Preparation of a plan has been set out proposed Master Plan at 3-levels namely Structural Plan, Urban Area Plan and Ward Action Plan.

l. At the first level, policies and strategies have been worked out for the preparation of a Structure Plan for each Paurashava under the package. The Master Plan has been prepared consisting of Structural Plan, Land Use Plan, Transportation and Traffic Management Plan, Drainage and Environmental Management Plan and Ward Action Plan.

m. A total list of primary and secondary roads, drains and other social infrastructures for each Paurashava for a plan period of next 20 years has been made. Examining and classifying according to the existing condition, long, medium and short term plans have been proposed and estimated cost for improvement of drain and road alignment and other infrastructures have been prepared.

n. In line with the proposed Master Plan, a Ward Action Plan has been proposed with 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.

o. With the help of concerned Paurashava, at least 2 public consultation meetings or seminars have been organized, one for discussion on Interim Report and the other on Master Final Report on the proposed Master Plan. Beneficiary's point of view has been integrated in the plan with utmost careful consideration.

p. Preparation and submission of Master Plan and Report with required standards as per the TOR.

1.6 Organization of the Master Plan Report

The Master Plan Report is organized in three major parts with an introduction at the beginning. The three major parts contain various components of work under the UTIDP of LGED. The three major parts of the Master Plan of Akkelpur Paurashava are as follows:

INTRODUCTION: It describes the ToR of the UTIDP, philosophy and objectives of the Master Plan, methodology and scope of the work and organization of the Master Plan Report.

PART – A: The Structure Plan sets the conceptual framework and strategies for planned development of the Paurashava based on its potentials for next 20 years up to 2031.

PART – B: Urban Area Plan includes i) Land Use Plan; ii) Transportation and Traffic Management Plan; iii) Drainage and Environmental Management Plan; and iv) Proposals for Urban Services.

PART – C: Ward Action Plan presents ward wise detailed proposals for implementation within first five years of the Master Plan period of 20 years.

Chapter 2: Introduction to Structure Plan

The Master Plan Report is the fourth of the series of the reports to be submitted as per the ToR of the project “Upazila Town Infrastructure Development Project - Preparation of Akkelpur Paurashava Master Plan (Structure Plan, Urban Area Plan and Ward Action Plan)”. Part A of this report describes the Structure Plan of Akkelpur Paurashava and Chapter 2 describes the conceptual issues related to the preparation of Structure Plan for Akkelpur Paurashava.

2.1 Background of the Paurashava

As per the Local Government (Paurashava) Act, 2009, the Paurashavas in Bangladesh are categorized mainly into A, B, and C classes based mainly on annual income of the Paurashava. There is also a separate category called “Special Class”, basically for industrial and commercial hubs of Narayanganj and Tongi within the Dhaka Metropolitan Development Area (DMDA).

Akkelpur is a C-category Paurashava with an area of 17.17 sq. km (4243.27 acre) that was established in 28th February, 1999 with 9 wards following the Paurashava Ordinance 1977. Akkelpur Upazila is bounded on the north by Joypurhat sadar and Khetlal Upazilas, on the east by Dhubchanchia upazila of Bogra zila, on the south by Adamdighi upazila of Bogra zila and on the west by Naogaon sadar and Badalgachhi upazilas of Naogaon zila. The location of Akkelpur withinJoypurhat District is shown in **Map 2-1**.

Akkelpur Paurashava is the urban center in the Akkelpur Upazila. Not much known about origin of the name of the Paurashava. The Upazila occupies an area of 139.47 sq. km. It is located located between 24º 51´ and 25º 03´ north latitudes and between 88º 59´ and 89º 06´ east longitudes. Joypurhat region is characterized by high and low lands.

Akkelpur is located within the flood plain of Tulshiganga River. The Tulshiganga Riveris of hydrographical importance of the area, which is More or less Morribund. During the rainy season, these Morribund Rivers act as excellent drainage channels draining of a large volume of water and have a strong current.

Akkelpur falls within the undulated Barind Land. The level of undulation ranges from 1 to 5 meters. Ward 6 covering Akkelpur mouza are found as the most elevated area of the Paurashava. The town center of the Paurashava is comparatively elevated and not subject to annual flooding. Flooding in the area usually occurs due to the over flow of the River Tulshiganga. In recent years, the severe flooding was occurred in 1988 and 1998. Duration of the flooding was more than 2 months and flood level was 1 to 3 meters above the surface. The extensive peripheral areas of Paurashava jurisdiction are comparatively low and are flooded each year during the monsoon. There exist a small number of unsanitary pools, kharis (canal), ditches and filth within the Paurashava. These depressions serve as catchments basin and help in reducing the flood intensity and also mitigate the flood damages during and after heavy rainfall in the monsoon period. Most of the buildings within the town are constructed in normal height but the houses outside the urban areas are mostly constructed on the elevated land of 3 and 4 meters above natural ground level to keep them free from annual flooding.

2.2 Vision of the Structure Plan

The vision of the plan is the creation of an urban livable environment, where people irrespective of their socio-economic, demographic and religious identities can live and enjoy today within affordable means without sacrificing interests of tomorrow. The implementation of Master Plan of the Paurashava will translate this vision into reality.

Map 2-1: Location Map of Akkelpur Paurashava within Joypurhat District

2.3 Objectives of the Structure Plan

To guide long term growth within the Structure Plan Area by means of demarcation of the future growth areas and indication of potential locations of major development areas includes: a) indication of important physical infrastructure; and b) setting out policy recommendations for future development. According to the Terms of Reference, the objectives of Akkelpur Paurashava Structure Plan are:

- Description of the Paurashava's administrative, economic, social, physical environmental growth, functional linkage and hierarchy in the national and regional context; catchments area; population; land use and urban services; agencies responsible for different sectoral activities, etc.
- Identification of urban growth area based on analysis of patterns and trends of development, and projection of population, land use and economic activities for next 20 years.
- Identification and description of physical and environmental problems of Akkelpur Paurashava.
- Discussion of relevant policies to analyze and find out potential scopes for the use in the present exercise and also find out constraints and weakness of the existing policy to suggest appropriate measures for the development and management of Akkelpur Paurashava.
- To provide land use development strategies.
- To provide strategies and policies for sectoral as well as socio-economic, infrastructural and environmental issues of development.
- To discuss about implementation issues including institutional capacity building and strengthening of Paurashava, resource mobilization etc.

2.4 Concepts, Content and Format of the Structure Plan

Concept

Structure Plan is a kind of guide plan, or framework plan, or an indicative plan that is presented with maps and explanatory texts in a broader planning perspective than other components of Master Plan. Structure Plan indicates the broad magnitudes and directions of urban growth, including infrastructure networks, the placement of major facilities such as hospitals and upazila complex. A Structure Plan is not intended to specify detailed lot by lot land use or local road configurations and development proposals. Rather it identifies the areas where growth and change are such that more detailed local and action plans are needed. Structure Plan does not require excessive effort in gathering data and it is flexible and dynamic and can be changed to accommodate demanded changes. The present Structure Plan is an overall long term strategic plan for the Paurashava Shahar (Town), Akkelpur.

Structure Plan is the 1st component of the Master Plan package. The other two lower level components are Urban Area Plan and Ward Action Plan. Structure Plan lays down the framework of the future plan including strategy and the sectoral policies. The Urban Area Plan and the Ward Action Plan detail out development proposals under the framework of Structure Plan. The extended area was selected in consultation with the Paurashava for possible extension of the Paurashava. But no development proposals are suggested for the extended part as existing Paurashava area is enough to accommodate population and services during Structure Plan period, that is, up to the year 2031.

Content and Format of the Structure Plan

The Structure Plan is an indicative plan that gives a brief on the future development of an area with policy guidelines. It is a long-term plan with flexibility in the sense that it sets down a broad framework for future development, but not the details. The format of a Structure Plan comprises written document and indicative major development locations presented in maps and diagrams as parts of the report. The written text analyses the issues that are not possible to be presented as diagrams, drawings and maps. Therefore, the written document is as important as the physical plan and diagrams and should be read in conjunction with each other.

2.5 Duration and Amendment of the Structure Plan

The Structure Plan is to remain valid for a period of 20 years from the time of its approval that is up to the year 2031. Structure Plan can contain two Urban Area Plan for the time period of 10 years each and four Ward Action Plan for the time period of 5 years each.

2.6 Structure Plan Area

The total area of Akkelpur Structure Plan is 4243.27 acres (17.17 sq km) that include total area of Akkelpur Paurashava, and there is no extended area in the structure plan of Akkelpur Paurashava. All the 9 wards of the Paurashava are covered by Structure Plan area.

Chapter 3: Existing Development Status of Akkelpur Paurashava

This chapter of the report makes a review of the various issues related to existing growth trend of the Paurashava and unveils its problems. The existing scenario in development status concerning socio-economic, physical infrastructure and environment are presented in the following paragraphs.

3.1 Social Development

Development is a dynamic issue. Measurement of social development essentially requires time series data. Consultant collected recent data of the project area by means of sample survey (5% of total households) with no reference to previous situation. Population census reports are the only sources of information for Paurashava level data, but they cover only a selected number of issues that are not sufficient to make a qualitative judgment of social improvement. It makes a review of social development based on available population census data of 2001 and 2011 and presents the current situation using the sample socio-economic survey data. This social review indicates positive social development in Akkelpur Paurashava. As per household survey, present average household size of the Paurashava is 4. This indicates the success of family planning programme at Akkelpur Paurashava though the national average (4.8%). Success is also achieved in education sector. Literacy rate is relatively higher in Paurashava; it is 57.56% for both sex, 62.04% for male and 52.77% for female. A tremendous increase in literacy is observed over the decade from 1991 to 2001.The employment situation is also slightly improved in this Paurashava.

3.2 Economic Development

Economic activity is the lifeblood of any urban centre. The higher is the economic activity, the higher will be the level of employment and consequent physical growth. So, before going for a development plan, it is necessary to assess the current level, constraint and prospects of economic activities of the Paurashava.

3.2.1 Economic Activities

The principal criterion to judge the economy of an urban centre is to learn about its main sources of employment. Besides, the number of productive enterprises and tertiary level activities are also the indicators of the pattern and level of economic activities in any area. Existing 73.99 % of the Paurashava area is under agriculture where 38.01 %(BBS-2001) are farmers in the project area. So a fair portion of people is engaged in agriculture for their livelihood. 7.98% are engaged in public and private sector services. About 26.56% are involved with business activities.

Industry

Except some small scale processing units, there is virtually no manufacturing, as such, in the Paurashava. The town actually has no strong industrial base. There are a number of rice processing units and saw mills in the town that may grow in the future, and should choose suitable locations in the Master Plan.

Commerce

The commercial activities in the Paurashava are dominated by retail small business. The Akkelpur bazaar is located at in ward 3 & 4 of the Paurashava. The retailers mostly collect their goods from this bazar, which is also the largest wholesale market.

Services

In Akkelpur Paurashava, total output of the service sector consists of the public administration and defense; storage and communication; financial intermediations; education; renting and business activities; health, community, social work; and social and personal services activities.According to BBS 2011, 7.98% households found depend directly on services, as the main source of income. Nationally the share of the services sector to GDP growth is 53.4% in FY 2010 which was 52.6% in FY 2009 and 50.0% in FY 2008 (State of the Bangladesh Economy in FY 2010-11, P-65).

Agriculture

According to BBS 2011 reveals that about 38.01 percent of the income earners in the Paurashava are engaged in farming occupation. Besides about 26.56% are small businesses living in the Paurashava (BBS, 2011). The farmers and farm laborers work in farm lands, both, within and outside the Paurashava. It is evident from land use survey of the Paurashava that about 73.99% of the Paurashava lands are still under agriculture.

Agro-based

As the Paurashava is mostly rural in nature at present, with effective agricultural extension services, the agricultural output can be increased many times to serve the agro-based industries in future. In this backdrop, the major challenge is to strike a balance between urbanization and maintenance of rural nature of the project area.

Informal Sector Economic Activities

Informal sector study was not a part of ToR, so the consultant did not conduct any formal study on the informal sector. It can be considered that the informal sector characteristics at upazila level Paurashava are same all over Bangladesh. It is more prominent, where the concentration of people takes place. Informal sector is a part and parcel of urban economy in developing countries. They have small capital and are usually self-employed. In Akkelpur, the concentration of informal businesses is found around the bazar area, transport terminal and stoppage areas and also near the Upazila Complex.

3.2.2 Existing Employment Pattern

Out of the employed male population, More than 26.56 percent is engaged in business. Since secondary sector employment is seriously lacking in the town, people move to self-employment like small business. Trading has not been found feasible as employment in the town, mainly, because of lower level of affordability of the people powered by remittance they receive from abroad regularly. About .6 percent of the working force is unemployed. The scenario is unlikely to change unless there is any major investment in the industrial sector that can pool a large number of workers and render the local economy more vibrant services.

According to BBS 2011, 7.98% are employed in government/autonomous organizations. It is unlikely that public sector jobs will show any major improvement in future. But with the increase in business, and industry there is possibility that private sector jobs will show further increase. Small business is an important source of income in this region. About 26.56% of the Paurashava households get involves in this sector.

3.3 Population

According to BBS 2011, the total population of Akkelpur Paurashava was 24227 and the density of population was 1411 persons/ sq.km with an annual growth rate of 1.115. At Present, Ward 05 is the most densely populated area. The density per sq.km is 6798 in this Ward, followed by 5893 in Ward no. 04 and 2360 for Ward no. 02.

Table 3-1: Population Distribution in Akkelpur Paurashava

WARD NO	Area (in acres)	Population 2001 (BBS)	Density (persons/ sq.km)	Population 2011	Density (persons/ sq.km)
WARD-1	671.87	1862	948	1708	870
WARD-2	549.25	3007	1853	3830	2360
WARD-3	82.19	1627	925	1773	1008
WARD-4	159.19	2967	4606	3796	5893
WARD-5	434.49	2093	6293	2261	6798
WARD-6	400.98	2716	900	2835	939
WARD-7	485.27	2764	957	2736	947
WARD-8	746.12	2130	783	2388	878
WARD-9	713.90	2517	1132	2900	1305
Total	**4243.27**	**21,683**	**1263**	**24227**	**1411**

Sex Ratio

The average sex ratio (males per 100 females) for the project area is 100: 103, slight lower than the national average (100:106).

Again, percentage of elderly (65+) male population is much higher than the percentage of elderly female population. These are some interesting information that can be observed from sample household survey at Akkelpur Paurashava.

Marital Status

The percentage of married and unmarried population is almost equally distributed. A negligible percentage of population is widow or widower. There is no respond of divorce, which is a good social aspect for the Paurashava.

Religious Status

Religious composition of population has various implications for area planning and overall welfare of the population. Almost 90.41 percent people of the study area belong to the Muslim community followed by only 7.83 percent Hindu.

Education

The literacy rate of Akkelpur Upazila in 2001 is 54.3% for both sex, 59.1% for male and 49.3% for female. Literacy rate is relatively higher in the Paurashava; it is 57.56% for both sex, 62.04% for male and 52.77% for female. A tremendous increase in literacy is observed over the last decade.

Monthly Income and Expenditure of the Household

According to economic survey, It reveals that 4.8% households have income level below 3001TK; 33.6% households have incone level between 3001 to 5000 TK; 44.5% households have income level between 5001 to 7000TK; 7.3% households have income level between 7001 to 10000 TK and only 9.7% households have income more than 10000TK. From the table expenditure it appears that the most of the people in this Paurashava are of middle income group. Income and expenditure level is given in ***Fig 3-1***.

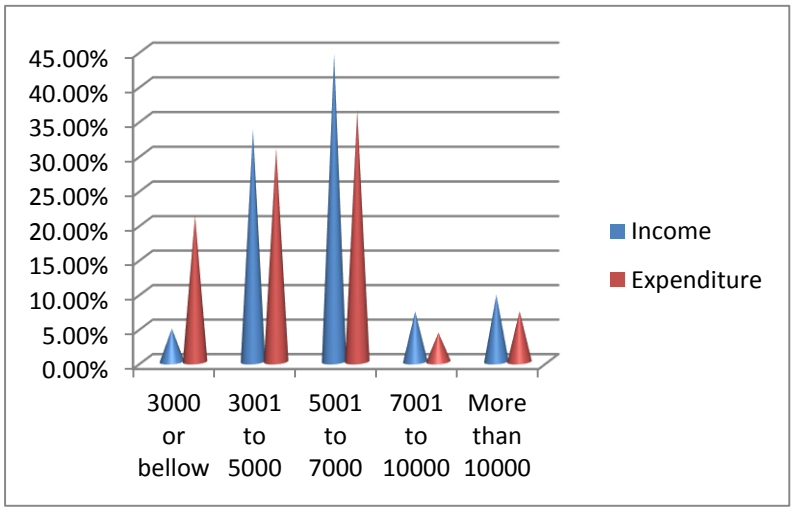


Fig 3-1: Percentage Distribution of the Household by Monthly Income and Expenditure at Akkelpur Paurashava

It reveals that 21.2%households have expenditure level below 3001TK; 30.9% households have expenditure level between 3001 to 5000TK; 36.4% households have expenditure level between 5001 to 8000TK; 4.2%households have expenditure level between 8001 to 10000TK and only 7.3%households have expenditure more than 10000TK.

Migration pattern

In this Paurashava there is no significant migration scenario.

Buildings and Structures

Akkelpur Paurashava has mainly grown following the major transport networks. Buildings and structures developed are based on road network system of the Paurashava.In Akkelpur Paurashava there are a total of 7587 structures of which 86.08% are used in residential purposes. Among the residential structures 50.38% are katcha, 41.10% are semi-pucca and the remaining 8.53% are pucca. Most of the Pucca structures are concentrated in Ward No. 4, where the major concentration of all type of residential buildings has been found in Ward No. 2. The next level of concentration of Pucca residential buildings is in Ward No. 4 and minimum concentration of

residential structure has been found in Ward No. 5. Housing Conditions of Akkelpur Paurashava have been discussed under the following sub-sections.

As stated earlier, among the residential structures 41.26% are Katcha. And the survey findings also show that in Akkelpur Paurashava pucca structures are 36.41%.

Transport and Communication

There are three major roads coming from three different directions meet together at the Paurashava morr and pass through the town. The roads coming from different places are; Akkelpur-Santhahar, Akkelpur to Joypurhat, Akkelpur to Chokropara etc. The physical survey findings of Akkelpur Paurashava shows that in Akkelpur Paurashava there is about about 85.11 Km road out of which 30.23 is Pucca, 28.94km is Katcha and 25.94km is Semi-Pucca road. In this Paurashava there are some LGED roads. Akkelpur-Chokropara roads, Santhahar etc are main roads in this Paurashava which is owned and maintained by LGED. The Paurashava has no formal bus terminal, but it has one CNG stand. Within the Paurashava there exits rail way network but have a provision of waterway network. Within the Paurashava there is no RHD road.

3.4 Utility Services

The following paragraphs present the existing condition of utility services in the Paurashava.

Electricity

In Akkelpur Paurashava there is electricity connection. The survey finding shows that there are 661 electric poles within the Paurashava area. In Akkelpur Paurashava there is an electric substation. Map 3.11 shows the location of electric poles in Akkelpur Paurashava. In ward no 4 there is the highest number of electric pole and in ward no 5 there is the lowest number of electric pole in Akkelpur Paurashava. The people of the Paurashava complained that they face severe problem of load shedding.

Water Supply

In Akkelpur Paurashava, there are mainly two ways of water supply facilities. These are tube-well and piped water supply. In this Paurashava the main source of water supply is tube-well. About 93.10%people use tube-well for their water source. This piped water supply (0.94%) covers Upazila Parishad, Government quarter, market area and households along the main road only. The piped water supply covers only a small portion in the ward 4& 5.

Telecommunication

As a Paurashava, telephone network exists in Akkelpur Paurashava. According to survey, the Paurashava accommodates 14 telephone poles and it is seen that in ward no 8 there are highest number of electric poles and in ward no 1, 2, 3, 5 and 9 there is no electric pole.

Solid Waste Management

Akkelpur Paurashava is lacking for sewerage system and household sewer links to the surface drains and or surface water bodies. This Paurashava does not possess good solid waste management system. Only there are two vehicles for solid waste disposal although those are not properly functioning. There are eight sweepers for solid waste collection. In this Paurashava there

are 28 permanent dustbins but no temporary dustbin for solid waste dumping. The Paurashava does not collect waste from household. Only roadside waste are collected and these wastes are thrown generally at various holes and borrow pits. When generally holes and borrow pits created due to earthwork for road construction then these holes and borrow pits are used for the solid waste dumping. Inadequate maintenance of human, domestic and market wastes, open and poor drainage system, water logging etc. create serious environmental degradation within the Paurashava area.

Gas Supply

The Paurashava has no gas supply facility at present.

Drains

It has been found that the entire drains of Akkelpur Paurashava are Pucca. The field survey indicates that there is moderate amount of drainage in Akkelpur Paurashava13.37 km drains out of which 11.30 km Katcha drains and 2.07 km Pucca drains.

3.5 Environmental Issues

Surface water of ponds, canals and rivers at Akkelpur is observed to be fresh and free from salinity. Water Development Board has taken a project to protect the Paurashava from river erosion by constructing embankment. With the development of a planned drainage system some environmental problem will be minimized.

Paurashava authority has taken initiative to reduce surface water pollution. At present, 27.89% (BBS-2001) inhabitants of the Paurashava use sanitary latrine.

From the overall survey findings, it has been revealed that the inhabitants of the Paurashava do not face any severe environmental problem. The problems that exist here can be mitigated through proper planning of the Paurashava.

The urban environment of Akkelpur Paurashava includes both built and natural environment. Urbanization has increased some hazards on natural environment. Where the built environment overburdens the natural environment urban development cannot be sustainable. The urbanization is vital for country's economic growth. Urban centers concentrate services, infrastructure, labor, knowledge, entrepreneurship and markets. Cities and towns are key generators of economic activities. The urban economies are critically important in national economic growth and of development goal. Urbanization is unavoidable. So in every phase of planning processes, all these environmental issues shall be evaluated and proper measure shall 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 etc. The town of Akkelpur is no different from other towns of Bangladesh, but as disasters are concerned it is moderately vulnerable to at least one disaster and it isflood, Some areas of the Paurashava are subject to water logging. Some part of ward 4 & 5 and Akkelpur Bazaar area experience little drainage problem. Akkelpur Paurashava is not normally affected by flood from the adjacent rivers. But the Paurashava is almost regularly affected by the storm water during monsoon period due to the inability of the existing drainage system to cope up with the situation. The existing drains cannot discharge the huge volume of storm water efficiently to the defined out falls. Because of prevailing such situation, local flooding occurs in many places of the Paurashava.

3.6 Institutional Capacity

The implementation of the Master Plan will require strengthening of the capacity of the Paurashava Authority. Although the capacity building is going in different ways by the government, the institutional capacity building for implementing the Master Plan of the Paurashava has not yet been seriously considered. This will be an important task for the government to restructure the organogram and include the required technical staff with appropriate job description for addressing the issues of implementing the Master Plan.

Existing Manpower

According to Paurashava manual, there should have been 78 officials and staff engaged in a "C" class Paurashava to manage the engineering, administrative, health, family planning, and conservancy works within the Paurashava area. In the organogram, Mayor is the head of the institution. Chief Executive Officer coordinates the three major divisions. These divisions are Engineering (headed by Assistant Engineer), Administrative (headed by Secretary), and Conservancy, Health and Family Planning (headed by Health Officer). In this organogram, both full time and contractual officials are included.

Existing manpower scenario of Akkelpur Paurashava is not so good. There is acute shortage of manpower in each section of the Paurashava. The important posts lying vacant are the Posts of Executive Engineer, Chief Executive Officer and the Town Planner; though in the "C' class Paurashava there is no options for the post of Town planner. Though a standard 'C' class Paurashava comprises of 8 personnel in Engineering Department, but Akkelpur Paurashava has not sufficient personnel in Engineering Department.

Paurashava Town Planning and Implementation Capacity of Master Plan

At present, the Paurashava has no town planning section or any appropriate manpower, especially Town planner to prepare or implement town plan. The existing capacity of the Paurashava is seriously inadequate to implement the Paurashava Master Plan. The Paurashava must strengthen its capacity to implement its Master Plan, when it is completed by employing requisite manpower.

Conservancy and Health Services

Conservancy service of Akkelpur Paurashava is also very poor. Paurashava has no fixed waste dumping land. The waste collection and dumping is operated in traditional way. Conservancy department of the Paurashava is not established yet. Staffs are recruited on contract basis to convey the work of conservancy service. There is no community based organization (CBO) for introducing house to house waste collection system in the Paurashava.

There is an Upazila Health Complex and clinic exists in the Paurashava area. People are supposed to go Akkelpur Upazila Health Complex for treatment.

Logistic Support/Equipment

According to the Paurashava manual, a "C" class Paurashava should get logistic support/equipment to continue the work properly. This includes one road roller (5-7 ton),one trucks/tractors, two motor cycles, two bicycles (according to the needs of the Paurashava), one mixture machine, one type writer machine, one photocopier machine and one duplicating machine.Akkelpur Paurashava got almost all of these logistic supports from the government,

except the jeep and truck/tractor. Additionally, they have one Computer and printer for official support.

3.7 Urban Growth Area

In the project area, urban development is taking place along both sides of the Joypurhat-Santhahar road from west to east. Development pressure is high at the surrounding areas of bazaar morr. This road is experiencing rapid change with development of residential settings.

The future growth potential of Akkelpur Paurashava is high. Recent trend in population increase indicates that high population density will not be a big problem in this Paurashava. However, it is obvious, and more likely that the growth of this Paurashava will follow natural increase and a little migration in population.

Analyzing the existing structure of the Paurashava and other growth factors it is expected that the future growth direction will occur in North direction, along Akkelpur-Joypurhat Road. Several factors will lead such future growth direction.

In the west direction, along the main road the area have more urban characteristics with more urban facilities compared to south part of the Paurashava, Middle part is more developed and have more urban and civic facilities compared to other part. In the Middle part of the Paurashava there exists Upazila Headquarter; and other urban areas, which is much More developed that the existing Paurashava.

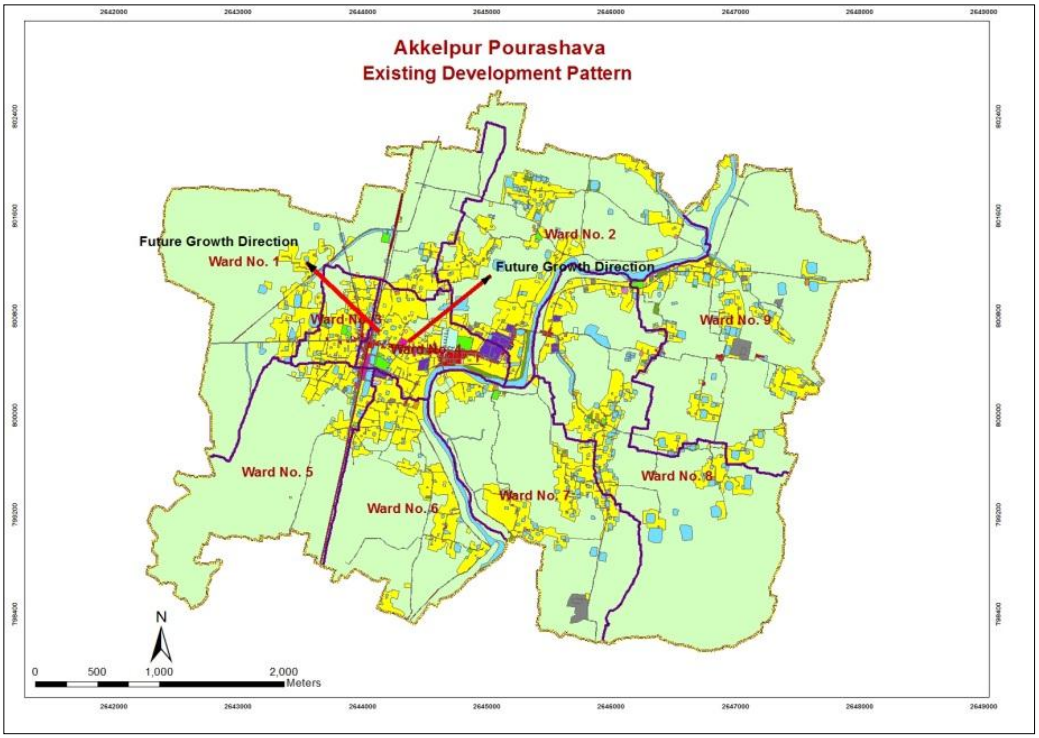


Fig 3-2: Future Growth Direction oif Akkelpur Paurashava

3.8 Catchments Area

It is widely recognized that there is a strong interdependence of social, economic and environmental development between rural and urban areas. The cities and towns play an important role in rural development as markets for their goods and products, and also as the sites for food processing and other agricultural related activities, and as source of non-farm income, especially from wage labour. On the other hand, urban areas rely on rural areas for food production, labour, and raw materials for manufacturing and markets for their products. This linkage is stronger in samll town like the Paurashavas, primarily due to their proximity to the surrounding rural hinterland. People of the catchment areas can access public service offices and hospitals in the towns with less difficulty than offices in cities, while schools and other facilities serve a large number of the catchment area population, contributing significantly to rural development.

The adjacent Santhahar and Joypurhat Upazilas have some influence over Akkelpur Paurashava. The favorable location has benefits Akkelpur in two ways: it allows people to come to Akkelpur to purchase goods and services, and it allows Akkelpur businesses, including wholesale businesses, to deliver goods and services to places outside the town. The Akkelpur Upazila HQ's provides govt. services for neighboring communities of the entire Upazila including the Paurashava area. The entire Upazila for given services by the Paurashava are the catchment area of Akkelpur Paurashava.

Transport and communication connectivity is an important factor for economic development of an area. Though Akkelpur is located at the far corner of Joypurhat and north corner of Bangladesh, it has a good road communication network with Joypurhat and nearby Upazila towns. The regional transportation network is shown in **Map 3-1**.

3.9 Land Use and Urban Services

The general land uses of the project area are shown in Table 11.1 in Chapter 11. In the land use pattern of the Paurashava, 16 types of land uses are found. It is clearly evident from the table that agricultural land use (almost 73.94%) dominates the Paurashava area, followed by residential (16.88%), water bodies (More than 4.75%), road network and transport and communication (only 1.74%), and government services and educational land use occupy 0.27 & 0.36 percentage of land. Akkelpur Paurashava has experienced major development along the river Tulshiganga.

Settlements are found particularly in the areas of higher elevation following linear pattern along side the roads and More specifically around the central bazar. The trend of settlement growth is greater in areas close to the main road. The core part of the Paurashava is the most built up part of the planning area. Apart from core area, in most of the other areas, residential developments have taken place as dispersed settlements on high lands. Dispersed settlements make provision of services difficult.

3.10 Paurashava Functional Linkage with the Regional and National Network

Any development initiative at the local level must relate to the national level plans in order to achieve cohesion and integrity with overall development of the country to attain the national development objectives.

The present system of national level planning hardly links the local level plans. The present system of allocation of resources in national development budget is a top down approach, which is highly influenced by political objectives. As a result, urban sector is not yet considered a priority sector and due to resource constraint, many problems of the Paurashavas remain unresolved. Therefore, it is important to establish a linkage between the local plans and the national development plan so that aspirations of the people can be realized. National development plans are prepared considering the overall needs and aspirations of the country with respect to different sectors of development.

This necessitates for a bottom up approach of development planning and the budget allocation should be made according to the choice of the local governments who are accountable to the Paurashava people directly. Budget should be allocated according to the priority list of the projects prepared by the Paurashava that is supposed to reflect the needs of the Paurashava people as the list can be prepared by the counselors and the Mayor who are directly elected by the people.

The aim of the Structure Plan is to prepare a development plan for Akkelpur Paurashava with full participation of its stakeholders. In the process of planning, a large number of development projects have been identified in different sectors. Implementation of development projects will improve infrastructure and services and will create an environment for utilization of local resources. This will attract more investment in the locality to generate new employment. New employment will generate income for the poor people and shall improve the poverty situation, which is the main objective of PRSP. New jobs will also be created during implementation of various development projects of the Paurashava prepared under the master plan. New and improved road infrastructure will increase mobility vis-a-vis economic activities of the Paurashava that will help to address the problems of unemployment.

The current program of Paurashava Planning helps to address urban poverty through adequate steps taken up to accelerate urban infrastructure development based on the Akkelpur Paurashava plan. The new developments will induce new investments in trade and industry and lead to generation of more employment in the service, construction, transport and informal sectors. This will directly assist in reducing poverty. It will help absorb additional work force of rural areas as a result of natural growth of population. Agricultural sector has limitations in absorbing labor force.

Map 3-1: Communication Network of Joypurhat Region showing Connectivity with Akkelpur Paurashava

3.11 Role of Agencies for Different Sectoral Activities

The successful implementation of Structure Plan depends upon the efficiency of the stakeholders and the degree of integration and coordination among them. Structure Plan of a town involves a complex affair having numerous stakeholders influencing the decision making process of development.

Care has been taken for all programmes and projects to be developed in a sound manner technically, socially, environmentally and institutionally with full participation of local communities. Due care has been taken so that there have no significant adverse internal or external environmental impacts. Sustainable urban development based on a continuous dialogue between the actors involved in urban development is needed to improve the urban environment. It is expected that after the completion and implementation of the Master Plan and as well as the mentioned projects and programmes of other organizations in Akkelpur, this small town will develop with its full potential.

Development Schemes Implemented by the GOs

The recent infrastructure development schemes implemented by the Government includes roads, road lights etc.

Akkelpur is an agriculture-based urban area and Upazila Agriculture Office has a significant influence on its agricultural sector. Central Government use subsidy for the betterment of the farmers. Local office distributes fertilizer to the poor farmers with 20 kg per head through the Paurashava. Some times, the agriculture office distributes 10 kg per head to balance between demand and allocation of fertilizer. Besides, agriculture office also arranges training workshops for the farmers on modern techniques of cultivation that increase production.

Upazila Fisheries and Livestock Office distribute fish fry and fertilizers for fish and vaccination of poultry and other livestock to the people free of cost. They also arrange training session to train the people. Upazila Parisad some times takes initiatives for afforestation and distribution of saplings.

Upazila Health Complex only implements a few activities like vaccination, training on child and mother health etc.

Electrification of Akkelpur is operated by Polli Biddutayan Board (Rural Electrification Board- REB) that has a Master Plan to avail 100% electrify in the whole Upazila including the Paurashava area. The Master Plan explains the basis of electrification to the residents and the commercial establishments on a priority.

DPHE recently conducted a survey in 14 villages among the 22 villages to know the arsenic contamination level of Akkelpur. It covers Paurashava and its surrounding areas. Local Government and Engineering Department (LGED) has upcoming project of construction of road, culverts and box culverts within the Paurashava.

Development Schemes Implemented by the NGOs

There is no mentionable infrastructure development project undertaken by the NGO's in the Paurashava. Several NGOs are working in Akkelpur to develop socio-economic condition and to

alleviate poverty of the local people providing infrastructure service and other facilities. Operationally important NGOs are Asroy, Human Right Organization, Bangladesh Warrior's Sanshad, BRAC and Social Work Centre.

Development Schemes Implemented by Private Sector

There are a few development works that have been implemented by private sector. Some commercial activities and private schools have been developed by private initiative.

Chapter 4: Critical Issues for Planning

Deficiency in infrastructure and services is one of the major critical problems of the Paurashavas in Bangladesh, and Akkelpur is no exception. The reasons for such deficiency may vary, but are mostly linked with the institutional capacity and resource potential of the Paurashavas. The institutional capacity of each similar category Paurashava in terms of manpower and other logistics at present can be same across the country, but their efficiency and performance in practice may vary for a variety of reasons.

Chapter 4 describes the critical issues for planning based on the existing conditions in respect of Socio-Economic and Demographic issues, Transport and Communication, Urban Utilities, Drainage and Environment, related other issues namely disaster, land use control, law and regulation etc. The weaknesses in the present development processes are also taken into consideration to identify the critical issues for planning at Akkelpur Paurashava.

4.1 Socio-Economic and Demographic Issues

Most of the Paurashavas in Bangladesh are basically urban centers with direct links to rural areas. There are significant differences in the standard of socio-economic well being and demographic characteristics of these small towns with large cities in the country. Most of these Paurashava towns have small population, not enough to sustain economic growth to render services and facilities for quality of life needed in an urban environment. As a result, qualities in socio-cultural and demographic matters suffer from inadequacies in their requirements of facilities and services of various kinds. Since Akkelpur Paurashava has all such problems and shortcomings, in the preparation of various components of the Master Plan, this aspect of reality in development has to be addressed for sustainable solutions.

4.2 Transportation and Communication

Transportation and communication network plays very important role in the growth pattern of both urban and rural settlements and their socio-economic and environmental development. Houses and other establishments always prefer road side lands to have easy access to different places and functions. The transportation and communication network at Akkelpur Paurashava is not yet planned and developed to serve a town. The Paurashava has a very low traffic volume to sustain high cost of development in this sector, particularly in areas of low population density and scattered settlements. However, without planning a transport network for the Paurashava area as a whole, a standard transport network and an efficient traffic management system for the future cannot be ensured. The nature of problems and deficiencies are identified below.

a. Unplanned and Narrow Road

Roads in the town are being developed without using any planning standard and network plan. As a result, narrow roads with tortuous pattern are common. Narrow roads and poor maintenance of roads are major problems for traffic movement in some parts of the Paurashava. New houses and other structures are cropping up along these sub-standard narrow roads. This is likely to poise traffic movement problems in the future, when development becomes more intense and density of

population increases. The existing narrow roads require widening and improvements of pavement. Some road segments within the Paurashava are built in an unplanned manner. These segments will require improvement as per future traffic volume and required space for turning lane in the intersections.

b. Traffic Congestion

A very level of vehicular traffic in the streets of the town at present does not pose a threat for congestion in the near future. However, occasional congestions are found to arise from non-motorized traffic at selected locations, where public assembly is profound, especially Akkelpur Bazar area. At present such congestions happen due to poor designing of the intersections. The slow moving rickshaws, on street parking and on street loading-unloading of goods are found to be the major sources of traffic congestion.

Manually operated rickshaw is a cozy and cheap traffic mode that can take passengers to their door steps. It is, therefore, a very popular mode that requires special planning attention in the design of transportation network and individual roads. Walking and cycling is encouraged in contemporary town planning practices to create healthy environment for all. Pedestrian safety should be an important element in the design of roads and other related infrastructure. These aspects require special attention in the Master Plan of Akkelpur Paurashava.

Reason for Congestion

- Lack of management is the prime reason for traffic congestion. There is a common tendency among the rickshaw pullers to disobey rules. They roam about the busy areas in search of passengers and park rickshaws at critical points leading to congestion.
- There is no proper and adequate space for parking auto-rickshaws and tempos. They are parked on the road. On road waiting for trips by these vehicles is also a source of congestion.
- Local buses often take passengers from wherever they find. In the same way, they disembark passengers according to their desires. These practices hamper smooth traffic movement.

c. Bus, Truck, and Tempo Terminal/Stand

Akkelpur has no formal bus and truck terminals and designated parking space for tempos and slow moving vehicles, such as rickshaws, van or cart. It has few bus stoppages along the main road. For the planned development of township in the future, these facilities are to be provided at suitable locations.

Map 4-1: Existing Road Network Map of Akkelpur Paurashava

4.3 Urban Utilities

A key issue related to the sustainable development of planning area providing a minimum quality and standard of living, pertains to the availability of accessibility to basic infrastructure facilities, viz. water, power, sewerage, drainage and solid waste management. The present state of infrastructure problems in the Paurashava may become a cause of crisis. At present, state of telecommunications and power scenario in Akkelpur Paurashava is not so good. There is no water and gas supply system in this Paurashava. Thus critical need of advance action and arrangement is required for adequate provision of physical infrastructure.

4.4 Drainage and Environment

Majority of the population at Akkelpur Paurashava is deprived of drainage facility. Uncollected waste is washed out into the roadside drains and natural canals. Blockage of drains by solid waste reduces the carrying capacity of drains and natural canals and become a source of pollution. Paurashava has very limited resources to clean the drains. It has been observed that in some areas, domestic sewage conveys directly to the water channels. Water logging is a problem at some parts of Akkelpur Paurashava, causing water logging for 5-7 days each time a heavy rainfall occurs between June and November every year.

The sources of surface water pollution are domestic waste, unhealthy sanitation and extensive use of fertilizer in the agriculture. Condition of solid waste management at Akkelpur Paurashava is very poor. There are 30 permanent but no temporary dustbins found in this Paurashava. One truck and two push carts are used to collect solid waste. Hospital waste is dumped to their own dustbin. Garbage of kitchen markets is dumped to nearby dustbins. The present conditions demand substantial improvement to ensure desirable environment.

4.5 Related Other Issues

Akkelpur Paurashava is located under Joypurhat District. The Akkelpur Paurashava is important in the national context for some reasons. It is well connected by road via Joypurhat Divisional headquarter. The Tulshiganga River is of hydrographical importance of the area. Many agricultural Products produced in this area are exported throughout the country.

4.6 Disaster Issues

Akkelpur is not located in highly disaster prone area. Floods sometimes overflow from the river and it creates some problem in locality.

4.7 Land Use Control

A Land Use Plan of the town was prepared in 1987 by Urban Development Directorate (UDD), but it was never brought into practice due to lack of regulatory measure for implementation. Instead, discretionary decisions are used in case of land use decisions. The Land Use Plan at that time was prepared for the Upazila Headquarters by UDD, but remained under the administrative control of the Ministry of LGRD & C. So conflict and lack of legal basis in implementation prevailed. In the present context of socio-economic demand and land use dynamics in the country, development of a Paurashava without a Master Plan cannot be imagined. The preparation of Master Plan is mandatory as per Local Government (Paurashava) Act, 2009.

4.8 Laws and Regulations

Absence of adequate planning and development control is a problem in all urban areas of Bangladesh and Akkelpur is no exception. A number of legislative measures are there to help the administration of urban area, urban development and management. But all of these planning laws cannot be readily enforced and many of them are not adequate in regulating planned development. Due to lack of proper implementation and enforcement, many important laws are mostly not applied by the urban local governments. As a result, weakness in the implementation of planned development in the Paurashava remains to be a critical problem and has to be addressed.

A substantial portion of national resource is invested in building construction in both public and private sectors. In order to ensure optimum return of this investment and to achieve satisfactory performance of the buildings in terms of safety, serviceability, health, sanitation and general welfare of the people, building construction needs to be controlled and regulated. Legislative measure for such control has been provided in the Building Construction Act, 1952 and from time to time, regulations have been promulgated by the government under the Section 18 of this Act. As per law, it is mandatory to get any structure approved from appropriate authority before construction. Permission for building construction in the Paurashava is administered by this authority within its jurisdiction. However, as elsewhere in the country, noncompliance to these rules is also observed here.

a. Weak Local Government

Though Paurashava is a democratically elected urban local government, its authority is limited to work as a local government. In most cases, prior government permission is required before taking any legal action against unscrupulous acts. Section- 66, Section-69 (1) and (2), Section- 72 (4), Section-32 (2) of the Local Government (Paurashava) Act, 2009 are few examples. This is one of the reasons that there has been a little progress in decentralization of governance at local level in Bangladesh.

b. Lack of Fund

Local bodies in this country are in constant shortage of funds as is the case in Akkelpur. The sources of the Paurashavas income are generally taxes, rates, fees and charges levied by it, and rents and profits accruing from individuals and institutions. The government grants, profits from investments, receipts accruing from the trusts placed with it, loans raised by it and proceeds from other services are the other sources of income for the Paurashava.

The lack of efficient manpower, poor assessment system, and weak legal enforcement for practicing an efficient revenue generation and collection system are the main reasons for the current weakness in the financial management. It is widely accepted that there are also corrupt practices in our public institutions in delivering services, which require to be addressed through institutional and legal reforms.

c. Public Participation in Plan Making Process

The planning and development Acts of earlier times had contained a little scope for the authorities concerned to seek public opinion on their city/town plans prepared before they are sent to the government for final approval. Not having any scope for public participation is against the democratic norms of an elected urban local government like the Paurashava Authority. The

authority must involve people by law in the planning and development process, and hear their views, needs and grievances to mitigate problems. This vital aspect should be incorporated in a stronger manner in the law through revision.

d. Coordination of Activities of Public Sector Development Agencies

There are a large number of public sector development agencies working in the town and surrounding areas, but there is lack of coordination among activities of these development agencies. Absence of coordination results wastage of resources and often brings misery to the people. This is commonly evident in our urban development works, for example, as one agency digs the streets for telecommunication network and repairs the streets, another agency starts digging for sewerage ducts. Effective coordination by law in this case is necessary for an integrated approach in development saving time and resources. There should be legal provisions for such coordination by the Paurashava Authority to ensure accountability of the agencies working for their respective jobs in the Paurashava area.

e. New Rules for Practicing Planning Standards

At present, there is no standard for infrastructure, services and facilities provided by the public sector. There is need to formulate standard rules for services and facilities and get incorporated in the Local Government (Paurashava) Act to secure public interests. A standard has been set in the UTIDP for future land use proposals in the Master Plan of the Paurashava.

f. Betterment fee

Due to failure of execution of the powers of charging betterment fee, all the benefits of land value enhancement due to Paurashava development of infrastructure go to the adjacent landowners or the persons having interest therein. A proper execution of betterment fees will help increase in revenue earning of the Paurashava.

g. Penalty for Violation of Plan Provisions

The penalty for violation of plan provisions provided in Local Government (Paurashava) Act, 2009 is only Tk. 5000/- and for delay Tk.50/day, if violation continues further after notification. This is an extremely low rate of penalty, which should be revised for a substantial increase to prevent any violation effectively. The penalty provision should be more stringent to ensure enforcement of plan provisions.

4.9 Existing Problems and Weaknesses in the Development

The two major problems that currently exist in Akkelpur Paurashava include the following:

a) The Paurashava town has a weak economic and revenue base that does not support improvement in the socio-economic well being of the people. The Paurashava authority for lack of resources, fails to make required investments in the development of physical infrastructure to improve the quality of life of the people living in the town.

b) The Paurashava has also no definite plan for the development of various physical infrastructures in a planned manner. With lack of resources, it also lacks in professionally skilled manpower to carry out development in a planned way.

Thus for making this Paurashava a viable urban center, attention should be paid toward cost-effective development of all of its required infrastructure in phases, with the help of professionally skilled manpower and utilizing the newly prepared Master Plan as an important tool for all sorts of development.

Chapter 5: Reviews of Policies, Laws and Regulations

5.1 Introduction

The urban planning and land use regulations are essential for municipal development. They impact on land market favorably or unfavorably and result in social benefits and costs depending on their nature and the specific contexts in which they are applied. Policies, regulations and processes that facilitate availability of land and its uses for planned development at affordable costs need to be continued and those lead to contrary results need too be eliminated or modified.

5.2 Review of Relevant National Policies

The various existing policies, regulations and laws of the country have direct and indirect effects on the preparation and implementation of Master Plans of the Paurashavas in the country. These are briefly reviewed in this chapter to examine their adherence with the Master Plans of the Paurashavas.

5.2.1 Directives of the Local Government (Paurashava) Act, 2009 for Preparing the Master Plan

The Paurashava Ordinances at different times since 1960's till the present time have iterated that a Paurashava as it gets established must prepare its Master Plan for planned development of the municipal town. So far, three ordinances have been made in the year 1967, 1977 and 2008, all suggesting for planned development. The Paurashava Ordinance 2008 was later modified and enacted as Local Government (Paurashava) Act, 2009 in the national Parliament on 6, October, 2009.

The 2009 Act made provision for having the Master Plan prepared by a Paurashava within five years of its inception. The Master Plan of a Paurashava town is aimed for ensuring planned development, and should include the following:

- Survey of history, detailed statistical information, public service activities and other mentioned subjects of the Paurashava;
- Development, extension and upgradation of any area within the Paurashava; and
- Control and regulation of development of any land, any building construction and renovation within the Paurashava.

Actions Suggested in the Act to Prepare Master Plan

The Local Government (Paurashava) Act, 2009 suggests for having qualified Town Planner in it's Organogram of Manpower to undertake the job of preparing the Master Plan of the Paurashava. Until such qualified Town Planner is not available in the Paurashava, the Paurashava may require a competent national government authority to prepare such plan for the Paurashava. The Act also makes it contingent to form a Town Planning Committee within the capacity of it's manpower to execute the Master Plan of the Paurashava Town.

Akkelpur Paurashava has no Town Planner and Town Planning Committee at the moment. This makes the Paurashava dependent on having the Master Plan currently being prepared by LGED.

5.2.2 National Land Use Policy 2001

To safeguard the use of its land resources, particularly the valuable agricultural land of the country, the government in 2001 declared the National Land Use Policy. The policy proposed for the preparation of national land use plan, which is very much relevant to the current plan of the Paurashava.

The land use plan is to be based on the criteria of land productivity, land capability and land suitability, use and requirement of land by agriculture, forestry, industrialization, urbanization and housing. Following are the key issues of the national land use plan:

- Execution of coordinated land conservation programs aimed at prevention of desertification and weathering of land, conservation of land fertility, development and conservation of land.
- Prevention of destroying the landscape by earth cutting, excavation and removal of land.
- Formulation and effective execution of Land Use Plan in order to ensure planned use of land.
- Payment of compensation to those who will be affected by land weathering and land acquisition by the government.
- Monitoring, survey and research on desertification, land reclamation, prevention of weathering of land, conservation and development of land and watershed areas.

The policy emphasizes on the planned and the best use of land, and stressed on the most intensive use of this scarce resources of the country. The policy aims to introduce 'land use zoning' based on particular characteristics of land, prevent unplanned expansion of residential areas and control of indiscriminate growth of industrial and commercial activities. In absence of execution, the situation in land use and land management is severely being deteriorated.

5.2.3 National Housing Policy, 1993

The Government of Bangladesh formulated the first ever housing policy of the country in 1993. The priority of the government is to create affordable housing, which might be possible through controlling unplanned and haphazard housing area development. The policy is committed to encourage private developers in land and infrastructure development, and house construction. The policy also made commitment to provide government assistance on participatory housing infrastructure development involving the community, NGOs, CBOs, private developers and social welfare organizations.

The policy declares that in housing activities, the government will continue to remain as a facilitator in housing sector. The government intends to provide housing only to the poor and the rootless classes of the society. The policy makes commitments to encourage private organizations, NGOs and CBOs in housing development, income generation and environmental improvement under local planning. The preparation of Master Plan of the Paurashavas is, therefore, a step forward to address the various development issues including housing for mass people at local level.

5.2.4 Population Policy 2004

Prepared in 2004, the Population Policy of Bangladesh responds to the critical need to deal with the complex national population problem in a holistic way. It aims to build national consensus and synergy among institutions: public, private, civil society and NGOs about the problem.

The objectives of the National Population Policy are to improve the living standard of the people through making a desirable balance between population and development. The Policy proposals can broadly be divided into four sectors, human resources development, decentralization of population activities, participation of NGOs and private sector in population planning. The population policy aims to create a large skilled workforce, emphasizing on education and training strategies.

The policy calls for decentralization of population activities and ensure people's participation through decentralization of services and devolution of power to the local levels. The policy aims to prepare Action Plan through participation of local elites, opinion makers, representatives of poorer section of the society along with the local level government officials. With a view to give a holistic approach, the population policy calls for making the NGOs and private sector as important partners in population activities at various levels.

5.2.5 Transportation Policy 2004

Prepared in 2004, following are the policy objectives of Transport Policy:

- To provide a safe and dependable transport service for all.
- Removal of unnecessary control and formulation of laws and regulations conducive to providing services.
- Fare control and reduction of transport cost of goods for export.
- Determining the roles of the Government sector and the private sector.
- To maintain an economic and environmental balance.
- To ensure maximum utilization of Government funds.
- Expansion of the role of transport in the ever increasing economic activities.
- Growth of traffic commensurate with economic development.
- Introduction of an integrated transport system and provision of alternate transport systems.

The aim is to encourage greater private sector participation with national ownership of road and rail infrastructure. Lease of infrastructure may be allowed on long term basis. The Government is interested to establish a user role within its transport planning process. The Government intends to make arrangements to realize the cost of transport operation and road maintenance from road users through new fiscal policies and protect public interests. The Government will regulate tariffs for passenger and goods both in road and rail transport.

5.2.6 National Environment Policy 1992

Government declared an environmental policy in 1992 with a view to safeguard the national environment. The main objectives of the policy are:

- To promote natural balance and overall development by means of conservation and development of environment.
- To save the country from natural disaster.
- To identify and control all sources of pollution and degradation.
- To ensure environment friendly development in all sectors.
- To ensure sustainable, long term and environment friendly use of all national resources.
- To get involved with all international initiatives on environmental issues.

The comprehensive environmental policy covers as many as 15 sectors of development namely, agriculture, industry, health and health promotion, energy, water resources, flood control and irrigation, land, forest, wild life and biodiversity, fish and animal resources, food, coastal and maritime environment, transport and communication, housing and urbanization, population, education and public awareness, science, technology and research, legal framework, institutional structure. The consultant highlights only those sectors that have relevance to urban development and planning.

Industrial Sector

The following environmental measures are important:

- Potential polluting industries must incorporate control measures in its set up.
- All industries must conduct EIA and take pollution control measures.
- All industries in residential areas to be gradually shifted and new locations to be
- Identified for planned industrial development.
- The industries producing pollutants should have their own system of pollution monitoring.
- Recycling of waste in order to reduce the volume of waste.
- Safeguard health of industrial workers.

Health Sector

The following environmental issues are important:

- Supply of safe drinking water in the Paurashava area and introduction of low cost healthy sanitation system.
- Control of pollution in all kinds of water bodies by municipal, industrial and toxic materials.
- Ban on carrying waste during day time and in open garbage trucks.
- Steps to be taken to protect public health and environment from all activities harmful for human health.
- Inclusion of environment in the academic syllabi.

Energy Sector

The following are some relevant policies:

- Large scale for introduction of improved cooker and wide dissemination of the technology to conserve energy and save environment.
- Promotion of biogas, solar energy, mini hydro electric unit and wind mill as sources of energy.

- Take up measures to reduce the amount of harmful elements in fuel including, sulfur in diesel and lead in petrol.
- Care has to be taken so that use and transformation of primary and commercial energy does not create any adverse impact on the environmental balance.
- Appropriate measures have to be taken during extraction and distribution of different natural resources like, oil, gas coal, peat so that they do not create any adverse impact on air, water, land, hydrological balance and the eco-system.
- Care has to be taken during giving fitness certificate to vehicles that emit black smoke. Mobile courts will have to be arranged to enforce the relevant legal provisions.

Transport and Communication Sector

The important aspects are:

- Care to be taken to make the road infrastructure development congenial to environment and the development of roads does not impede drainage of water.
- Appropriate measure to be taken so that the passengers and the transport do not endanger public health by indiscriminate throwing of solid waste and defecation.
- The rail, road and water transport must adopt measures to control emission of excessive black smoke.
- Creation of public awareness about the effect of pollution of river water.
- Control on water pollution to be ensured in inland river ports and dockyards.
- Encourage railway rolling stocks that generate less pollution.
- Forestation on both sides of railways and roads.

Population Sector

The important aspects are:

- Conduct study on the impact of population growth on environment and take appropriate measures to mitigate the problems of population growth.
- Prepare manpower utilization plan to make planned and effective use of human resources congenial to environment.
- Emphasize participation of women in environment conservation.
- Appropriate measures are needed to safeguard health of the poor and save them from the adverse effects of environmental degradation.

5.2.7 Industrial Policy 2005

The key aspects of the Industrial Policy 2005 are to:

- set up planned industries considering the real domestic demand, prospect of exporting goods abroad, and discouraging unplanned industries in the light of the past experience.
- accept private initiatives as the main driving force of economic development and uphold the government's facilitating role in creating a favourable atmosphere for private investments.
- take necessary initiatives to establish industries on state initiative in those sectors that are considered very important and essential, where private entrepreneurs are not forthcoming.

- cater to the needs of consumer satisfaction of the local products; measures to be undertaken to: produce quality products, diversify goods, and provide support for enhancing productivity using appropriate and advanced technology.
- provide inspiration for the speedy expansion of cottage industries and SMEs, and for further investment in these sectors so that new employment opportunities are generated, unemployment reduced and poverty alleviation programs made available.
- prioritize the expansion and development of agro-based and agricultural processing industries, and assist in the expansion of poultry, dairy and goat-sheep industry as agricultural industries.
- provide women entrepreneurs with all necessary assistance in establishing industries in various sectors.
- provide all necessary assistance for producing environment-friendly product with the objective to creating a pollution-free environment in the industrial sector.
- Enrich the industrial sector with the proper utilization of various natural and mineral resources.

5.2.8 National Tourism Policy 1992 and 2010

Recognizing the contribution of tourism to the socio-economic development of the country, the government framed the National Tourism Policy in 1992. The government in a gazette notification in May 2010 declared that the government may declare any potential site as a tourist area and if declared so, any development within the area will require formal permission from the government. The attractions of tourism can be varied, and the major policy thrusts for the sector are:

- To create interest in tourism among the people
- To preserve, protect, develop and maintain tourism resources
- To take steps for poverty-alleviation through creating employment
- To build a positive image of the area concerned
- To identify sectors for private capital investment
- To arrange entertainment and recreation
- To strengthen solidarity and integrity among the peoples

5.2.9 Agriculture Policy 1999

Agriculture Policy of Bangladesh was framed in 1999. A new policy is currently under preparation. The following are the important considerations in the 1999 Agriculture Policy.

The major issues dealt within the policy are, seed, fertilizer, irrigation, pest management, agricultural research, extension services, marketing of agro-products, land use, education and training, environment and agriculture, women and agriculture, coordination of various agencies engaged in agricultural development. Most of these issues are not relevant to the current Master Plan. The only relevant issue is the land use. So, review has been carried out on the land use only.

The Policy stresses on all possible steps to ensure optimum use of land. Its use has to be compatible with the overall goals of socio-economic services and utility provisions. The policy targeted to take the following steps to ensure planned utilization of land:

- Land zoning programme will be taken up by the Soil Resources Development Institute (SRDI) on a priority basis. Integrated approach of SRDI will be further strengthened for this purpose.
- To ensure maximum utilization of land, bottom up planning through people's participation will be started from the mouza or village level.
- Measures can be taken to stop fertile agricultural land being used for non-agricultural purposes, such as private construction, house building, brickfield, etc.
- Acquisition of land in excess of requirement for non-agricultural purposes will be discouraged.

About one percent of agricultural lands are being converted into non-agricultural use every year. In a country of constantly growing population, withdrawal of land from agriculture will affect food production. So it is necessary to safeguard farm land from conversion. But this vital issue has been partially addressed in the policy. It states only about fertile land and not agricultural in general.

Government has not framed any effective mechanism to discourage acquisition of land in access of requirement for non-agricultural purpose. To protect agricultural land, immediate steps are necessary to delineate agricultural lands. This issue has not been covered in the policy. It has been found that large areas of agricultural lands are unnecessarily being included within Paurashava. Sometimes, it is about 70% of the total Paurashava area.

5.2.10 Urban Forest Policy 1994

Representing an amendment of the forest policy of 1979, current national forest policy was enacted in 1994 and officially announced on 31st May 1995. The policy was formulated to initiate a 20-year Forestry Master Plan (FMP). The plan provides a framework for optimizing the forestry sector's ability to stabilize environmental conditions and assist economic and social development. Three imperatives were identified: sustainability, efficiency and people's participation. Important objectives are:

- To afforest about 20% of the total area of the country by initiating various a forestation programmes in forest lands, fallow lands, lands not useful for agriculture, hinter lands and other possible areas to meet the basic needs of the present and future generations and to ensure greater contribution of the forestry sector to economic development;
- To enrich biodiversity in the existing degraded forests by conserving the remaining natural habitats of birds and animals.
- To strengthen agriculture by extending assistance to those sectors related with forest development, especially by conserving land and water resources
- To provide for and implement a forestation programmes on both public and private lands.

The policy statements which are most relevant to local participatory forestry are as follows:

- tree growing by communities, local groups or individual families on roadsides, windbreaks, canal/river banks and other public or marginal lands will be promoted through NGOs and relevant state agencies;
- Buffer zones attached to protected areas may be allocated for tree farming and agro-forestry on a long term lease basis;

- The State will provide technical assistance and financial support to promote all forms of homestead forestry;
- Cottage and small scale labor intensive industries, which contribute to the local economy and process wood and other forest based raw materials, will be promoted;
- The traditional rights of people living within and adjacent to designated forest areas will be maintained and their forest-related cultural values and religious beliefs will be respected.

5.2.11 National Plan for Disaster Management, 2008-15

National Plan for Disaster Management 2008-2015 is an outcome of the national and international commitments of the Government of Bangladesh (GoB) for addressing the disaster risks comprehensively. The plan is developed to reduce the vulnerability of the poor to the effects of natural, environmental and human induced hazards to a manageable and acceptable humanitarian level. The objectives of this Plan are to:

- Align the strategic direction of disaster management programs with national priorities and international commitments.
- Articulate the vision and goals for disaster management
- Outline the strategic direction and priorities to guide the design and implementation of disaster management policies and programs.
- Create a cohesive and well-coordinated programming framework incorporating government, non-government and private sector.
- Ensure that disaster management has a comprehensive and all-hazards focus comprising disaster risk reduction and emergency response.
- Illustrate to other ministries, NGOs, civil society and the private sector how their work can contribute to the achievements of the strategic goals and government vision on disaster management.

A holistic approach for disaster management has been emphasized to work together with all the stakeholders and build strategic, scientific and implementation partnerships with all the relevant government departments and agencies, other key non-government players including NGOs, academic and technical institutions, the private sector and the donors. The role of Government is mainly to ensure risk reduction and comprehensive disaster management.

5.2.12 National Plan of Action for Person's with Disabilities (PWDs) as well as Autism, 1995

In line with the Government policy the Department of Social Services under the Ministry of Social Welfare has an enthusiastic vision & mission to address the social issues relating to Person's with Disabilities (PWDs) as well as Autism. The National policy for the persons with disability, 1995 calls for social protection and ensured the rights of the vulnerable groups. In the recent time, dynamic and sustainable steps have been taken for the PWDs. The steps are:

- To establish separate ticket counters in railway station, bus terminals, river ports, steamer terminal, airport and airways office to facilitate easy availability of tickets for the PWDs.
- To maintain reserve seats in the bus, train and water transports for PWDs.

- To fill up 10 percent reserved quota for employment in government jobs by orphans and PWDs.
- To construct a ramp in all the government offices to facilitate easy movement of the PWDs.
- To withdraw the existing restrictions regarding appointment of PWDs in the Govt. class I & class II jobs, and arrange micro-credit for PWDs by all the Nationalized Commercial Banks (NCBs).

5.2.13 Review of Relevant Laws and Regulations

5.2.13.1 The Act (36 of 2000) for Conservation of Play field, Open space, Park and Natural Water Reservoir in Mega City, Divisional Town, District Town and Paurashavas of Bangladesh

According to the section 5 of the Act, any land having such use as play field, park and natural reservoir can not be changed or can not be used for any other purpose(s). However, in absence of Paurashava Master Plan, the Act can not be properly applied. This emphasizes upon having Master Plan for each Paurashava.

In the existing provision of the Act, any person violating the Act may be liable to punishment up to 5 years of imprisonment or Tk. 50,000 fine or both. The Act makes a provision for appeal, however, and any land owner having any land with above mentioned use may apply to the appropriate authority to have permission to change the use. The authority shall convey the results of appeal within 60 days of the appeal.

5.2.13.2 Bangladesh National Building Code (BNBC) 1993

The Bangladesh National Building Code (BNBC) 1993 was formulated in 1993, but given legal status in 2008. The purpose of Bangladesh National Building Code (BNBC) is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings in order to safeguard within achievable limits, life, limb, health, property and public welfare. It aims to insure public safety, health, and general welfare in so far as they are affected by the construction, alteration, repair, removal, demolition, use or occupancy or buildings, structures of premises, through structural strength, stability, means of egress, safety from fire and other hazards, sanitation, light and ventilation. The BNBC suggests for conservation and restoration of historic buildings.

5.2.13.3 The Building Construction Act 1952

This Act was prepared in 1952 to prevent haphazard construction of buildings and excavation of tanks that are likely to interfere with the planning of certain areas in Bangladesh. The Act is usually exercised in areas under the urban local governments. The Act sets some conditions regarding construction of buildings in urban areas, where the Act will be in execution.

Preparation of Master Plan

The Act calls for preparation of a Master Plan of the urban area concerned before approval of building plan. The Master Plan shall show the future land use of the area through land use zoning. The buildings will be approved according to the land use provisions of the zoning plan. Having a Master Plan prepared, a Paurashava has the scope of exercising the following provisions/actions:

Building Construction Rules

The Act in its Section 18 keeps provision for preparation of Building Construction (BC) rules to ensure healthy and environment friendly building development. The last BC Rules were prepared in 1996. However, due to special characteristics of building development in Dhaka city a separate set of BC Rules was prepared for Dhaka City in 2008 under the same Act.

Power to Removal of Construction (Section 3B)

The Act gives special power to plan approval authority to remove any building that did not follow the specified rules of the Act or take action against any building owner who constructs building violating the rules after approval of the building plan.

Restriction on Cutting of Hills (Section 3C)

The Act forbids cutting of any hill without prior permission of appropriate authority.

Removal of Unauthorized Building (Section 7)

The Act empowers the authority to remove any building that has been built violating the BC rules. On failure to do so, the authority itself shall dismantle it and the entire cost shall be recovered from the owner as public demand.

Appeal

The Act, however, keeps provision for appeal, if the owner finds himself aggrieved due to any action by the authority.

Observation on the Building Construction Act

For appropriate execution of the Act, there is necessity of having Master Plan for a Paurashava. At the moment, there is serious lack of monitoring of disobedience of rules by the builders. Once the Master Plan is made for a Paurashava Town, the Paurashava Authority will be able to follow the rules properly.

5.3 Applicability of the Acts, Regulations and Policies in the Paurashava Master Plan

The key aspects of the policies presented in this Chapter have both direct and indirect relationships with the preparation of Master Plan of Paurashava Town in general, and Akkelpur Paurashava in particular. The Local Government (Paurashava) Act, 2009, the Building Construction Act 1952, the BNBC, the Conservation Act 2000, Agriculture Policy etc. have serious stakes in the execution of Paurashava Master Plan. The other policies also have relevance in the preparation of Master Plan for an Urban Centre. As a result, the relevant aspects of the Acts, rules, and policies are mentioned in this chapter and are taken into consideration in the preparation of the Master Plan for the Paurashava. The key aspects that are most relevant with the preparation of Paurashava Master Plan are shown in **Table 5.1**.

Table 5-1: Important provisions of different Acts, Policies and Rules having relevance with the preparation of Paurashava Master Plan

Act/Ordinance, Policies, Rules	Relevance with Paurashava Master Plan
Local Government (Paurashava) Act, 2009	Makes provision for having a Master Plan of the Paurashava Town. Provides legal basis for the preparation and implementation of Paurashava Master Plan. Suggests on the content and structure, and other relevant issues, such as provision for qualified Town Planner in the Paurashava staff.
National Land Use Policy 2001	Formulation and effective execution of Land Use Plan in order to ensure planned use of land. Suggests for aforestation, conservation and development of land maintaining landscape.
National Housing Policy, 1993	To create affordable housing through controlling unplanned and haphazard housing area development. To encourage private developers in land and infrastructure development, and house construction. Participatory housing infrastructure development involving the community, NGOs, CBOs, private developers and social welfare organizations.
Population Policy 2004	To improve the living standard of the people through a desirable balance between population and development. The proposals are divided into four sectors - human resources development, decentralization of population activities, participation of NGOs and private sector. The policy aims to create a large skilled workforce providing education and training.
Transportation Policy 2004	To provide a safe and dependable transport service for all. Removal of unnecessary control and formulation of laws and regulations conducive to providing services, determining the role of public and private sectors, maintaining an economic and environmental balance, maximum utilization of Government funds and introduction of an integrated transport system and provision of alternate transport systems.
National Environment Policy 1992	To promote natural balance and overall development by means of conservation and development of environment, save an area from natural disaster, identify and control all sources of pollution and degradation, ensure environment friendly development in all sectors, ensure sustainable, long term and environment friendly use of all national resources, and get involved with international initiatives on environmental issues.
Industrial Policy 2005	To set up planned industries considering the real domestic and export demand discouraging unplanned industries, provide necessary assistance for producing environment-friendly products with the objective of creating a pollution-free environment, and enrich the industrial sector with the proper utilization of various natural and mineral resources. To prioritize the expansion and development of agro-based and agricultural processing industries, and assist in the expansion of poultry, dairy and goat-sheep industry as agricultural industries; and provide women entrepreneurs with all necessary assistance in establishing such industries.
National Tourism Policy 1992 and 2010	To create interest in tourism among the people, preserve, protect, develop and maintain tourism resources, take steps for poverty-alleviation through creating employment, build a positive image of the area concerned, arrange entertainment and recreation, identify sectors for private capital investment, and strengthen solidarity and integrity among the peoples.

Act/Ordinance, Policies, Rules	Relevance with Paurashava Master Plan
Agriculture Policy 1999	To strengthen land zoning program, ensure maximum utilization of land through bottom up planning and people's participation, stop fertile agricultural land being used for non-agricultural purposes, and discourage acquisition of land in excess of requirement for non-agricultural purposes.
Urban Forest Policy 1994	To afforest about 20% of the total area of the country by initiating various aforestation programs in forest lands, fallow lands, lands not useful for agriculture, hinter lands and other possible areas to meet the basic needs of the present and future generations and to ensure greater contribution of the forestry sector to economic development; enrich biodiversity in the existing degraded forests by conserving the remaining natural habitats of birds and animals; To strengthen agriculture by extending assistance to those sectors related with forest development, especially by conserving land and water resources; and implement aforestation programs on both public and private lands.
National Plan for Disaster Management, 2008-15	To align the strategic direction of disaster management programs with national priorities and international commitments, articulate the vision and goals for disaster management, outline the strategic directions and priorities to guide the design and implementation of disaster management policies and programs, create a cohesive and well-coordinated programming framework incorporating government, non-government and private sector, and ensure that disaster management has a comprehensive and all-hazards focus comprising disaster risk reduction and emergency response.
National Plan of Action for Person's With Disabilities (PWDs) as well as Autism, 1995	To establish separate ticket counters in railway station, bus terminals, river ports, steamer terminal, airport and airways office to facilitate easy availability of tickets for the PWDs, fill up 10 percent reserved quota for employment in government jobs by orphans and PWDs, construct a ramp in all the government offices to facilitate easy movement of the PWDs, and withdraw the existing restrictions regarding appointment of PWDs in the Goverment Class I & class II jobs.
The Act (36 of 2000) for Conservation of Play field, Open space, Park and Natural Water Reservoir in Mega City, Divisional Town, District Town and Paurashavas of Bangladesh	To protect the existing use of land such use as play field, park and natural reservoir, and ensure punishment for conversion of such lands by any person/authority without proper permission from the appropriate authority..
Bangladesh National Building Code (BNBC) 1993	To establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings in order to safeguard within achievable limits, life, limb, health, property and public welfare. It aims to insure public safety, health, and general welfare in so far as they are affected by the construction, alteration, repair, removal, demolition, use or occupancy or buildings, structures of premises, through structural strength, stability, means of egress, safety from fire and other hazards, sanitation, light and ventilation. The BNBC also suggests for conservation and restoration of historic buildings.

Act/Ordinance, Policies, Rules	Relevance with Paurashava Master Plan
The Building Construction Act 1952	The Act calls for preparation of a Master Plan of the urban area concerned before approval of building plan. The Master Plan shall show the future land use of the area through land use zoning. The buildings will be approved according to the land use provisions of the zoning plan. To ensure healthy and environment-friendly building development. To empower special power to remove any building that did not follow the specified rules of the Act. To take action against any building owner who constructs building violating the rules after approval of the building plan. To forbid cutting of any hill without prior permission of appropriate authority. To keep provision for appeal, if the owner finds himself aggrieved due to any action by the authority.

Chapter 6: Projection of Future Growth by 2031

The future growth projection is helpful to draw mechanisms for improving and guiding long-term development strategies, identifying existing problems and future demand and making possible suggestions, to formulate viable projects for urban development and increase management capabilities of the concerned authority.

6.1 Projection of Population

It is a difficult task to collect detailed information of population for a recently declared Paurashava in Bangladesh. Perhaps no single factor is more important for planning than the size and composition of a region's population and the way it changes in the future. Estimation of future population for a specific period of a particular area is one of the most difficult tasks in the planning process. For Bangladesh, population projection is a very difficult task as the required data are not available for the particular area of a Paurashava and same is the case for Akkelpur.

The population figures collected from secondary sources, especially for the Paurashava were very much ambiguous. So for the final projection, several discussions were made with experts and BBS officials. Following the annual growth rate for the study area available from the 2001 Population Census, the projection up to the year 2031 with five years interval has been made.

The data found from several sources is arranged in different formats according to their requirement and analysis. So, comparison of data between different sources is very difficult. As a result, projection with various sources of information on population shows variable results in the calculation. Migration information is not available in population census by BBS as it only considers the natural growth rate. But actual population projection requires both natural growth rate and migration rate. For this unavailability of migration rate, population projection becomes very difficult.

By the formula population in any requisite year can be projected using the following equation which is also known as Geometric Progression Method of the following formula.

$Pn = Po (1+R/100)n$---------- (i)

As projections are based on the assumption that the past trends will continue to operate in the future, population of current year (according to BBS, 2011) have been taken to estimate the future population. The existing population of Akkelpur Paurashava is 24227 in 2011 within an area of 4243.27 acres. According to 2001 Population Census, the population was 21683. With an annual growth rate of 1.115%, the forecasted population of Akkelpur Paurashava will be-

$Pn = Po (1+R/100) n$
$Pn = 24227 (1+1.115/100) 20$
$Pn = 30242$

The existing population of Akkelpur Paurashava is 24227 in 2011 within an area of 4243.27 acres. According to 2001 Population Census, the population was 21683. With an annual growth rate of 1.115%, the forecasted population of Akkelpur Paurashava will be 30242 in the year 2031. The gross density of the area will be 5 ppa (person per acre). Due to the maximum concentration

of residence in Ward no. 04, the density of population will also be higher (24ppa) in this area.**Table 6-1** shows ward wise population distribution of Akkelpur Paurashava based on growth rate.

Table 6-1: Population Projection with Density for Akkelpur Paurashava Up to 2031

Ward	Area (Acre)	Pop'01	PPA	Pop'11	PPA	Pop'16	PPA	Pop'21	PPA	Pop'26	PPA	Pop'31	PPA
1	671.87	1862	3	1708	3	1805	3	1908	3	2017	3	2132	3
2	549.25	3007	5	3830	7	4048	7	4279	8	4523	8	4781	9
3	82.19	1627	20	1773	22	1874	23	1981	24	2094	25	2213	27
4	159.19	2967	19	3796	24	4012	25	4241	27	4483	28	4738	30
5	434.49	2093	5	2261	5	2390	6	2526	6	2670	6	2822	6
6	400.98	2716	7	2835	7	2997	7	3167	8	3348	8	3539	9
7	485.27	2764	6	2736	6	2892	6	3057	6	3231	7	3415	7
8	746.12	2130	3	2388	3	2524	3	2668	4	2820	4	2981	4
9	713.90	2517	4	2900	4	3065	4	3240	5	3425	5	3620	5
Total	4243.27	21,683	5	24227	6	25608	6	27068	6	28611	7	30242	7

Source: BBS, 2011. Estimation by the Consultant
Note: Annual Medium Growth rate for Population projection has been considered as 1.115%.

Table 6-2 shows the ward wise population growth of Akkelpur Paurashava up to 2031 at a High population growth rate consider as 1.615%.

Table 6-2: Population Projection with Density for Akkelpur Paurashava Up to 2031

Ward	Area (Acre)	Pop'01	PPA	Pop'11	PPA	Pop'16	PPA	Pop'21	PPA	Pop'26	PPA	Pop'31	PPA
1	671.87	1862	3	1708	3	1850	3	2005	3	2172	3	2353	4
2	549.25	3007	5	3830	7	4149	8	4495	8	4870	9	5277	10
3	82.19	1627	20	1773	22	1921	23	2081	25	2255	27	2443	30
4	159.19	2967	19	3796	24	4113	26	4456	28	4827	30	5230	33
5	434.49	2093	5	2261	5	2450	6	2654	6	2875	7	3115	7
6	400.98	2716	7	2835	7	3071	8	3328	8	3605	9	3906	10
7	485.27	2764	6	2736	6	2964	6	3211	7	3479	7	3769	8
8	746.12	2130	3	2388	3	2587	3	2803	4	3037	4	3290	4
9	713.90	2517	4	2900	4	3142	4	3404	5	3688	5	3995	6
Total	4243.27	21683	5	24227	6	26248	6	28437	7	30808	7	33378	8

Source: BBS, 2001. Estimation by the Consultant
Note: High Growth rate for Population projection has been considered as 1.615%.

Table 6-3 shows the ward wise population growth of Akkelpur Paurashava up to 2031 at a low annual population growth rate consider as 0.615%.

Table 6-3: Population Projection with Density for Akkelpur Paurashava Up to 2031

Ward	Area (Acre)	Pop'01	PPA	Pop'11	PPA	Pop'16	PPA	Pop'21	PPA	Pop'26	PPA	Pop'31	PPA
1	671.87	1862	3	1708	3	1761	3	1816	3	1873	3	1931	3
2	549.25	3007	5	3830	7	3949	7	4072	7	4199	8	4330	8
3	82.19	1627	20	1773	22	1828	22	1885	23	1944	24	2004	24
4	159.19	2967	19	3796	24	3914	25	4036	25	4162	26	4291	27
5	434.49	2093	5	2261	5	2331	5	2404	6	2479	6	2556	6
6	400.98	2716	7	2835	7	2923	7	3014	8	3108	8	3205	8
7	485.27	2764	6	2736	6	2821	6	2909	6	3000	6	3093	6
8	746.12	2130	3	2388	3	2462	3	2539	3	2618	4	2700	4

Ward	Area (Acre)	Pop'01	PPA	Pop'11	PPA	Pop'16	PPA	Pop'21	PPA	Pop'26	PPA	Pop'31	PPA
9	713.90	2517	4	2900	4	2990	4	3083	4	3179	4	3278	5
Total	4243.27	21683	5	24227	6	24981	6	25759	6	26561	6	27388	6

Source: BBS, 2001. Estimation by the Consultant
Note: Low Growth rate for Population projection has been considered as 0.615%.

With an annual growth rate of 1.615% (assuming higher growth rate), the forecasted population of Akkelpur Paurashava will be 33378 in the year 2031. The gross density of the area will be 8 ppa (person per acre). Due to the maximum concentration of residence in Ward no. 04, the density of population will also be higher (33ppa) in this zone.

Again, with low growth rate of 0.615%, the forecasted population of Akkelpur Paurashava will be 27388 in the year 2031. The gross density of the area will be 6 ppa (person per acre). Due to the maximum concentration of residence in Ward no. 04, the density of population will also be higher (27ppa) in this zone.

6.2 Identification of Future Economic Opportunities

The contribution of the small towns to the economic development of their hinterlands depends largely on the urban development in these urban centers. Depending on transport, communication and storage facilities, this Paurashava can play a vital role in linking rural farmers to the urban market. For instance, development of road network between this small town and its rural hinterlands may greatly benefit rural farmers as it enables them to transfer their agro products to bigger markets. The industrial development in the Paurashava will have significant impact on the demand for raw materials that are required for the industrial production. All sorts of production materials, like brick, wood, bamboo etc. are produced in the countryside, serving as supply centers for urban demand. To support urban industries and related activities, it requires adequate infrastructure, such as urban rural transfer routes, communication and information structures. Investments in these projects result in enhanced productivity in both urban and rural areas.

Table 6-4 shows the work force of Akkelpur Paurashava. From the BBS- 2001, it is revealed that the among the economically active age group of population, 35.84% are found engaged directly in Employment activities while 64.16% are found not engaged in employment activities. Not working population found about 31.73%, where as looking for work found 1.36% and 31.07% of population found engaged in house hold work. The major occupations found are farming, fishing, business and trading, services in government, non-government and private organizations, day-laboring in agriculture. From the Household Survey it is revealed that the Agricultural (farming) activities are the dominant occupation class in the town. The percentage of the people engaged in this occupation is in a major portion. The next highest occupation class found is the small business and private service. Most of the households' earning members often adopt a secondary occupation which indicates that under-employment is very much prevalent in the project area.

In the project area, most of the economically active population whose age is 10 years and above are involving in agriculture (farming), small business and transport sector.

Table 6-4: Existing Working Force for Akkelpur Paurashava

Total	Not Working	Looking for Work	House hold Work	Agriculture	Industry	Water, Electric & Gas	Construction	Transport	Hotels & Restaurant	Business	Service	Others
17250	5474	234	5360	2473	214	10	354	287	25	1553	132	1134
%	31.73	1.36	31.07	14.34	1.24	0.06	2.05	1.66	0.14	9.00	0.77	6.57
Total	**64.16%**			**35.84%**								

Source: Community Series (Zila: Joypurhat), Bangladesh Population Census-2001

However, it is extremely difficult to make any precise projection about future economy of this small urban center. Considering the present level of economic activities, no major change is anticipated in the local economy in the near future.

The town has good prospects to local economic upliftment provided appropriate government policies and initiatives are taken. People have money, but they will have to convert it into capital. The following suggestions may be considered.

First, training on entrepreneurship may be arranged for prospective young and educated entrepreneurs to encourage them to invest in manufacturing, in particular.

Second, local entrepreneurs may go for consumer goods production targeting local market.

Third, prospective investors may also explore possibilities of investment in agriculture sector for local as well as export market, particularly, in fisheries, poultry and horticulture.

As stated earlier agriculture is an important source of income mainly in Joypurhat region. Besides this, business is the another source of income of 26.56 percent of the household of Akkelpur Paurashava (BBS, 2001 and household survey). They mainly invested on land, which is considered the safest investment, as the land value never falls. Without investment in basic industries, it is unlikely that the local economy will experience a major boost in the near future. Both government and private initiatives will bring prospective up gradation of the economy through proper policy for utilization of the remitted money inflow. It is the high time to create some special incentive packages for their investment make a rewarding role in the economy of the country.

6.3 Projection of Land use

Projected land use is a critical component to a comprehensive plan. The forecast determines the amount of land needed to accommodate future growth, and includes the land required for residential, commercial and industrial uses. In some instances, a community may have enough vacant lands within its boundary to accommodate its forecasted population increases and land use demands. In other instances, there may be a need to consider land outside a community's boundaries to accommodate this increase. According to land use projection it reveals that there is land required for residential purpose in the year 2031. The Consultants estimates about 574.97 acres of land for residential uses with a net residential density of 52 people per acre. Including existing commercial activities, the total commercial land in 2031 has been fixed at 14.23 acres. Again need of educational land for projected population will be 14.53 acres and 11.05 acres of land for community facilities. A huge land (26.3 acres) will require for open space and recreational

facilities covering play field, park, neighbourhood park and stadium. The projection and demand on land requirements as per the planning standard approved by the PMO office of UTIDP project are discussed details in Chapter-10 and Section 10.1.2.

Chapter 7: Landuse Zoning Policies and Development Strategies

This chapter sets land use policies and development strategies for planning area. It classifies the Structure Plan area into categories and also includes strategies for optimum use of urban land resources, plans for new area development and areas for conservation and protection.

7.1 Zone of Structure Plan Area

To guide long term growth within the Structure Plan Area by means of demarcation of the future growth areas and indication of potential locations of major development zones are broadly classified into seven categories. **Table 7-1** shows the Structure Plan area zones, its area and percentage coverage. Details of the description of structure planning zones are given in the following paragraphs. **Map 7-1** and ***Appendix-1*** shows the structure plan of Akkelpur Paurashava.

Table 7-1: Structure Plan Policy Zoning

Zoning	Description of the Zone	Area (acre)	%
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	137.10	3.23
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, be undertaken soon to enable provision when justified by increased density levels and allowed by	426.54	10.05
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. Ideally, it might be reasonable to provide primary infrastructure networks in this area to foster development and encouraged to enable a more rapid urbanization in	304.47	7.18
New Urban Area	This zone will be the required additional area for future planned urban development as per population projection. New facilities and services like road, drains, footpath, waste transfer station and other civic services will be provided. This area is proposed to grow within 2031.	107.39	2.53
Agriculture	Agricultural land (also *agricultural area*) denotes the land suitable for agricultural production, both crops and livestock. It is one of the main resources in agriculture. The land under annual crops, such as cereals, other crops, potatoes, vegetables, and melons; also includes land left temporarily fallow; land under permanent crops (e.g., fruit plantations);	2827.36	66.63
Water body	Water body containing an area equals to or more than 0.25 acres excluding those of khal, irrigation canal and river will be treated as this category.	194.75	4.59
Major Circulation	Major circulation contains major road network and railways linkage with regional and national settings.	245.66	5.79
Total		**4243.27**	**100.00**

Map 7-1: Structure Plan Zone of Akkelpur Paurashava

7.1.1 Core Area

Total 137.10 acres of land, which covers 3.23% of Structure Plan area, is declared as Core Area (**Map 7-1** and ***Fig 7-1***). It is located with in Ward nos. 3, 4, 5 and 6.It includes the highest concentration of services area for an example, schools, post office, police box, Clinic in Akkelpur Bazar area etc. and it has the highest potentiality of development. Because the town developed based on the Akkelpur Bazar, which is located at the centre of the Paurashava, there are differences in levels of provision, particularly between the formally developed and planned areas and the majority of unplanned areas. Levels of provision should be maintained in the planned areas. Since these areas are forecasted to show density increase and increased demand and therefore will require regular upgrading. The main thrust to improve services should be in the unplanned zones, particularly where the deficiencies already are great and quality of life will sharply decline when the services also have to cater for the additional population.

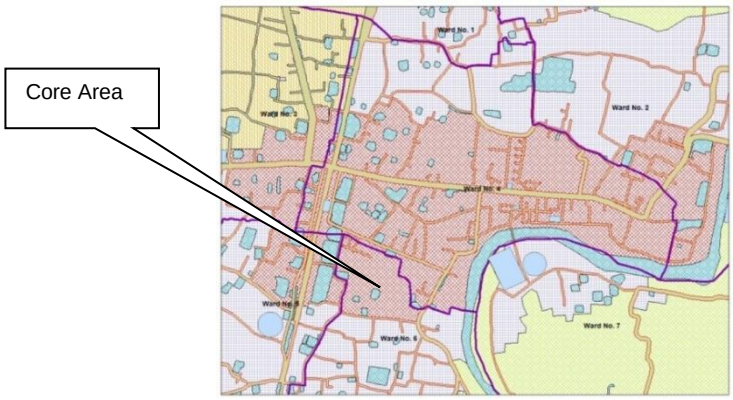


Fig 7-1:Total Core Area of Akkelpur Paurashava

7.1.2 Fringe Area

A total of 426.54 acres of land covering only 10.05% of Structure Plan area is declared as Fringe Area (**Map 7-1** and **Fig 7-2**). Maximum fringe area of proposed structure plan is located North and southeast corner of Core area. It covers large portion area of Ward no. 1, 2, 5, 6, and 8. This area mainly proposed, where a slow trend of urbanization is continuing in unplanned manner. The area is identified in the Structure Plan as the likely choice for new urban development beyond the core area. Ideally, it might be reasonable to provide primary infrastructure networks in this area to foster development encouraging a more rapid urbanization in a planned way.

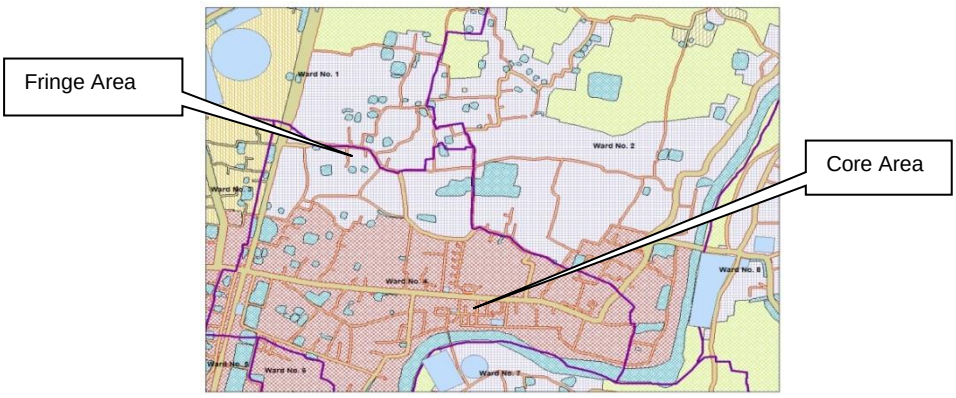


Fig 7-2:Proposed Fringe Area beside Core Area

7.1.3 Peripheral Area

A total of 304.47 acres of area, which covers 7.18 % of Structure Plan area, is declared as Urban Peripheral Area (**Map 7-1** and ***Fig 7-3***). Maximum peripheral area is in Ward nos. 2 and 6 of the Paurashava.This zone is developing areas that will take a longer time 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, be undertaken soon to enable provision when justified by increased density levels and allowed by resources.

Fig 7-3:Proposed Peripheral Area in South Corner of Akkelpur Paurashava

7.1.4 New Urban Area

Total 107.39 acres of land covering 2.53% of Structure Plan area is declared as New Urban Area (**Map 7-1** and ***Fig 7-4***). New urban area mainly located within Ward nos. 1& 3. All these wards has partially involved with new urban area. Most of the new urban lands in Ward nos. 4 will be use to meet the extra pressure of development trend for this for this reason. A large portion of Land in Ward no. 01and 04will be used to future planned urban development as per population projection.

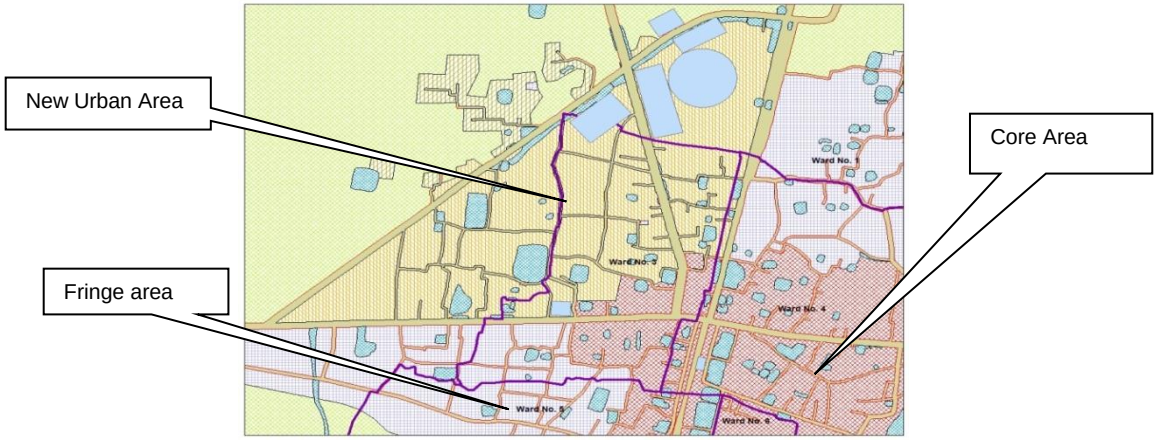


Fig 7-4:New Urban Area beside Core Area

7.1.5 Agriculture

Total 2827.36 acres of land covering 66.63 % of Structure Plan area is declared as Agriculture Area (**Map 7-1** and ***Fig 7-5***). Agriculture Area is quite spread all over the Paurashava.

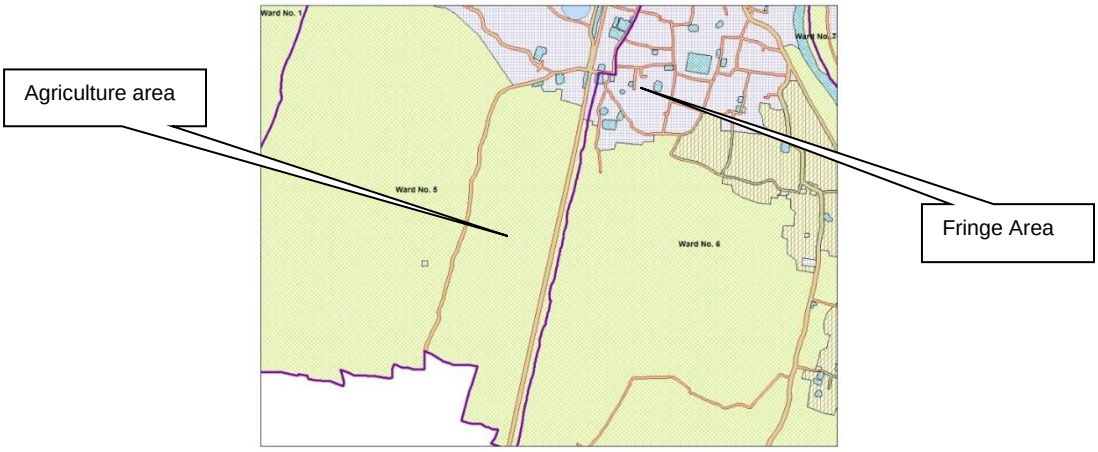


Fig 7-5: Agriculture Land spread all over of the Paurashava

7.1.6 Water body/Retention Area

Total 194.75 acres area, which covers 4.59 % of Structure Plan area, is declared as water body (**Map 7-1**). It includes pond, ditch and all the canals and river within the Paurashava. More detail information is provided in drainage and environmental plan.

7.1.7 Major Circulation Network

It contains major road network with Joypurhat and other neighbor urban center and also included the major road way network required for maintaining existing internal communication. Total 245.66 acres of land including proposed road which covers 5.79% of total structure plan area. **Map 7-1** shows major circulation network.

7.2 Strategies for optimum use of Urban Land Resources

7.2.1 Optimum use of Urban Land Resources

With a limited land mass, Bangladesh is the most densely populated country in the world. The land area of the country remains static amid continuously increasing population. Such a situation calls for strict regulation to utilize its scarce land resources for non-agricultural purposes. Increase in urban population means more demand for houses, roads, schools, hospitals, factories, bazars, shops, business centres, offices, other service facilities etc. Providing all these facilities require land and that is at the cost of valuable agricultural land, as the country has hardly any fallow land to accommodate all these land uses. Akkelpur Paurashava is surrounded by valuable fertile agricultural land. Any urban expansion will cost net deduction of agricultural land that will consequently affect local food and cash crop production. Practice of thriftiness on land utilization is, therefore, essentially needed in plans and development proposals. Such practice should start through adoption of conservative and rational standards of space use and their proper application in planning, designing and development. **Table 7-2** shows the optimum use of urban land resources.

Table 7-2: Policy for optimum use of urban land resources

Policy	Justification	Means of Implementation	Implementing Agency
Policy: Optimization of Available Land Resources Growth within the established urban area is not compact in Akkelpur. There are still large amount of land lying vacant amid all categories of land uses within the Paurashava area and beyond. Infilling of these lands should be promoted and encouraged to optimize use of land.	Keeping large land areas vacant within the existing built up area, extension of physical boundary of the town is not logical. Such a tendency might cause valuable agricultural land out of use. There is a need to economize the use of land, which is a scarce resource against an expanding population in the country.	*Control:* Imposition of tax on the land remaining vacant for a long time can be tried to discourage speculation on the land use practices. Measures should be adopted to minimize the use of land by public sector agencies. Policies to discourage large scale land acquisition for development by the public sector can be tried. *Promotion*: The public sector should develop infrastructure facilities and services in deprived areas to enable	-Akkelpur Paurashava; -Ministry of Land
Policy: Utilisation of Khas Land for Urban Development	Khas lands are public land that should be made best use for community purpose. Instead of evicting people from their own land for implementing development proposals, khas land should be used as much as possible.	Taking over of khas land by Paurashava that falls under different development proposals under the current development plan. Paurashava can later on hand over the land to the concerned authority that will implement the particular development proposals.	-Akkelpur Paurashava -Ministry of Land -DC, Joypurhat

7.2.2 Plans for New Area Development

Table 7.3 shows policy to develop new urban area. It includes justification of new area development, means of implementation and agencies for implementation.

Table 7-3: Policy for new area development

Policy	Justification	Means of Implementation	Implementing Agency
Policy: Initiatives For New Urban Area Development	New areas with their growing stage offer excellent opportunity for organized development with little or no compensation cost for eviction and less hindrances in motivation of the local residents in favor of organized development	Participatory approach to new urban area development is to be supported by innovative ideas of spatial development. Long motivational activities will have to be carried out for this purpose. Public sector with technical and financial support of the private sector and cooperation from service	- Akkelpur Paurashava - Private sector

Policy	Justification	Means of Implementation	Implementing Agency
		giving agencies will make the task easier.	

7.2.3 Areas for Conservation and Protection

To ensure livable environment in the planning area, different areas are conserved in various forms, namely agricultural land, low land, pond and natural drainage, green belt, historic and heritage areas, etc. Details are given in **Table 7.4**.

Table 7-4: Area for conservation and protection

Type of Land	Means of Implementation	Implementing Agency
Loss of Productive Agricultural Land: The Master Plan area has a vast agricultural land in the northern side of this project. After implementation of the project, environment of agriculture will be converted into non-productive urban and semi-urban area.	The EIA Guidelines of DOE emphasized on the avoidance of productive agricultural land for any development project. Therefore, it will be wise to consider more economical use of land to avoid fertile lands. The town expansion and land acquisition should be based on the growth rate of population. According to population projection for the year 2031, the present residential land use area will grow with increasing density. So a large share of agricultural land can be spared at least for the	- AkkelpurPaurashava - DOE
Low Land, Pond and Drainage Path: A total of 55 ponds with an area equal to or more than 0.25 acres within the Paurashava are declared as retention area. In no way permission for filling up of these ponds should be given. Paurashava should acquire these ponds at suitable time to use them for retention and	This area is declared as water body in the Master Plan. As per the guideline of The Act (36 of 2000) for Conservation of Play field, Open space, Park and Natural Water Reservoir in Mega City, Divisional Town, District Town and Paurashavas of Bangladesh, this area will be conserved as water body. According to population projection for the year 2031, the present residential land use area can be developed with increasing density up to this year. So a large share of water body can be spared.	- Akkelpur Paurashava - Water Development Board
Green Belt: The Bank of the Tulshiganga river is declared as green belt. This area will be used for aforestation and recreational purposes for conservation of environment and creation of opportunity for tourism development in this town.	This area is declared as green belt in the Master Plan.	- Akkelpur Paurashava

7.3 Policies for Development

This section of the chapter sets forth strategies and policies for various components of the Master Plan on sectoral basis.

7.3.1 Policies for Socio-economic Sector

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. It is, therefore, necessary to enhance population control drive. The people at the grassroots can play an 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 the creation of awareness about small family size. The Paurashava may undertake relevant measures in line with national objectives to strengthen its own position in population planning.

Strategy

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

Table 7-5: Policy for Population Sector

Policy	Executing Agency
Policy1: Declaring population as one of the most critical sectors of national development	-Ministry of Planning -Ministry of Health and Family Planning
Justification: Per capita 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 level of living standard of the people.	
Policy2: Putting more efforts and resources in raising the level of education.	-Ministry of Education -Ministry of Planning -Ministry of Health and Family Planning
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 higher pay that would reduce poverty.	
Policy3: Creation of well paid and well trained grassroots 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 theymust be efficient and well paid.	

Economic Development and Employment Generation

Economic development of any place is associated with generation of employment. The 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 Akkelpur as it is a very small town with a very small size of population. However, the Paurashava must ensure that

any foreseeable opportunity in economic development is given due attention for its own growth and economic benefits.

Strategy:

- Creating basic sector investment and leading the local economy forward through promotion of Small and Medium Enterprises (SME).

Table 7-6: Policy for Economic Development and Employment Generation

Policy	Executing Agency
Policy1: Provision of bank loans on easy terms to attract prospective investors in the SME	-Ministry of Industries -Ministry of Commerce
Justification: Easy loans would encourage and attract prospective investors for investment in small scale industries.	
Policy 2: Taking of 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 diverted to productive sectors to help create more employment.	
Policy 3: Arranging entrepreneurship training programmes 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 operation of an enterprise. The training can help them get educated in these lines.	

Housing

As the town has low level of population, housing is yet to become a problem here. Housing policy and programmes are provided and executed by the national government. There is no local office of the National Housing Authority to execute housing programmes 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 at the moment is highly lacking.

No slums are observed in this small town, the way they are exposed in large cities. So no slum and squatter related problems are there in the town. This provides a better scope for planned housing development in the Paurashava.

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 land owners can be encouraged in housing area development on a public-private partnership basis.

Table 7-7: Housing and Slum Improvemen

Policy	Executing Agency
Policy House/1: Provision of necessary services and facilities to promote housing at private	- National Housing Authority - Ministry of LGRD - Akkelpur Paurashava
Justification: It is more difficult to provide housing on public sector initiatives, as it involves funding and land acquisition that takes a long time. By providing infrastructure and services, general people can be encouraged to build their own houses.	
Policy House/2: Housing zone land owners can be involved in a participatory development approach, where Paurashava will provide infrastructure and the cost will be shared by land owners.	- National Housing Authority - Ministry of LGRD - Akkelpur Paurashava

Social Amenities and Community Facilities

Social amenities and community facilities include, education facilities, health facilities, open space recreation facilities like, park and playground, amusement park and community centre. 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 good. For education and health facilities, the national governments have policies and there are separate ministries and their agencies to execute the policies through programmes and projects. There are also Upazila level offices of the concerned agencies to take care of the execution of national education and health policies and programmes. For providing amenities like, park and playground and community centre, 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 and pricier. For community center, intensive use of land should be made by making multiple use of the same space, for example, providing community center, ward councilor's office, clinic or any other use in the same building.

Strategy:

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

Table 7-8: Social Amenities and Community Facilities

Policy	Executing Agency
Policy-Amenity/1: Procurement of khas and other public land for park, playfield, community centre.	-Ministry of Land -DC Office, Joypurhat - Ministry of LGRD - Akkelpur Paurashava
Justification: Since above facilities are non-revenue earning, they should be procured at least cost.	

Policy	Executing Agency
Policy-Amenity/2: Land should be procured for open space facilities as quickly as possible, because when land value will be higher, cost of providing the facilities will also be very higher. 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 Land -DC Office, Joypurhat - Ministry of LGRD - Akkelpur Paurashava

7.3.2 Physical Infrastructure Sector

Transport

By far, transport is the most important means to revitalize an urban center. Intra and inter urban 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-Upazila and inter-District road network will have to be created that makes movement faster and easy. With good transport infrastructure, economic development may become attractive. 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-town communication for easy transportation of goods and passengers.

Table 7-9: Policy for Transport Sector

Policy	Executing Agency
Policy-Transport/1: Development of efficient inter-city road network with standard road.	- Roads & 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) -Joypurhat District
Justification: Not only that communication is needed between urban centers, but to attract investment, emphasis must be laid on quality of roads built.	
Policy-Transport/3: Development of local road network through participatory approach.	- Akkelpur 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.	

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. Utility services include water supply, solid waste management, power supply, sanitation and drainage. Except power supply, the rest are the responsibilities of the 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.

Table 7-10: Policy for Utility Services

Policy	Executing Agency
Policy-Utility/1: Exploration of alternative sources of water to ensure sustainable supply.	- LGED - Akkelpur Paurashava
Justification: 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: Involvement of beneficiaries in solid waste management.	- Akkelpur Paurashava - NGOs and CBOs
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.	- Akkelpur Paurashava - NGOs and CBOs
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 - Akkelpur Paurashava - NGOs and CBOs
Justification: Motivation will encourage people to adopt healthy sanitation and reduce health	
Policy-Utility/5: Protection of natural drainage system and preparation of hierarchical drainage	- LGED - Akkelpur Paurashava
Justification: Natural drainage systems are being grabbed and filled up, which increases the risk of water logging. Well planned hierarchical drainage network helps smooth drainage of storm and waste water.	

7.3.3 Environmental Issues

From environmental point of view Akkelpur Paurashava is not yet badly affected. There are some issues that must be taken care of. The issue of sanitation has already been dealt within the utility services section. Except cyclone, there is no natural hazard. There is no mentionable air, water or soil pollution in the Paurashava from any mentionable sources at present.

Natural Resources

The Paurashava is not endowed with many natural resources that can be conserved. Among the meager meager natural resources that are available, 361 numbers of ponds and natural drainage canals can be mentioned. Out of the total ponds 65 with an area equal to or more than 0.25 acres and the natural khals need to be protected and conserved to ensure sustainability in drainage and water supply of the Paurashava.

Strategy:

- All khas land and canals should be vested with Paurashava for use in community interest.

Table 7-11: Policy for Natural Resources

Policy	Executing Agency
Policy-Nature /1: All khas lands within the Paurashava must be assessed and handed over to the Paurashava for use in community interest.	- Ministry of Land - Akkelpur Paurashava
Justification: This will prevent misuse of khas lands by political and powerful local people.	
Policy-Nature /2: All natural canals within the Paurashava must be vested with the Paurashava for maintenance and proper use as drainage canal.	- Ministry of Land - Akkelpur Paurashava - NGOs and CBOs
Justification: This will help prevent unauthorized occupation and filling of natural drainage.	

Chapter 8: 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.

8.1 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 Local Government (Paurashava) Act needs to be revised and more power should be given to the Executive Officer for appointment of employees.

It can not 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 can not 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 can not 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 Akkelpur 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.

8.1.1 Staffing and Training

First and Second class officers are directly appointed by Ministry of Local Government and rests are appointed by Paurashava. In Akkelpur Paurashava, the revenue income is too low. That's why it is not capable to pay the salary of all the officials and staffs. The salary is recovered from the government grant and BMDF allocation. 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 can not deliver proper service to the citizens. Besides, most of them are not qualified enough to render proper services.

8.1.2 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.

8.1.3 Town Planning Capacity

8.1.3.1 Institutional Framework (Proposed by UGIIP, LGED)

To rearrange the institutional framework for the Paurashavas recently the government has made a committee to reform the organogram of all the Paurashavas of Bangladesh. According to the clause no. 72-78 (Paurashava Officer & staff, provident fund etc) of Paurashava Act, 2009 and on the basis of the type and category of works, the committee suggested appropriate section/units/divisions within the Paurashava framework. Planning unit or division will be necessary to set sequentially as the authority can perform it's mandatory responsibility 'town development and control' well and serve the inhabitants presently as well as in the future. The planning unit/division may have some sections that are as follows:

Planning unit/Division:
a) IT Section
b) Planning Section
c) Beautification and recreation Section

According to the division and it's relevant sections, what so ever appropriate with the necessity and capacity over time, it is recommended to set up necessary manpower for each category of Paurashava. Possible scope of proposed planning unit/division is given bellow:

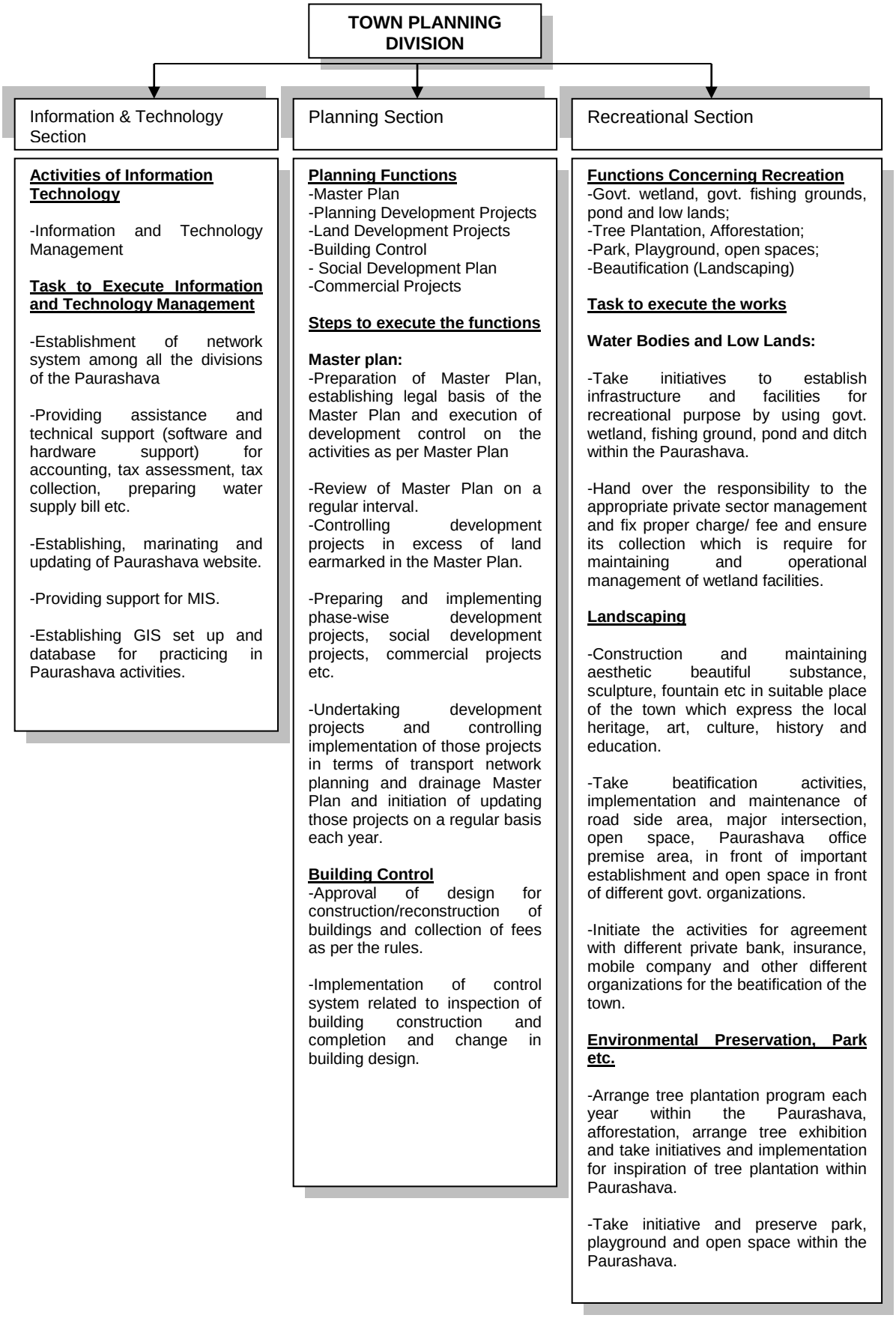


Fig 8-1:Scope of Work for Planning Division

8.1.3.2 Lack of Paurashava Town Planning Capacity

At present, the Paurashava has no town planning section or any appropriate manpower to prepare and implement the Master Plan. For proper implementation of the Master Plan for each Paurashava under UTIDP, establishment of a separate planning unit 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.

Akkelpur is a 'C' class Paurashava.For the 'C' class Paurashava Government approved an organogram. If we compare the existing manpower with the approved organogram we find that there is a huge gap between the two. Many positions have been vacant since the inception of Paurashava. Out of total 78 numbers of allocated positions only 28 numbers are filled up. However, strengthening of the Town Planning Unit is a pre-requisite for successful implementation of the Structure Plan. Following organogram of the Town Planning Unit is proposed for staffing capacity building of this Unit.

8.1.4 Legal Aspects

The drive to establish strong urban local governance in the Paurashava is yet to be legalized. The governance programs 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.

8.1.5 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 Ordinance. 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.

8.1.6 Financial Issues

Governance in Akkelpur 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 Akkelpur 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 asses 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, Akkelpur 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 can not raise its own revenue adequately, it will not be able to execute much of the development projects under the Master Plan.

8.1.7 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 Akkelpur 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.

8.1.8 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 Akkelpur 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.

8.2 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.

8.3 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.

Chapter 9: Urban Area Plan

This is the first chapter of Part- B that starts with Urban Area Plan. Urban Area Plan is the mid level plan that covers the existing Paurashava. It lays down the land use zoning plan and infrastructure development proposals at the town level. Land use planning is an important part of Master Plan ensuring that land is used efficiently for the benefit of economy, society and environment of Akkelpur Paurashava. This planning means the scientific, aesthetic, and orderly disposition of land, resources, facilities and services with a view to securing the physical, economic and social well-being of urban communities.

9.1 Goals and Objectives of Urban Area Plan

Urban Area Plan is the first phase illustration of the Structure Plan intended to be implemented over a time span of 10 years that includes 1st phase (1st-5th year) and 2nd phase (6th-10th year) of development programs. The Urban Area Plan 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. In fact, Urban Area Plan is the first phase detailed illustration of the policies and strategies of the structure plan.

The preparation of Master Plan for Akkelpur Paurashava is aimed towards its future development, and covers the areas that are likely to become urban in future. The Urban Area Plan is aimed to:

- determine the present and future functional structure of the town, including its land uses; and
- provide infrastructure proposals for improving and guiding development of future urban area.

9.2 Methodology and Approach to Planning

The base map supporting for land use survey was obtained from the physical feature survey that contained all categories of physical features within the planning area (Chapter 3 of Survey Report). During physical feature survey, all structures and the functions of principal buildings were picked up and depicted on the map. The physical features were superimposed on a mouza map and printed for land use survey on the map. The map was carried to the field by investigators for detailed plot to plot land use survey (Chapter 4 of Survey Report). The field investigators carrying the map visited each and every plot and the structures therein and noted their uses in writing and marking them on the map with colour pencil. They also verified the land uses and put during the physical feature survey. Back in the office, the common land uses of plots were delineated in the map as per land use format given in the ToR. The delineated zones were then digitized and a new land use map was prepared for the entire planning area. After land use demarcation, field checking was done to correct possible errors.

Urban Land Use Plan is aimed to guide the physical development of Akkelpur town including its economic and social activities. This plan adheres to the policy directives spelled out in the Structure Plan. The current Urban Area Plan is akin to the traditional Master Plan approach prevalent in the country that designates plot-to-plot use of land apart from infrastructure development proposals. Thus it will also serve as a development control mechanism/instrument.

The Urban Area Plan is, therefore, more rigid than Structure Plan. Making a land use plan on a cadastral map makes the Urban Area Plan more rigid. Once the plan on a cadastral map is drawn and accepted by the government and formalized, it gains a formal status and thus becomes a binding for all concerned.

The objectives of the Urban Area Plan have been attained through:

- orderly location of various urban land uses;
- location of appropriate transportation and drainage network; and
- Orderly location of services and facilities.

9.2.1 Delineation of Planning Areas

For delineation of Master Plan area, it is necessary to identify the possible future urban growth locations. The objective of project area demarcation is to determine the boundary of the area and mark it on the map as well as in the field. Logic behind the delineation of the Planning area of Akkelpur Paurashava for the year 2031 has been done on the basis of the gazette notification of the Paurashava and after the reconnaissance survey within the area, the discussions with all groups of stakeholders, analyzing the present trend of developmental growth of the town. Cooperation of the Paurashava was more important in delineating the Paurashava area in the cadastral map and the future planning area boundary (Detail was given in Chapter 2, Section 2.4 of Survey Report). As conversant with local conditions and the future trend of development, valuable advices were received from the Poura Mayor, engineers and other staffs. **Table 9-1** presents the detail about the mouzas.

Table 9-1: List of Mouza Maps of Akkelpur Paurashava

Sl No	Paurashava	Mouza Name	J.L No	Sheet No	Mouza Type	Source
1.	Akkelpur	Akkelpur	016	00	RS	DLRS
2.	Akkelpur	Amtraw	015	01	RS	DLRS
3.	Akkelpur	Amtraw	015	02	RS	DLRS
4.	Akkelpur	Biharpur	030	00	RS	DLRS
5.	Akkelpur	Chokropara	028	01	RS	DLRS
6.	Akkelpur	Chokropara	028	02	RS	DLRS
7.	Akkelpur	Gurki	024	00	RS	DLRS
8.	Akkelpur	Hastab Santapor	017	01	RS	DLRS
9.	Akkelpur	Hastab Santapor	017	02	RS	DLRS
10.	Akkelpur	Kesobpur	026	00	RS	DLRS
11.	Akkelpur	Manikpara	029	00	RS	DLRS
12.	Akkelpur	Mokimpur	034	00	RS	DLRS
13.	Akkelpur	Raj Kanda	031	00	RS	DLRS
14.	Akkelpur	Santa	027	01	RS	DLRS
15.	Akkelpur	Santa	027	02	RS	DLRS
16.	Akkelpur	Sri Krisnopur	018	00	RS	DLRS
17.	Akkelpur	Thangapur	032	00	RS	DLRS

Source: DLRS, 2010.

9.2.2 Content and Form of Urban Area Plan

The Urban Area Plan is presented in both map and textual format. The plan map is presented in 1:1980 or 1 inch to 165 feet scale, superimposed on latest cadastral/revenue map having plot boundaries within mouzas. The plan is accompanied by an explanatory report supported by necessary figures, maps and data. The report explains the various plan proposals and other components of the plan. At present, the Urban Area Plan covers the total area of Structure Plan area of 4243.27acres with a present population of 24227 of Akkelpur Paurashava.

The Urban Area Plan of the Master Plan of Akkelpur Paurashava contains several components. These are:

i) Land Use Plan;
ii) Transportation and Traffic Management Plan;
iii) Drainage and Environmental Management Plan and
iv) Proposals for Urban Services.

Chapter 10: Landuse Plan

The Land Use Plan is the main part of the Urban Area Plan and is planned for the period of first 10 years. The proposals in the Land Use Plan will be implemented through the 1st and 2nd phase development programs of the Master Plan. The 1st phase development projects are identified as priority projects and are listed in the Ward Action Plan for implementation within the first five years of the Master Plan.

10.1 Existing and Projected land use

This section describes the analysis of existing and proposed land uses and at the same time mentions estimation on the requirement of land for different land uses. It also lays down the land use zoning plan and infrastructure development proposals at the town level.

10.1.1 Existing Land Use

Map 10-1illustrates how the land uses are distributed at present in the Paurashava area. The information helps the preparation of Master Plan providing background information for selection of areas of different land uses.

In the land use pattern of the Paurashava, 16 types of land uses are found. It is clearly evident from the table that agricultural land use (almost 73.99%) dominates the Paurashava area, followed by residential (17.07%), water bodies (more than 4.75%), circulation network and transport and communication (only 1.71% & 0.05%), and educational land use occupy 0.33% of land.

Table 10-1: Existing Land use Classification of Akkelpur Paurashava

Sl.No.	Land Use Category	Area in Acres	%
1.	Residential	724.458	17.07
2.	Commercial	21.47	0.51
3.	Industry and Manufacturing	17.333	0.41
4.	Education and Research	13.801	0.33
5.	Community Service	7.19	0.17
6.	Service Activity	6.25	0.15
7.	Recreational	1.18	0.03
8.	Governmental Service	14.54	0.34
9.	Non-Governmental Service	0.72	0.02
10.	Urban Green Space	15.70	0.37
11.	Transport and Communication	2.33	0.05
12.	Agriculture	3139.75	73.99
13.	Mixed Use	2.16	0.05
14.	Circulation Network	72.47	1.71
15.	Water Body	201.37	4.75
16.	Miscellaneous	2.84	0.07
Total		**4243.27**	**100.00**

Source: Land Use Survey, 2010

Map 10-1: Existing Land Use Map of Akkelpur Paurashava

AkkelpurPaurashava has followed its major development along the Joypurhat-Joypurhat road. The main population is engaged with the farming.

10.1.2 Land Requirement Estimation

The main basis of future land requirement will be the population size of the Paurashava and area will be covered by each utility service. The existing services have to be considered in the forecasts. Land requirements for different types of utility services have been analyzed following the standard developed jointly by the team leaders of all packages and urban planners from Project Management Office (PMO) of the UTIDP.The category wise land allocations are provided below.

Table 10-2: Planning Standard Considered for Land Uses

Types of Land Uses	Recommended Standard Provision (unit)
General residential	100 – 150 persons/1 acre
Real Estate – Public/Private	200 population/ 1 acre
Roads	
Paurashava primary roads	150 – 100 feet
Paurashava secondary roads	100 – 60 feet
Paurashava local roads	40 - 20 feet
Education	
Nursery	0.5 acre/10,000 population
Primary School/ kindergarten	2.00 acres/5000 population
Secondary/High School	5.00 acres /20,000 population
College	10.00 acres/20,000 population
Vocational Training Centre	5 - 10 acres / Upazilla
Other	5.00 acres / 20,000 population
Open Space	
Play field/ground	3.00 acres/20,000 population
Park	1.00 acre /1000 population
Neighborhood park	1.00 acre /1000 population
Stadium/sports complex	5 – 10 acres/Upazila HQ
Cinema/ Theatre	1.0 acre /20,000 population
Health	
Upazila health complex/ hospital	10 -20 acres/Upazila HQ
health centre/Maternity clinic	1.00 acre/ 5,000 population
Community Facilities	
Mosque/Church/Temple	0.5 acre /20,000 population
Eidgah/	1.0 acre/20,000 population
Graveyard	1.00 acre /20,000 population
Community centre	1.00 acre /20,000 population
Police Station	3 – 5 acres/Upazila HQ
Police Box/outpost	0.5 acre/ per box
Fire Station	1.00 acre/ 20,000 population
Post office	0.5 acre /20,000 population
Commerce and Shopping	
Wholesale market	1.0 acres/ 10000 population
Retail sale market	1.0 acres/ 1000 population
Corner shops	0.25 acre/per corner shop

Types of Land Uses	Recommended Standard Provision (unit)
neighborhood market	1.00 acre/per neighborhood market
Super Market	1.50 – 2.50 acres/per super market
Utilities	
***Solid waste transfer station**	**Minimum 20 decimal per ward**
***Solid waste disposal site**	**Minimum 5 Acre per Paurashava**
Electric sub-station	1.00 acre/20,000 population
Telephone exchange	0.5 acre/20,000 population
Fuel Station	0.5 acre/20,000 population
Industry	
small scale	1.50 acres /1000 population
cottage/agro-based	1.00 acres /1000 population
Transportation	
Bus terminal	1.0 acre /20,000 population
Truck terminal	0.50 acre /20,000 population
Launch/steamer terminal	1.00 acre /20,000 population
Railway station	4.00 acre / per Station
Baby taxi/tempo stand	0.25 acre /one baby taxi/tempo stand
Rickshaw/van stand	0.25 acre /one rickshaw stand
Passenger Shed	0.25 acre /one passenger stand
Administration	
Upazila complex	15.00 acres
Paurashava office	3 – 5 acres
Jail/Sub-Jail	10 acres/Upazila HQ
Agri-extension Farm	10 acres/Upazila HQ
Urban Deferred	10 percent of the total built up area
Reserve	-

Source: UTIDP Planning Standard, LGED

Housing

Housing is the most significant segment of urban development scenario. The future housing area need to be based on a recommended planning standard of 100 persons per acre. With this standard, the estimation shows, the maximum land required to accommodate total projected population (30242) in the year 2031 will be 242.27 acres. Existing residential land of Akkelpur Paurashava is 724.46 acres and net residential density is 33 persons per acre. The consultant, does not required any extra landfor the population of the Paurashava in 2031(net density will be about 39 persons per acre).**Table 10-3** shows the detail.

Table 10-3: Estimation of Housing Land Requirement

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
General Housing	150 persons/acre	161.51	724.56	No required land to accomodate the future population
	100 persons/acre	242.27		

Source: Estimation by the Consultants

Commerce and Shopping

Market facilities are usually provided privately on commercial basis depending on the trend of sale of goods. So it is not possible to fix a standard appropriately. However, for the sake of current planning, we can earmark land as per standard at appropriate location, where commercial facilities may be developed privately or publicly. Including existing commercial activities, the total commercial land in 2031 has been fixed at 11.80 acres.**Table 10-4** shows the detail.

Table 10-4: Estimation of Land Requirement for Commerce and Shopping

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Whosesale	1.0 acres/ 10000 population	3.02	1.44	1.58
Retail sale Market	1.0 acres/ 10000 population	3.02	15.54	NR
Corner shops	0.25 acre/per corner shop	2.00	0.00	2.00
Neighborhood	1.00 acre/per neighborhood market	4.00	0.00	4.00
Super Market	1.50 – 2.50 acres/per super market	1.50	0.00	1.50
Total:		**11.80**	**18.98**	

Source: Estimation by the Consultants

Industry

According to approved planning standard, the total land for industries is estimated to be 60.48 acres with 30.24 acres for small scale industries and 30.24 acres for Heavy industries. **Table 10-5** shows the details.

Table 10-5: Estimation of Land Requirement for Industries

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Small scale	1.50 acres /1000 population	30.24	17.33	12.91
Heavy Industries	1.00 acres /1000 population	30.24	0.00	30.24
Total:		**60.48**	**17.33**	**43.15**

Source: Estimation by the Consultants

Education

Estimation of land according to standard indicates that there will be a land requirement of 43.85 acres to accommodate educational facilities by the year 2031. Existing land uses under various education facilities of Akkelpur Paurashava is 12.01 acres. There will be need of additional 31.84 acres of land for education facilities. Details are shown in **Table 10-6**.

Table 10-6: Estimation of Land Requirement for Education Facilities

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Nursery	0.5 acre/10,000 population	1.51	0.46	1.05
Primary School/ kindergarten	2.00 acres/5000 population	12.10	4.81	7.29
Secondary/High School	5.00 acres/ 20,000 population	7.56	2.53	5.03
College	10.00 acres/20,000	15.12	3.76	11.36
Vocational Training Centre	5 – 10 acres / Upazila	0.00	0	0.00
Other	5.00 acres/ 20,000 population	7.56	0.45	7.11
Total:		**43.85**	**12.01**	**31.84**

Source: Estimation by the Consultants

Health

There already exists an upazila health complex in Goadagari Upazila. As Akkelpur Paurashava is under the Goadagari Upazila there should be no provision of another complex. In future, as the population and density increases, demand for local health facilities other than Health Complex will increase which currently use 5.24 acres. So the Paurashava requires additional 10.81 acres of land for the Health center/Maternity clinics in future. Table **10-7** shows the detail.

Table 10-7: Estimation of Land Requirement for Health Facilities

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Upazila health complex/ hospital	10 -20 acres/Upazila HQ	10.00	5.08	4.92
Health center/ Maternity clinic	1.00 acre/ 5,000 population	6.05	0.16	4.69
Total:		**16.05**	**5.24**	**9.61**

Source: Estimation by the Consultants

Administration

Estimation of land according to standard indicates that there will be a land requirement of 18 acres to accommodate administrative facilities by the year 2031. If we deduct 5.67 acres of existing land under various administrative facilities, additional 9.44 acres of land for these facilities will be required.**Table 10-8** shows the details.

Table 10-8: Estimation of Land Requirement for Administration

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Upazila complex	15.00 acres	10.00	5.28	1.88
Paurashava office	3 – 5 acres	3.00	0.39	3.00
Others	10 acres/Upazila HQ	5.00	0	4.56

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Total:		**18.00**	**5.67**	**9.44**

Source: Estimation by the Consultants

Community Facilities

For various community facilities, the total land requirement has been fixed at 9.80 acres. About 0.76 acres have been earmarked for mosque, 0.76 acres for eidgah, 1.51 for Paurashava provided graveyard. No additional land is required for mosque, church and graveyard. A total of 3.00 acres have been reserved forpolice station, 1.51 acres of land is required for fire station and 0.76 acres for post office.**Table 10-9** shows the details.

Table 10-9: Estimation of Land Requirement for Community Facilities

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Mosque/Church/ Temple	.5 acre /20,000 population	0.76	3.52	NR
Eidgah	1.0 acre/20,000 population	0.76	2.76	NR
Graveyard	1.0 acre/20,000 population	1.51	2.33	NR
Community	1.00 acre /20,000 population	1.51	0.31	1.20
Police Station	3 – 5 acres/Upazila HQ	3.00	1.68	1.32
Police Box	3 – 5 acres/Upazila HQ	0.00	0.2	NR
Fire Station	0.5 acre /20,000 population	1.51	0.3	1.21
Post Office	0.5 acre /20,000 population	0.76	0.26	0.50
Total:		**9.80**	**11.36**	NR

Source: Estimation by the Consultants

Open Space/Recreational Facilities

Field survey shows no public park or play field in the town, except play grounds in the premises of educational institutions. The total land required for various open space recreation facilities recommended by consultants stands at 65.02 acres. The facilities include, play field/ground, parks of various categories and stadium/sport complex. **Table 10-10** shows the detail.

Table 10-10: Estimation of Land Requirement for Open Space/Recreational Facilities

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Play field/Urban Green Space	3.00 acres/20,000 population	4.54	0.37	4.17
Park	1.0 acre /1000 population	30.24	0.00	30.24
Neighborhood park	1.00 acre /1000 population	30.24	0.00	30.24
Stadium/sports complex	5 - 10 acres/Upazila HQ	0.00	0.00	0.00
Total:		**65.02**	**0.37**	**64.65**

Source: Estimation by the Consultants

Utilities

A number of utility establishments are required in a town to run services properly. The consultant, according to approved standard, has earmarked 1.51 acres for water supply installations, like, pump stations and other establishments related to water supply; and 1.51 acres have been fixed for gas related facilities. The total land requirement for dumping site is 5.00 acres.**Table 10-11** shows the details.

Table 10-11: Estimation of Land Requirement for Utilities

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Water supply	1.00 acre /20,000 population	1.51	0.00	1.51
Gas	1.00 acre /20,000 population	1.51	0.00	1.51
Solid waste disposal site	5.00 acre /Paurashava	5.00	0.00	5.00
Waste transfer station	0.20 acre/ward	1.8	0.00	1.8
Electric sub-	1.00 acre /20,000 population	1.51	0.00	1.51
Telephone exchange	1.00 acre/20,000 population	0.76	0.83	NR
Total		**10.54**	**0.83**	**9.71**

Source: Estimation by the Consultants

Transport and Communication

Estimation of land according to standard indicates that there will be a land requirement of 6.77 acres to accommodate transport and communication facilities by the year 2031. If we deduct the already available 0.18 acres of existing land uses under various facilities, an additional 6.59 acres of land is required for this category of land use.**Table 10-12** shows the details.

Table 10-12: Estimation of Land Requirement for Transport and Communication

Use/Facility	Recommended Standard	Land in Acre		
		Estimation	Existing Land	Addl. Requirement
Bus terminal	1.00 acre /20,000 population	1.51	0.00	1.51
Truck terminal	0.50 acre /20,000 population	0.76	0.00	0.76
Launch/steamer terminal	1.00 acre /20,000 population	0.00	0.00	NR
Railway station	4.00 acre / per Station	0.00	0.18	NR
Baby taxi/tempo stand	0.25 acre /one baby taxi/tempo stand	1.50	0.00	1.32
Rickshaw/van stand	0.25 acre /one Rickshaw/van stand	1.50	0.00	NR
Passenger shed	0.25 acre /one baby taxi/tempo stand	1.50	0.00	NR
Total:		**6.77**	**0.18**	**6.59**

Source: Estimation by the Consultants

10.2 Land Use Proposals

Bangladesh is the most densely populated country in the world. The land area of the country remains static amid continuously increasing population. Such a situation calls for strict regulation to utilize its scarce land resources for non-agricultural purposes. Increase in urban population means more demand for houses, roads, schools, hospitals, factories, bazars, shops, business centers, offices and other service facilities. Providing all these facilities require land and that is at the cost of valuable agricultural land, as the country has hardly any fallow land to accommodate all these land uses. Akkelpur Paurashava is surrounded by valuable fertile agricultural land. Any urban expansion will cost net deduction of agricultural land that will consequently affect local food and cash crop production. A conservative and rational standard of space use and their proper application in planning, designing and development is, therefore, followed in the land use proposals.

10.2.1 Designation of Future Land Use

Designation of the future land uses in the Land use Plan is an important task of planning as it will ensure the compliance with the Structure Plan guidelines and provide the details of land use pattern along with transport and drainage network and utility lines. The existing uses and new proposals of land uses for future development have been identified and designated on the map for compliance by law. The land use categories with quantity of land required are based on the sectoral needs for now and in future. The implementation of the plan will require cooperation and collaboration of relevant authorities and agencies, and the Paurashava being the custodian of the Plan will safeguard the status of the Plan.

10.2.2 Land Use Zoning

Development control is an essential part of urban planning. For development control certain procedures have to be followed for approval of designs of various categories of structures, establishments and land uses. The first condition is to secure land use permit according to approved zoning plan followed by approval of the design of proposed building/structure.

10.2.2.1 Types of Land Use Zoning

In land use zoning, the entire area of a town is divided into suitable land use zones to create congenial and livable environment and thereby enhance land value. In Bangladesh such land use zoning is incorporated as a part of the master plan / land use plan/urban area plan. Before submitting building plans for approval an applicant must secure land use permit from the Paurashava. For land use permit, an applicant's prospective use of structure must be compatible with the approved land use zone of the site. Land use zoning limits activities that can or cannot function on a land parcel by establishing a range of development options. Land use zoning is a legal instrument by application of which a Paurashava can control.

i) The height of building/structure,
ii) The area of a land parcel that must be left vacant, and
iii) The use of a buildings and land.

Zoning can be of three types, area zoning, density zoning and height zoning.

Area Zoning

By area zoning an area is divided into zones suitable for that particular area. The main objectives of such zoning are done mainly from environmental point of view that accrues other social benefits.

Density Zoning

The aim of the density zoning is to limit the size of population in any particular area by means of density control. The size of population has bearing on the capacity of designed utility facilities and amenities and traffic volume and crowding, especially in the residential areas. Such zoning is done to ensure a healthy and enjoyable community living.

Height Zoning

Height zoning restrict the height of buildings structures in any particular area. This zoning is aimed to promote the proper and sound development of areas. Height zoning is of particular importance in airport areas to ensue take off and landing of aircrafts. Considering the existing level of development and development prospects, the consultant recommends to follow the area zoning only. Zoning is only a part of development control regulations. A prospective developer in a Paurashava has to comply with other rules and regulations, like, Building Construction Rules, 1996 under Building Construction Act 1952, Bangladesh National Building Code 1993 and other conditions of construction method, building safety and associated issues.

10.2.2.2 Classification of Land Use Zoning

After a detailed consultation between the Paurashava and the consultants of the project, the land use classification for the Paurashava Master Plan is finalized **Table 10-13**. **Map 10-2** and ***Appendix-2*** shows the Land Use Plan of Akkelpur Paurashava.

Table 10-13: Proposed Land Use Categories for Urban Area Plan of Akkelpur Paurashava

Sl. #	Land Use Category	Remarks	Area (acre)	%
1.	Urban Residential Zone	Urban Residential area is a land use in which housing predominates. These include single family housing, multi-family residential, or mobile homes. Zoning for residential use may permit some services or work opportunities or may totally exclude business and industry. It may permit high density land use.	530.39	12.51
2.	Rural Settlement	Rural settlement includes the low dense residential area which is scattered and rural in nature. It may permit only low density uses. Aiming to control the growth in this zone, less service and facilities will be provided.	225.76	5.32
3.	Commercial Zone	The land used for commercial activities is considered as commercial land use. These activities include the buying and selling of goods and services in retail businesses, wholesale buying and selling, financial establishments, and wide variety of services that are broadly classified as "business". Even though these commercial activities use only a small amount of land, they are extremely important to a community's economy. Commercial land includes established markets and areas earmarked for markets.	14.23	0.32
4.	Mixed Use Zone	Mixed land use refers to the area without a dominant land use (Residential, commercial,	28.40	0.67

Sl. #	Land Use Category	Remarks	Area (acre)	%
		industrial etc.).		
5.	General Industrial Zone	Green and Orange A categories as per The Environment Conservation Rules, 1997	41.76	0.91
6.	Heavy Industrial Zone	Other toxic and pollutions Industries (Orange B and Red categories as per The Environment Conservation Rules, 1997)	-	-
7.	Government Office	All Government Offices except large scale service based offices as Civil Surgeon Office, DC Office, Police Box, Police Fari, Police Station, LGED Office, Paurashava Office, Settlement Office, Upazila Headquarter, BADC Office, Fisheries Office, Ansar/VDP Office, Agriculture Office, Post Office, Telephone Exchange Office and Other Government Offices.	12.90	0.30
8.	Education & Research Zone	All kinds of educational institutes like Primary/ secondary/other Schools/ Colleges etc are mentioned to calculate the land use for education and research purpose.	26.19	0.62
9.	Agricultural Zone	Agricultural land denotes the land suitable for agricultural production, both crops and livestock. It is one of the main resources in agriculture. It includes productive land (single, double and triple cropped), seed bed, fisheries, poultry farm, dairy farm, nursery, horticulture etc.	2827.42	66.63
10.	Water body	Equal or More than 0.25 acre and justification by the consultant and wet land will merge with water body	194.66	4.59
11.	Open Space	Playground, Botanical Garden, Stadium, Zoo etc. (Facilities without or with minimum building structure)	38.31	0.90
12.	Recreational Facilities	Facilities other than those mentioned to Open Space and indoor based facilities with designated building structure i.e. Cinema Hall, Theater Hall etc.	0.82	0.02
13.	Circulation Network	Road and Rail communication	245.66	5.79
14.	Transportation Facilities	Under transport and communication land use both transport and communication services are considered. 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.	5.92	0.14
15.	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.	8.02	0.19
16.	Health Services	This land will be used to provide health facility.	9.49	0.21
17.	Community Facilities	All community facilities including funeral places and other religious uses	10.32	0.26
18.	Historical and Heritage Site	The entire mentionable historical and heritage site.	0.00	0.00
19.	Restricted Area	A Restricted Area is an area where no one but certain people can enter. Here the areas which are not accessible for the general public except some high ranked personnel are considered as restricted area.	0.00	0.00
20.	Overlay Zone	If the consultant justify any area that should not be defined as other given definitions but the facility(s) may not be avoidable, they may use this category	Not applicable	
21.	Urban Deferred	Optional depending on the Paurashava and the Consultant's judgment	20.36	0.47
22.	Forest	Designated Forest Area	Not applicable	

Sl. #	Land Use Category	Remarks	Area (acre)	%
23.	Beach	Sea Beach	Not applicable	
24.	Miscellaneous	Any other categories which are not related to above 23 categories.	2.66	0.06
Total:			**4243.27**	**100**

According to the proposed land use zoning categories shown in table 10.13, the amount of land for each land use category was calculated.

In the sections below, the general definition of the use and description of associated permitted and conditionally permitted uses under each land use zone have been provided. The uses that are not listed here in any of the categories shall be treated as Miscellaneous Use for the corresponding land use category and shall not be permitted unless unanimously decided otherwise by the appropriate authority. In such situations, the use shall get permission in the category of New Use. The following is a short description of recommended land use zones. Land use plan of Akkelpur Paurashava is given in **Map 10-2** and ***Appendix-2***.

Urban Residential Zone

Urban residential zone refers to all categories of urban residential areas, including existing ones and the residential land use proposed under the present Master Plan. In total, this zone covers 530.39 acres of land delineated up to the year 2031, considering standard provided by LGED. Table A.1, Annexure- A shows the permitted use of urban residential area and conditional permission will be given to a number of other land uses as specified in Table A.2, Annexure- A shows the planning schedule of Urban Residential Area in Akkelpur Paurashava.

Table 10-14: New Development Proposal for Urban Residential Zone

Type of Facilities	Area in Acre	Ward No.	Mouza Name	Plot No.	Phase
Low Income Housing	10.13	1	Amtraw (15_01)	979,988,989,990,991,992,993,994,995,996,1011,1012, 1013,1014,1015,1016,1017,1018,1019,1020,1021,1022, 1023,1126,1127	1st Phase
		5	Hastab Santapor (17_01)	1,2,3,4,5,6,66,	

Rural Settlement

Most of the Paurashava has some rural characteristics. So in Urban Area Land use category for UTIDP Master Plan the residential settlements within the agricultural belt are categorized as rural settlements. These settlements have usually temporary type of structures. Akkelpur Paurashava is mostly rural in character. About 73.99% existing land use is in agriculture practice and most of the settlement situated surrounding or within this agricultural land. So in a manner to develop control of Akkelpur Paurashava some portion of land declare as rural settlement. This settlement occupies 225.76 acres of land, which comprises More than 5.32% of the total land. The areas of rural settlement have some restrictions for non-agricultural development. Table A7, Annexure-A shows the permitted land use of rural settlement and Table A8, Annexure-A conditionally permitted use in this zone.

General Industry

General Industrial Zone (**Table 10-13**) is intended to provide locations, where manufacturing and processing industries can be set up and function without creating hazards to surrounding land uses. There is scope to establish Green and Orange-A category industry as per mentioned in The Environmental Conservation Rule, 1997.As a small urban center, it is unlikely that any major industrial development will take place here in the near future. This zone has an area of 41.76 acres (0.91%) designated up to 2031. Though as per the planning standard provided by PMO office Akkelpur Paurashava require 48.45 industrial lands (**Table 10-14**). But the town has not highly potentiality to develop such industrial estate in terms of basic infrastructure, utility connection, raw materials, market of the products, labor force and unavailability local entrepreneur to establish industry. So rest of industrial land is declared as urban deferred in land use proposal.

Table 10-15: New Development Proposal for General Industrial Area

Type of Facilities	Area in Acre	Ward No.	Mouza Name	Plot No.	Phase
General Industrial Area	31.74	9	Mokimpur (034_00)	105,106,107,108,109,110,146,147,148,162,211,212,213,316, 317,318,319,320,326,336,337,339,340,341,342,343,344,345, 346,348,349,350,353,355,356,357,358,359,360,361,362,363, 365,366,367,368,370,373,375,376,387,596,598,599,720,728.	1st Phase

Again, since there is no industrial agglomeration within the town, the industrial zone will be meant for new industries. In this zone, a complex line of industrial and supporting non-industrial land uses will be permitted as per Table A.3, Annexure- A and conditional permission will be given to a number of other land uses as specified in Table A.4 and Annexure- A. **Table 10-13** shows new land use proposals for this type of activity in Akkelpur Paurashava. This land will be provided in the general industrial area. shows the planning schedule of General Industrial Area in Akkelpur Paurashava.

Map 10-2: Land use Proposal for Akkelpur Paurashava

Commercial Zone

The commercial zone is intended to provide locations, where commercial activities including retails and wholesale can be set up and function without creating hazards to surrounding land uses. The total area under this use has been determined as 25.73 acres although the standard suggests about 11.80 acres of land. The consultant proposed some extra land to meet demand of future population.and zone will allow commercial uses as listed in Table A.5, Annexure- A, and conditional uses as listed in Table A.6, Annexure- A. shows the planning schedule of Commercial Activity Area in Akkelpur Paurashava.

Table 10-16: New Development Proposal for Commercial Facility

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre(Proposed)	Phase-wise development		
					First Phase	Second Phase	Third Phase
Neighbourhood Market	07	Kesobpur (026_00))	Partial 830-834,836-839,842	0.39	Land acquisition and establish	Continue the development	
	02	Thangapur (032_00)	129-131	0.13	Land acquisition and establish	Continue the development	
	06	Hastab Santapor (017_02)	943, 966-969	0.48	Land acquisition and establish	Continue the development	
Super Market	01	Amtraw (015_02)	1480,1481,1482,1483,1495,1496,1497,1498,1499,1500,1505,1506,1507,1508,1509,1510,1511,1512,1514,1515,1516	4.73	Land acquisition and establish	Continue the development	
Cattle Hat	08	Manikpara (029_00)	Partial 157,158, 160	0.72	Land acquisition and establish	Continue the development	
Total Proposal				**6.12**			

Mixed Use Area/Mixed Use Zone

Mixed use zones have been recommended to allow some flexibility in development. In a small town like Akkelpur, as the trend shows, an exclusive commercial land use is unlikely to function. This land use will allow flexibility of development, instead of restricting development. Total area for mixed uses has been put to 28.40 acres, including both, existing and proposed land uses. This zone will allow residential structures together with commercial uses as listed in Table A.11, Annexure-A, and conditional uses as listed in Table A.12, Annexure-A. shows the planning schedule of Mixed Use Area in Akkelpur Paurashava.

Table 10-17: New Development Proposal for Mixed Use Zone

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre (Proposed)	Phase
Ward Center	1	Amtraw (015_02)	1507,1508,1511,1512,1513,1514, 1515,1516,1517,1538,1539	1.88	1st Phase
Ward Center	2	Raj Kanda (031_00)	191,192,193,194,195,196,197	0.73	1st Phase
Ward Center	3	Akkelpur (016_00)	41,45,261,262,263,264	0.45	1st Phase
Ward Center	4	Akkelpur (016_00)	650,651,652	0.41	1st Phase

Ward Center	5	Hastab Santapor (017_02)	838,839,841,842,843,844,846	0.67	1st Phase
Ward Center	6	Hastab Santapor (017_02)	1048,1210,1212,1213,1214,1216, 1217,1218,1219,1272	1.17	1st Phase
Ward Center	7	Kesobpur (026_00)	1,3,4,5,6,10,11,12	1.35	1st Phase
Ward Center	8	Manikpara (029_00)	340,341,342,343,344,360,361,362 ,363,364	1.0	1st Phase
Ward Center	9	Chokropara (028_01,02)	23,24,61,479,543,544	0.75	1st Phase
Total Proposal				**8.41**	

Governmental Services

Administrative zone covers all kinds of government and non-government offices in the town. The total area under this use has been estimated as it has now.

Education and Research Area

Institutional zone refers to mainly education, health and other social service facilities as listed in Table A.13, ***Annexure-A***, and conditional uses as listed in Table A.14, ***Annexure-A***. The total area under this use has been determined as 26.19 acres although the standard suggests about 43.85 acres of land. The consultant does not maintain the standard due to insufficient land and try to keep protect agricultural land as much as possible. Detail new land proposal for education and research is shown in **Table 10-16**. Some standard of LGED is not considered here due to insufficient land in built up area. Total seven primary schools, one secondary school, one vocational training institute and one college will be established in this land. shows the planning schedule of Education and Research Area in Akkelpur Paurashava.

Table 10-18: New Land Proposal for Education and Research

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre (Proposed)	Phase-wise development		
					First Phase	Second Phase	Third Phase
Primary School	5	Hastab Santapor (017_01)	110,111,114,115,116,117, 118,119,120,122,143	2.8	Land acquisition and establish	Continue the further development of the Primary school.	
Vocational Trainning Inst.	8	Manikpara (029_00)	204,209,210,211,212,213,214,215,216 ,217,218,220,221,231,232,233,234,235, 236,237,238,239,240,241,242,243,244, 245,247,248,249,250,251,252,253,254, 255,256,257,258,259,260,261,262, 263,264,265,266,273,274,275,276, 277,278,279,280,281,282,283, 286,287,288,289,290,291,292,293,294, 296,298,299,	10.96	Land acquisition and establish	Continue the further development of the Primary school.	
Total Proposal				**13.76**			

Agriculture Area/ Agricultural Zone

The Paurashava has a vast area of agricultural land that demands formation of a separate zone of, agriculture. Agriculture zone is primarily meant for agriculture; land uses related to it and land uses that support it. Detail of land use is presented in Table A.17, Annexure- A and conditional uses as listed in Table A.18, Annexure- A. The total area under this use has been estimated as 2827.42 acres that include existing and proposed land uses. shows the planning schedule of Agriculture Area in Akkelpur Paurashava.

Water Body

The plan suggests preserving most of these water bodies for two purposes, first, to serve as source of water, second to serve as water retention area during monsoon. The ponds with an area equal to or More than 0.25 acres will be preserved as the water retention ponds accoding to **The Act (36 of 2000) for Conservation of Play field, Open space, Park and Natural Water Reservoir in Mega City, Divisional Town, District Town and Paurashavas of Bangladesh**. There will be permitted uses in this zone as stated in Table A.23, Annexure- A and some other uses may conditionally be permitted as stated in Table-A.24, Annexure- A. shows the planning schedule of Water Body Area in Akkelpur Paurashava.

Open Space/Recreational Facilities

This zone has been provided to meet the active and passive recreational needs of the people and at the same time, conserve the natural resources. The total area under this use has been determined as 38.31 acres although the standard suggests about 65.02 acres of land. The consultant does not maintain the standard due to insufficient land and try to keep protect agricultural land as much as possible. The details of permitted and conditional permits have been presented in Table A.19 Annexure- A, and conditional uses as listed in Table-A.20, Annexure- A. **Table 10-17** shows the detail of new land proposal for open space proposal in Akkelpur Paurashava. There are two playgrounds, one stadium, one central park and one local park will be established in this proposed open space. Table 10-17 shows the planning schedule of Open Space Area in Akkelpur Paurashava.

Table 10-19: New Land Proposal for Open Space

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre	Phase-wise development		
					First Phase (1st to 5th yr)	Second Phase (6th to 10th yr)	Beyond 10th year
Stadium	1	Amtraw (015_01)	594,603,604,605,606,607,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,631,632,638,640,642,643,644,645,646,647,648,649,1121	9.75		Land acquisition and establishment	Maintaining the Stadium and improve facilities.
		Amtraw (015_02)	1421,1423,1459,1476,1477,1707				
Playground	7	Kesobpur (026_00)	3,4,53,54,55,56,57,62	1.24	Land acquisition and establishment	Maintaining the playground and improve facilities	
	2	Raj Kanda (031_00)	141,142,149,153,154,155,156,157,165,166,360	2.28		Land acquisition and establishment	Maintaining the playground and improve facilities
	5	Hastab Santapor (017_02)	842,844,846,847,848,849,882,1568	1.75		Land acquisition and establishment	Maintaining the playground and improve facilities
Central Park	2	Biharpur (030_00)	578,584	4.84	Land acquisition and establishment	Land acquisition and establishment	
	8	Manikpara (029_00)	39,155,156,461,462,463,464,467,603,604				
Neighborhood Park	7	Kesobpur (026_00)	1,6,7,8	2.76	Land acquisition and establishment	Maintaining and improve facilities.	
	6	Sri	214,215,216,217,218,219,22	4.76		Land	Maintaining

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre	Phase-wise development		
					First Phase (1st to 5th yr)	Second Phase (6th to 10th yr)	Beyond 10th year
		Krisnopur (018_00)	0,222,223,224,231,264,265, 543,544,545,546,547,548,55 4,555,561,596			acquisition and establishme nt	and improve facilities.
	2	Biharpur (030_00)	229,230,231,232,233,239,44 0,578	0.94		Land acquisition and establishme nt	Maintaining and improve facilities.
Total Proposal				**28.31**			

Circulation Network

The road network is mainly considered as circulation network. National highway, pucca/ semi-pucca/ katcha road, footpath, flyover, over- bridge, underpass, bridge, culvert, railway, railway bridge all are include in circulation network. Total 245.66 acre land which covers 5.79% of total planning area of Akkelpur Paurashava. At present 72.47 acres of land uses for circulation network in this Paurashava. shows the planning schedule of Circulation Network in Akkelpur Paurashava.

Transportation Facilities

Ttransportation facilities incorporate transport and communication services. For an example airport, bus terminal/ stand, ferry ghat, filling station, and garage, launch terminal, post office, passenger shed, telephone exchange, ticket counter, transport office etc. The total area under this use has been determined as 4.17 acres although the standard suggests about 6.77 acres of land. The consultant does not maintain the standard due to insufficient land and try to keep protect agricultural land as much as possible. Some standard of LGED is not considered here due to insufficient land in built up area.shows the planning schedule of Transportation Facilities in Akkelpur Paurashava. **Table 10-18** shows the new transportation facilities for Akkelpur Paurashava.

Table 10-20: New Transportation Facilities

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre	Phase-wise development		
					First Phase (1st to 5th yr)	Second Phase (6th to 10th yr)	Beyond 10th year
Bus Terminal	1	Amtraw (015_01)	594,653,654,655,656,657,665, 666,667,668,669,670,671,672	3.47	Land acquisition and establishment	Maintaining and improve facilities	
	3	Akkelpur (016_00)	1,2,3,4,5,6,15,16,209				
Tempo /Nasimon Stand	4	Akkelpur (016_00)	Partial- 641	0.07	Land acquisition and establishment	Maintaining and improve facilities	
	1	Amtraw (015_01,02)	598,607,609,610,1420, 1421,1427	1.03	Land acquisition and establishment	Maintaining and improve facilities	
Rickshaw/ Van Stand	8	Manikpara (029_00)	39,157,465	0.23	Land acquisition and establishment	Maintaining and improve facilities	
Total Proposal				4.8			

Utility Services

It incorporated all utilities and service facilities except the health service. For an example water treatment plant, water reservoir, water pump house, public toilet, fire service, waste disposal, sewerage office, power office or control room and over head tank. In survey stage this type land use was define as service activity. The total area under this use has been determined as 8.02 acres although the standard suggests about 10.54 acres of land. The consultant does not maintain the standard due to insufficient land and try to keep protect agricultural land as much as possible. Total 02 waste transfer stations, one waste dumping station will be newly established to fulfill the desired need of Akkelpur Paurashava. **Table 10-19** shows the planning schedule of Utility Services in Akkelpur Paurashava.

Table 10-21: New Land Use Proposal for Utility Services

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre	Phase-wise development		
					First Phase	Second Phase	Third Phase
Waste Transfer Station	4	Akkelpur (016_00)	Partial-787,788,791	0.19	Land acquisition and establishment	Maintaining and improve facilities	
	4	Akkelpur (016_00)	Partial-392,9999	0.17	Land acquisition and establishment	Maintaining and improve facilities	
Waste Dumping Area	9	Mokimpur (034_00)	240,241,242,243,261,277,278,279, 280,282,283,284,285,288,289 ,290,291,292,293,294,295,296,298	6.82	Land acquisition and establishment	Maintaining and improve facilities	
Total Proposal				**7.18**			

Health Services

This land will be used to provide health facility. The total area under this use has been determined only 0.50 acres although the standard suggests about 16.05 acres of land. The consultant does not maintain the standard due to insufficient land and try to keep protect agricultural land as much as possible. Along with this community based health facilities ill be provided at ward center. Ward center is given in mixed use category in land use plan proposal.Table 10-20 shows the planning schedule of Health Services in Akkelpur Paurashava.

Table 10-22: New Land Use Proposal for Health Services

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre	Phase-wise development		
					First Phase	Second Phase	Third Phase
Clinic	3	Akkelpur (016_00)	Partial-261-264	0.56	Land acquisition and establishment	Maintaining and improve facilities	
Mother & Child Care Hospital	6	Hastab Santapor (017_02)	1219,1225,1226,1227, 1228,1229,1230,1231,12 32,1233,1234,1238,1264, 1268,1270,1271,1272	4.32		Land acquisition and establishment	Maintaining and improve facilities
Total Proposal				**4.88**			

Community Facilities

Community services include community centre, club house, religious centres, other community services etc. In additionally all funeral places and other religious uses incorporated in this category. The total area under this use has been determined 10.32 acres although the standard suggests about 10.54 acres of land. The consultant needed some extra land to meet demand of future population.Table 10-21.shows the planning schedule of Community Facilities in Akkelpur Paurashava.

Table 10-23: New Land Use Proposal for Community Facility

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre	Phase-wise development		
					First Phase (1st to 5th yr)	Second Phase (6th to 10th yr)	Beyond 10th year
Community Centre	9	Chokropara (028_01)	63,64,65,479	0.97	Land acquisition and establishment	Maintaining and improve facilities	
Fire Service	8	Manikpara (029_00)	Partial-159-162	1.00	Land acquisition and establishment	Maintaining and improve facilities	
Public Toilet	4	Akkelpur (016_00)	717,723,724	0.11	Land acquisition and establishment	Maintaining and improve facilities	
Total Proposal				**2.08**			

Restricted Area

A Restricted Area is an area where no one but certain people can enter. Here the areas which are not accessible for the general public except some high ranked personnel are considered as restricted area. There have been no restricted land is need to be required for Akkelpur Paurashava.

Urban Deferred

The Urban Deferred refers to lands lying outside of the urban growth boundary and identified as Urban Reserve. The total area under this use has been proposed as 20.36 (0.47%) acres that include existing and proposed land uses. shows the planning schedule of Urban Deferred Area in Akkelpur Paurashava. The following are permitted Uses within the Urban Reserve (UR) Zone:

- Agriculture, Livestock based
- Agriculture, Vegetation based (mushroom farms shall not be permitted)
- Existing facilities up to the date of gazette notification of the Master Plan. Condition is that, no further extension will be permitted.

10.2.3 Land Use Permission

One of the major purposes of land use zoning is to restrict an area for a particular use meant for the zone. This is intended to maintain a disciplined land use distribution and development. But there are many uses other than the use meant for the zone that are considered for permit in the zone. Sometimes such applications are accommodated to support or assist the area, with conditions imposed in giving land use permit, sometimes strict restrictions are maintained by refusal of applications. Detailed lists of permissible and conditionally permissible uses have been

provided in Annexure-A according to land use categories. The list has been developed with ideas borrowed from the recommendations made by the consultants under the recently completed DAP Project of RAJUK. It is required that permit procedures mentioned in Annexure-A are officially adopted through incorporation in the Building Construction Rules under Section 18 of the Building Construction Act 1952.

10.3 Plan Implementation Strategies

This section deals with the issues of implementation of land use plan. Discussion is made on development regulation and recommendation on implementation, monitoring and evaluation of urban land use plan.

10.3.1 Land Development Regulations to implement the Land Use Plan

Urban planning regulations are necessary for the smooth functioning of land use plan. The land use regulations impact on planned development and result in social benefits and costs depending on their nature and the specific contexts in which they are applied. Careful reforms of these regulations can result in a lower cost for urban development and for housing. An additional benefit could be in terms of a More functional spatial organization of the town. Regulations and processes that facilitate land availability and uses for planned development at affordable costs need to be continued. Regulatory and process reforms can lead to:

- more compact towns, containment of urban sprawl, more efficient urban forms,
- less costly urban infrastructure,
- more market-friendly development of urban land;
- more intensely used central areas, better efficiency of public transportation systems and decrease in trip length and transportation costs;
- less violations in zoning, sub-division and building regulations, and reduction in non-conforming and non-compatible uses and slums;
- reduction in difference between what is allowed under regulations and what is financially feasible due to land use reforms leading to reduced opportunities for corruption;
- generally lower land prices in city/town but higher prices in some prime commercial and business districts driven by market forces;
- average urban population densities likely to stay constant as more efficient land use consumption.

The following measures of Land Development Regulations should strictly be followed for the proper implementation of the Land use Plan.

a. Restriction on Use of Land Contrary to the Master Plan

No person shall use any land for any purpose other than that laid down in the land use zoning of the Master Plan approved by the Government. All future developments and constructions, both public and private within the area of Structure Plan shall be in conformity with the Master Plan approved by the Government. No compensation shall be payable to any person owing to demolition of any construction developed in violation of the Master Plan provisions.

b. Building Permission and Construction Approval

Development control mechanism will be one of the major plan implementation instruments to be carried out through the Building Construction Rules under Section 17 of the BC Act 1952 and the land use provisions of the Master Plan.

c. Building Permission in Proposed Development Areas

The Master Plan proposes a number of development projects. Many of the lands under these development projects are under private ownership. No development in these lands by their owners will be allowed. They will remain in the present form till they are taken over by the respective authority for development or the development project is abandoned.

d. Parking in Commercial and Mixed Use Areas

For parking, BC Rules, 1996 has specific provisions for housing and commercial areas. But no provision has been suggested for mixed use areas. According to the rules for commercial area, 23 sq.m areas, has to be reserved for every 200 sq.m of commercial space. The consultant suggests that for mixed areas, BC Rules, 1996 meant for commercial area should also be applied to the mixed areas under the current plan.

f. Rules for Realization of Betterment Fee

The Ordinance enables Paurashava to charge betterment fees on land owners or any other person having interest in it for an increase in land value due to execution of any development scheme by the Authority. The Authority should develop appropriate procedures in this regard and get them approved to start charging betterment fee. Due to failure of execution of the powers of charging betterment fee, all benefits of land value enhancement due to Paurashava development projects goes to the land owner at the cost of the community. So it is not irrational for the road developer to demand a share of the benefit accruing to the land owner following road development.

g. Planning Rules for Real Estate Companies

With the increase in population, there will be further rise of land based real estate activities. But there is no provision in the Paurashava Ordinance to control the activities of real estate companies. It is needed that infrastructure and services provided in the housing plans of the real estate projects be standardized to secure interest of the buyers. Strict vigilance is needed against any fraudulent practices that might affect public interest.

However, any control imposed on the housing companies must be imbued with a positive approach, so that it does not affect the housing promotion activities of the private sector. The intention would be to allow them function under certain control that would secure public interest and at the same time will not discourage private investment in housing. The infrastructure, services and facilities provided in a housing project must be standardized. Road width and the land allocated for community facilities must be adequate to meet requirements of the future inhabitants. The infrastructure provided therein must follow minimum standard as some day these housing estates would become parts of the future town and the infrastructure provided therein would be used by a wide range of population of the town.

To control apartment development, the national rules under Building Construction Act 1952 will be applied. The rules for land based real estate projects exist for Dhaka only. In anticipation of

expansion of real estate projects, there is an urgent need to prepare a set of rules for small towns. The real estate companies seeking approval for their housing project layout plan must fulfill certain conditions as set in the rules. The set of rules is clearly described in the Private Residential Land Development Rule-2004.

h. Minimum Road Width

Building Construction Rules, 1996, should be amended in the following way by incorporating the minimum road width standard.

To ease future traffic movement, it is necessary to keep provision for wider roads in the present plan. It is an uphill task to widen roads after development has taken place along the road. So it is wiser to reserve wider right of way for new roads now. Building Construction Rules, 1996 has determined the minimum road width as 12 ft. or 3.65 meter for roads in general and approximately 10 ft. for private roads. The consultants feel that this standard is not enough in view of future increase in population density and traffic. For safeguarding and easing future traffic movement the consultants have set the minimum width for any road for common use as 20 ft. or 6 meter and 16 ft. or 4.77 meter for private roads. However, in the built up areas, where development has already blocked the scope for developing such wide roads, the consultant recommends the minimum road width provisions of BC Rules, 1996. The new road width provision will be applicable in new areas. In the areas, where there already exist roads of less than 20 ft., the land owners on either side of the road will equally share the space needed to increase the road width to 20 ft. The land owners must leave the space vacant for taking it over by the Paurashava for widening of the road at some later date. No proposal for construction should be permitted on the vacant space reserved for road widening though the land will remain under its current ownership till it is taken over by the authority. In the light of the above recommendations, necessary amendment will have to be brought in the Building Construction Rules, 1996 applicable to the secondary and small towns only.

i. Low Land, Pond and Drainage Path

No low land that retains water for certain period of the year can be filled up and no obstruction to natural or man made drainage system shall be allowed. Prior permission of Akkelpur Paurashava will be required for filling up of any low lands. The Paurashava shall accord such permission based on prevailing laws. All ponds should not be allowed to be filled up as they are a good source of urban water supply as well as serve as open space. As per the The Act (36 of 2000) for Conservation of Play field, Open space, Park and Natural Water Reservoir in Mega City, Divisional Town, District Town and Paurashavas of Bangladesh, the use of these water bodies can not be changed without prior permission of the authority.

j. Security Areas - Cantonment, BDR, Police Stations

BDR, Police, etc. areas have to be safe guarded from any possible incompatible development.

k. Radio, Television, Water Treatment and Pump Station and Power Station Sites

The key point installations including radio, television, water treatment and pump station and power station sites will have to be safeguarded from any possible undesirable development around these areas that can endanger their security. No building except vegetation should be allowed within 183 meters around the transmission towers.

10.3.2 Implementation, Monitoring and Evaluation of the Land Use Plan

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 the execution on 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 Akkelpur 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.

Updating of Plans

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 professional and fund that are highly lacking in Akkelpur Paurashava. There is no planner or planning department in the Paurashava. Updating would require service of senior level planners that Paurashava would 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. A new set of plans would 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 move for setting up a planning department with planner(s) and other staff. The department 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.

Chapter 11: Traffic and Transportation Management Plan

11.1 Introduction

11.1.1 General

The transportation system directs the urban development pattern. The performance of transportation system largely influences the economy and social progress of an area. It provides mobility to people, goods and services to their destination. It has linkages with other sectors of development and for a sustainable development of any area, its traffic and transportation system should be adequately addressed. The current chapter of the report is about Transportation and Traffic Management Plan covering the scope of improvement of the existing network and system and plan proposals for new development. The proposals on improvement and new development are made for the project area up to 2031. The report also provides the purpose and the role of Transportation and Traffic Management Plan and its relation with Structure Plan and Land Use Plan.

11.1.2 Approach and Methodology

Transport study provides special attention to urban transportation planning as it greatly influences the location decisions and travel behavior of people, goods and services. Transportation is critical for the efficiency of towns contributing to their productivity and economic growth. A good network of roads & other transportation mode coupled with an efficient transport management system makes a substantial contribution to the "working efficiency" of cities and towns and enables them to become catalysts for social and economic development. On the other hand, the impact of a poorly designed urban transport system is manifested in terms of traffic congestion, delays, accidents, high energy consumption, high pollution of the environment and inequitable access to services. A well-planned transportation system results in orderly urban growth, greater use of urban public transport, lower vehicular pollution, and shorter auto trips.

Standard methodology was followed for traffic study in the project area. An introduction meeting was held at Paurashava and the Paurashava authority recommended Wednesday as local Hat day and others as regular day to conduct transport survey. With reference to their observations, survey time was set from 6:00 AM to 12:00 PM for those two days when traffic movements were frequent.

In order to identify the major causes of the congestion and the nature of the problem on transportation networks, a number of tasks were undertaken. Those tasks included traffic volume counting at the directions, speed and delay studies, Origin-Destination (O-D) survey at major traffic generating intersections and consultation with the stakeholders regarding the generated problems. The volume and movement pattern of people and goods within the planning area were collected through a series of volume and O-D surveys.

In addition to collect information on volume and pattern of traffic movement by traffic survey, the Consultant accommodates certain important questions regarding people's attitude and preferences.

The volume counts were conducted at four points in a node. For this, Manual counting method was followed to conduct the traffic volume survey and data was recorded in prescribed formats (**Table 11-1**).

Table 11-1: Sample Size and Location Number According to Surveys

Types of Survey	Sample Size/Locations
Volume count	1 nodes
O-D survey	80 Samples at three location
Journey Speed/Delay	JoypurhatRoad and link connecting Ward 1 , 3 and 4

Details methodology of the work is shown in a flow chart (***Fig 11-1***) below.

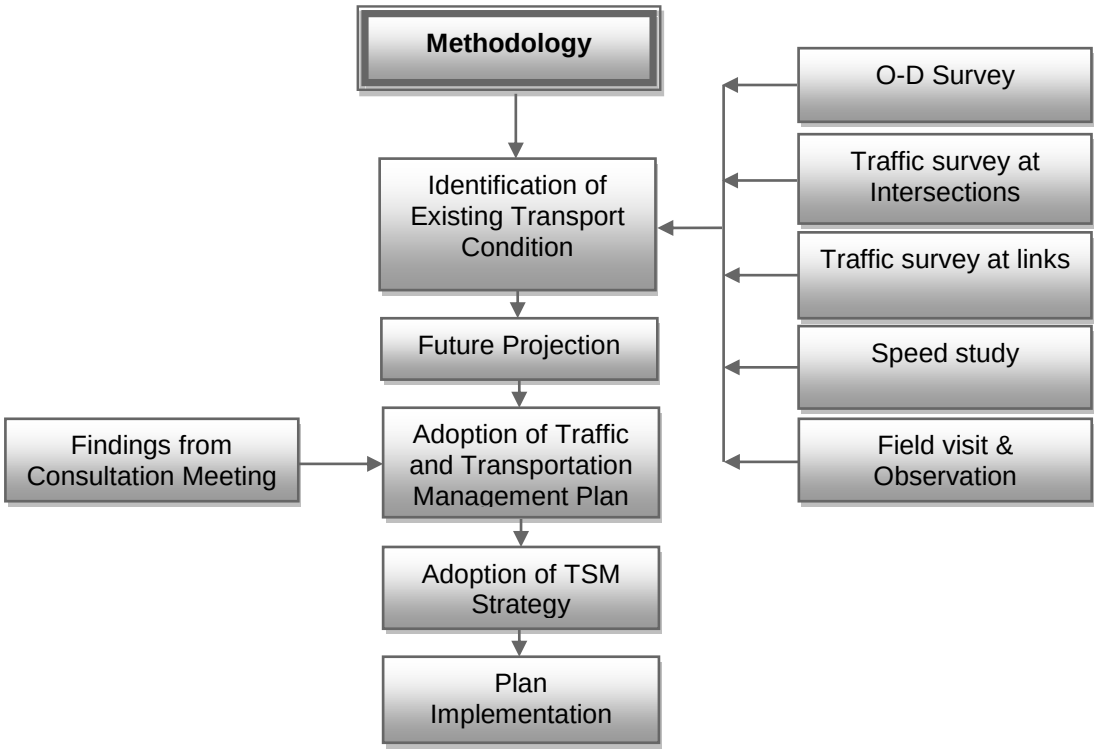


Fig 11-1: Flow Chart of the Methodology

11.2 Existing Conditions of Transportation Facilities

11.2.1 Roadway Characteristics

The planning area covers 17.17 sq. km. (4243.27 acres) and road length is 85.10 km. There are only one important road intersections named Paurashava morr providing linkages with other secondary roads. Akkelpur Paurashava does have direct transport communications with the Dhaka by bus. The areas towards the Joypurhat-Akkelpurroad are predominantly rural with little commercial development along the road. The road network and hierarchy within the Paurashava boundary is poorly established.

The roads of the Paurashava belong to number of agencies. Local Government Engineering Department (LGED) responsible for construction and maintenance of Upazila and Union roads and

Akkelpur Paurashava responsible for construction and maintenance of roads within the Paurashava area. Existing transportation system is dominated by road network catering to the passenger service and freight transport (**Table 11-2**).

Table 11-2: Road status in Akkelpur Paurashava

Road Type	Length (Km)	%
Pucca	30.23	35.52
Semi-Pucca	25.93	30.47
Katcha	28.93	34.00
Total	85.10	100.00

Source: Transportation Survey of Akkelpur Paurashava by AQUA, 2010.

The road network provides access to various places within the study area and connects various parts of the country following bus routes. Major trips of vehicles are generated from, Akkelpur Bazar and Santhahar Road, Akkelpur Bazar to Chokropara road. Existing transportation system is dominated by road network catering to the passenger service and freight transport.

The major routes which connect Akkelpur Paurashava are:

- Akkelpur-Santhahar
- Joypurhat-Akkelpur
- Akkelpur-Chokropara

Apart from major roads, a large number of local roads having width varying from 10 ft. to 20ft width, provide access to individual houses and establishments and connect them to major roads.

11.2.2 Mode of Transport

Road is the only mode of transport in the Paurashava. The road is using for efficient movement and multi-dimensional purposes. As a result, transportation survey includes only the road transportation and the outcome of the survey is presented in the following paragraphs.

11.2.3 Intensity of Traffic Volume

To analyze the existing traffic situation, one location has been identified where the volume count survey were conducted for 18 hour basis. To find out total discharging traffic volumes both in peak hour and off peak hour traffic survey has been analyzed. The Traffic Volume survey was conducted on the following Paurashava Morr that is very important considering the locational importance as these locations do not only cover the inter-Upazila traffic but also provide accurate view of the local traffic. The following figure shows details of the traffic node. Motorized traffic flow occurs in North-East direction according to diagram, especially only for bus service. The north (Joypurhat) and east (Joypurhat) links can be characterized by two funnel connected face to face in the node. A general overview of the traffic flow has been given in the following ***Fig 11-2***. It is found that traffic movement in general occur mainly bazar morr. A significant number of vehicle trips are also attracted towards north-south corner of the node.

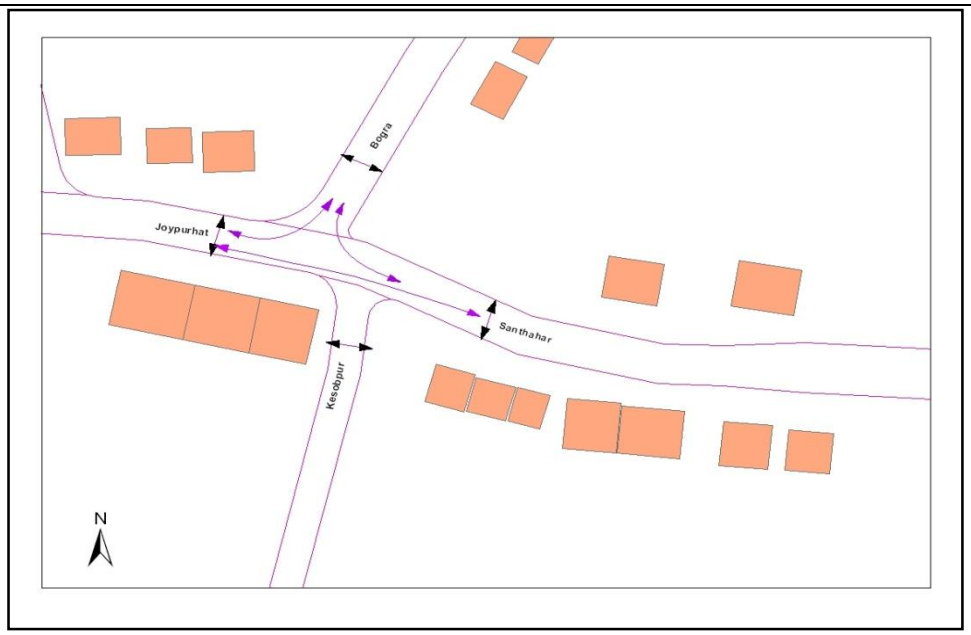


Fig 11-2: Paurashava morr Intersection Flow Diagram

11.2.4 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.

Traffic generation centers at Akkelpur Paurashava are very limited. The central bazar is the main Traffic generation center. Besides, different governmental offices, shopping centers, educational institutions etc. are also generate traffic.

Traffic generation centers are mostly Bus Stoppage, Bazar, and Police box, Different Educational Institutions, Different Markets, Katcha Bazars, Land Office and Different Govt. Offices. Traffic generation centers are mostly Bus Stand, Different Educational Institutions, Different Markets, Katcha Bazars, Land Office and Different Govt. Offices. The bazaar areas are the most congested areas in Akkelpur Paurashava.

The transportation services are also very limited in Akkelpur Paurashava. Wikipedia rates the Roadway Level-of-Service (LOS) by using speed survey data (**Table 11-3**).

Table 11-3: Roadway Level-Of-Service (LOS) Ratings of Wikipedia

LOS	Description	Speed (mph)
A	Traffic flows at or above the posted speed limit and all motorists have complete mobility between lanes.	Over 60
B	Slightly congested, with some impingement of maneuverability. Two motorists might be forced to drive side by side, limiting lane changes.	57-60

LOS	Description	Speed (mph)
C	Ability to pass or change lanes is not assured. Most experienced drivers are comfortable, and posted speed is maintained, but roads are close to capacity. This is often the target LOS for urban highways.	54-57
D	Typical of an urban highway during commuting hours. Speeds are somewhat reduced, motorists are hemmed in by other cars and trucks	46-54
E	Flow becomes irregular and speed varies rapidly, but rarely reaches the posted limit. On highways this is consistent with a road over its designed capacity.	30-46
F	Flow is forced; every vehicle moves in lockstep with the vehicle in front of it, with frequent drops in speed to nearly zero mph. A road for which the travel time cannot be predicted.	Under 30

[N.B. This table summarizes roadway Level of Service (LOS) rating. These only account for motor vehicle traffic speeds and congestion delay. Other impacts and modes are often ignored.]

The LOS for different roads of Akkelpur Paurashava is demonstrated here on the basis of Wikipedia ratings (**Table: 11-4**).

Table 11-4: Existing Level of Service (LOS) of major roads of Akkelpur Paurashava

Sl. #	Name of Roads	Speed (mph)							LOS
		Truck	Bus	Car/ Microbus	Auto Rickshaw	Motorcycle	Other (Nosimon)	Average	
1	Joypurhat-Akkelpur	25.00	30.00	48.50	22.30	52.84	20.00	33.1	E
2	Akkelpur - Santhahar	25.00	32.00	45.20	23.25	55.25	22.20	33.8	E
3	Akkelpur to Chokropara	-	-	35.25	20.50	50.00	20.25	21.0	F

Source: Traffic and Transportation Survey Data of Akkelpur Paurashava by AQUA, 2011

The Origin-Destination (O-D) survey is important in describing transportation. This survey is conducted to collect information on travel and transportation generated between zones of a study area. Due to the proper design, this study will identify the passenger movements where and when trips originated and end, the socio-economic characteristic of the trip market, the purpose of travel and the mode of travel. **Table 11-5** describe about Paurashavas O-D trips.

Table 11-5: O-D matrix of surveyed trips of Akkelpur Paurashava

		W1	W2	W3	W4	W5	W6	W7	W8	W9	OP (Joypurhat)	OP (Santhahar)	OP (Bogra)	Total
Origin	W1	6	2	5	5	4	5	3	5	2	0	0	0	37
	W2	3	5	6	5	5	3	3	2	3	0	0	0	35
	W3	4	3	6	4	4	3	3	2	2	0	0	0	31
	W4	2	3	5	9	3	2	2	2	1	0	0	0	29
	W5	1	2	5	4	2	3	2	1	2	0	0	0	22
	W6	1	2	4	5	2	3	2	3	1	0	0	0	23
	W7	1	2	4	3	2	2	2	3	2	0	0	0	21

	W8	1	2	2	3	2	2	1	2	2	0	0	0	17
	W9	1	1	3	3	3	2	2	2	2	0	0	0	19
	OP (Joypurhat)	2	1	2	1	1	1	2	2	2	0	3	4	21
	OP (Santhahar)	1	2	2	0	0	2	2	2	3	2	0	1	17
	OP (Bogra)	2	1	0	2	2	0	0	0	0	5	0	0	12
	Total	25	26	44	44	30	28	24	26	22	7	3	5	284

*W= Ward, IP=Inside Paurashava, O=Outside Paurashava
Source: Traffic and Transportation Survey Data of Akkelpur Paurashava by AQUA, 2010

Table 11-6 reveals that both are internal and external trips. It is found that ward 4 Akkelpur bazar attracts more trips. Apart from this, ward1, 2, and 9 also place for trip destination. It is also noted that this road also used for external trips, for instances a significant number of trips produce and go for Joypurhat.

Table 11-7 shows the relationship between mode use and trip purpose where it is found that trips is mainly used for work purpose. Rickshaws are used for all types of trips especially for work trips.

Table 11-6: Trip Purpose according to Mode Use of Akkelpur Paurashava

Vehicle	Work/Personal Business	School/College/ University	Shopping	Social/Recreation/ Sports	Home	Others	Total
Truck	4	0	0	0	0	0	4
Bus	2	1	0	0	0	3	6
Car/pickup/jeep	1	2	1	1	0	0	5
Auto-rickshaw/Tempo	4	1	3	2	0	1	11
Motorcycle	4	4	2	2	2	2	16
Rickshaw	4	3	3	1	3	1	15
Bi-cycle	1	1	3	1	2	1	9
Votvoti	2	1	1	0	1	1	6
Van	3	1	1	1	1	1	8
Total	25	14	14	8	9	10	80

Source: Traffic and Transportation Survey Data of Akkelpur Paurashava by AQUA, 2010

11.2.5 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 Akkelpur Paurashava.

11.2.6 Analysis of Existing Deficiencies

Like any other town, Akkelpur 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.

11.2.6.1 Roadway Capacity Deficiencies

Primary Road

The Joypurhat and Akkelpur-Snathahar Road is known as primary road as per Akkelpur Paurashava, length is 4.93 km and width is 4.52m. Road standard (ROW) recommended is 100 feet proves that the ROW of the existing primary road in the Paurashava is lower than the standard (ROW) recommended.

Secondary Road

There are three major secondary roads are in the Paurashava named Chokropara road, length is 2.31 km and average width 3.05 meter, Station road, length is 0.72 km and average width 3.37 meter and Kesobpur Road, length is 1.52 km and average width 2.99 meter.

Road standard (ROW) recommended is 40 feet to 60 feet, proves that the ROW of the existing secondary roads in the Paurashava is lower than the standard (ROW) recommended.

Tertiary/Acess Road

In the Paurashava, two major tertiary roads have been identified and they are Gurki Road, length is 1.89 km and average width 3.51 meter. Santapor Road, length is 1.69 km and average width 3.13 meter.

Road standard (ROW) recommended for tertiary road is 20 feet to 40 feet, proves that the ROW of existing tertiary roads in the Paurashava is lower than the standard (ROW) recommended.

Narrow Road Width

Narrow widths of roads and poor maintenance have marked by most respondents as major road problems in the town. From the survey, it has found that there are various problems in connection with transport such as problem of narrow road, and damaged during rainy season etc. This will cause traffic on the street will rise and will create serious traffic congestion on the narrow streets. The project area is served by 85.10 kilometers of roads. When asked about the problem of roads, they pointed to narrow width of roads, flooding of roads during monsoon, poor condition of roads due to lack of maintenance, traffic congestion at particular points of the town.

When asked about the problem of roads, most households respondents answered affirmative (Household survey, 2010). Indicating to major road problems, they pointed to narrow road; broken roads due to poor maintenance, flooding of roads during monsoon, and traffic congestion.

The following **Table 11.7** shows the details about the road width deficiencies of Akkelpur Paurashava.

Table 11-7: Width of some Major Roads in Akkelpur Paurashava

Type	Name	Type	Length (Km)	Width (m)
Primary Road	Joypurhat-shanthar Road	Pucca	4.93	4.52
Secondary Road	Thana Road	Pucca	1.64	3.37
Secondary Road	Bogra Road	Pucca	2.56	3.86
Secondary Road	Chokropara Road	Pucca	2.31	3.05
Tertiary/Acess Road	Chudhurypara Jame Mosque Road	Pucca	0.91	2.46
Tertiary/Acess Road	Kesobpur Road	Pucca	2.05	2.99

Source: Transportation Survey of Akkelpur Paurashava by AQUA, 2010

The above table clearly define that the Paurashava has severe deficiencies regarding road width. It has been very unfortunate that not a single road (including primary road) has not near to the standard width mark. It has been found that very narrow road width (less than 8 feet roads) which only provides free movement of a rickshaw is 53.64 percent of the total roadway. Narrow roads are defined as those road having 8-12 feet width where two rickshaws can pass comfortably (21.28%).

Map 11-1: Width of some Major Roads in Akkelpur Paurashava

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 one main point where the traffic conflict is highest, which is Bazar Morr Intersection. At this point the slow moving vehicles, like, rickshaw, Nasimon 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.

11.2.6.2 Operational Safety, Signal and other Deficiencies

Traffic management system is absent in the Paurashava. No operational system yet being imposed on traffic movement.

Due to the minimum PCU/hr. both in hat and non-hat day, availability of non-motorized vehicles and absent of available built-up area, road safety exists naturally in the Paurashava.

Traffic signaling system is totally absent in the Paurashava. Generally, traffic signaling system will not be needed up to the limit of the planning period. On some specific point of primary and secondary roads, traffic signaling will be needed.

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

Within the Paurashava there exits no rail way network.

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

11.3 Future Projections

Road design standards are prescribed in the section 21 of the Public Roads Act, 2004. The regulations of the sections are:

1. The Government may declare design standards for roads by publication in the Official Gazette.
2. The road design standards shall set out design requirements for roadways and road-related areas including structures located on roadways or road-related areas.
3. A road authority shall comply with the road standards when carrying out works on a roadway, road-related area or when installing, modifying or maintaining a structure on a roadway or road-related area.
4. Despite sub-section (3), a road authority is not required to comply with the road standards if:
    a. The road authority is carrying out maintenance and, in the view of the road authority; it would not be practicable to comply with the road design standards.

b. The Government has, in writing, exempted the road authority from complying with the road design standards in relation to the works or structure.

c. The Government may revoke or amend road design standards in the same manner as a declaration.

The Urban Area Plan for Dhaka City has recommended road standards with the consideration of traffic volumes, which were not undertaken in conjunction with the Dhaka Integrated Transport Study (DITS). A wide range of standards was suggested for various classes of roads, ranging from 4 meters to 24 meters, as mentioned below. The required right of way (ROW) is also indicated:

- Main Road 24.0 meter (78 ft) ROW
- Arterial Road 14.5 meter (47.5 ft) ROW
- Collector Road 13.0 meter (42.6 ft) ROW
- Access Road 9.0 meter (29.5 ft) ROW
- Access Road 6.0 meter (19.7 ft) ROW
- Non-motorized Road 4.0 meter (13.4 ft) ROW
- Footpath 2.5 meter (8.2 ft) ROW

In order to promote development of all roads in a systematic manner, new road standards were recommended for both built up areas, as well as for less built-up areas. These will replace the old standards, which were included in the Dhaka Metropolitan Development Plan (DMDP). The standards, when adopted will facilitate earmarking the right of way (ROW) for all major roads. The details of these standards used in this plan are indicated in **Table 11-8** below.

Table 11-8: Geometric Road Standard of Roads Proposed by LGED

Types of Road	Recommended width
Paurashava Primary Roads	150-100 feet
Paurashava Secondary Roads	100-60 feet
Local Roads	40-20 feet

Source: UTIDP Planning Standard, LGED

11.3.1 Travel Demand Forecasting for Next 20 Years

Existing road network is quite enough for accommodating present volume of traffic. The study area is rural in nature. Most of the roads are katcha and needs to be constructed as pucca. Katcha roads become clayey in the rainy season and bring immense sufferings for the users. As a result, social, cultural and economic activities are disrupted significantly at that time. A very limited uses of small boats are found for transportation of goods within the short distance particularly on hat day. Due to the absence of effective alternatives, passengers and goods movement of the study area is largely dependent on road transportation. This dependency will be calculated according to the increase of accessibility, consideration of the missing links, volume of traffic movement, bulk density of the area and economic importance of the area. Growth direction is also a considerable component for the demand analysis of the road.

11.3.2 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.

11.3.3 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 future traffic volume of Akkelpur Paurashava is forecasted by adopting extrapolation method. An extrapolation factor indicating the growth trends, which is derived from earlier and present year traffic volume is introduced in this method. The future traffic volume is forecasted at one intersection, which is bus stand morr intersection, is the most important intersection of the Akkelpur Paurashava. The intensity of traffic movement observed in these intersections is high and traffic conflict is prevalent at these points. The forecasted traffic volume of one major intersections of Akkelpur Paurashava is presented in **Table11-9**.

Table 11-9: Projection of Target Year Traffic Volume

Name of Intersection	Duration	Year			
		2011	2016	2021	2031
Traffic Volume at Paurashava morr Intersection	09:00-10:00	220	267	323	392
	10:00-11:00	286	347	420	509
	17:00-18:00	272	330	400	484
	16.00-17.00	185	224	272	329

Source: Transportation Survey of Akkelpur Paurashava by AQUA, 2010

For this reason, future population growth is often a good indicator of future increases in traffic volumes.

The Level of Service (LOS) represents the minimum acceptable performance standards on a particular roadway facility indicated in **Table 11-10**. 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

Table 11-10: Level of Service of Different Major Roads and their Relative Proposals

Sl. #	Road Name	Average Speed of Vehicle(km/h)	Road Width (m)	Level of Service	Remarks
1	Akkelpur–Joypurhat Road	33.1	5.75	E	Need road widening
2	Akkelpur –Santhahar Road	33.8	4.52	E	Need road widening
3	Akkelpur–Chokropara Road	21.0	3.04	F	Need road widening

Source: Transportation Survey of Akkelpur Paurashava by AQUA, 2010

11.4 Transportation Development plan

11.4.1 Plans for Road Network Development

The standards are meant for use by UTIDP, LGED and other planning and developmentagencies. The standards have been adopted by the consultants to draw up the transportationdevelopment plan. Following are the suggested planning standards (Table 11.11) for road networkdevelopment. These road hierarchies are proposed based on the functional linkage of the road ofAkkelpur Paurashava.

Table 11-11: Proposals of Roads Standard in the Project Area

Type	Width
Paurashava primary roads	ROW 60-80 ft
Paurashava secondary roads	ROW 30-50 ft
Access Road/ Local Road	ROW 20 ft

Source: *Upazila Towns Infrastructure Development Project and Proposed by Consulting Firm.*

Neighborhood and Local Road

The right of way (RoW) of all neighborhoods (mahallah) roads may be in between 20 ft. depending on their functions.

Standard Road Design

All urban roads should have flexible pavements. The road intersection should be designed toallow easy movement of vehicles. At bridge, the road design should provide for an adequate sightdistance and a smooth riding**.**

Functions of Roads

Each category of road has its particular functions to perform. Access road carries traffic frombuildings to the collector road and collector road carries traffic to the major road and vice versa. Inreality, however, it is almost impossible to maintain this hierarchical use of roads except in

anentirely planned area. However, functions will not be dependent on the road width, rather on thelocation of the road, surrounding land use and the link it is providing or the volume of traffic it iscarrying. Thus a 40 feet wide secondary road can become a major road due to its strategiclocation and the purpose it is serving.

11.4.1.1 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-11-8**. The standards are meant for use by UTIDP, LGED and other planning and development agencies. The standards have been adopted by the consultants to draw up the current series of plans. 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, Paurashava Secondary Road and Local Road are proposed designating a unique ID No. to each road for the purpose of identifying them in map. The road network plan along with transportation management plan is presented in **Map 11-2** below.

Paurashava Primary Road

Joypurhat-Santhahar Road is one of proposed Primary roads. Total length of primary road is 11.46 km with 80 ft and 60 ft RoW.Figure 11.3 showsthe layout design of primary road with 80ft RoW.

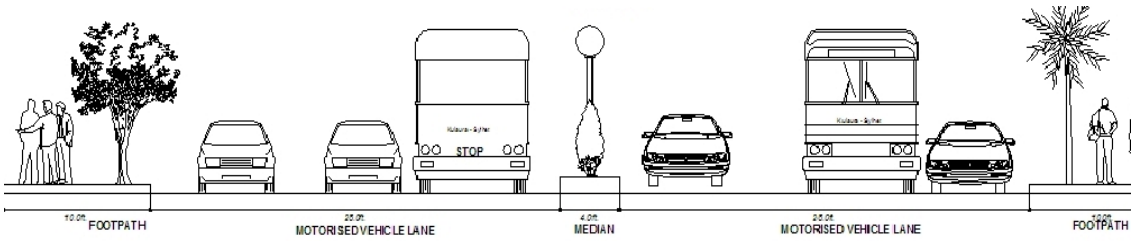


Fig 11-3: Primary Road Width 80ft ROW

Paurashava Secondary Road

Total secondary road is 35.69 km with 30-50 ft RoW and will be developed on different phases to fulfill the future needs of the Paurashava. Figure 11.4 shows the layout design of primary road with 40 ft RoW.

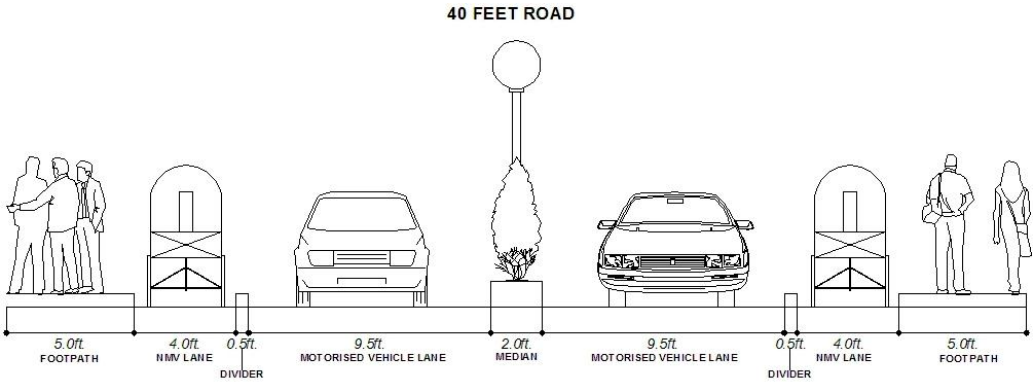


Fig 11-4: Secondary Road Width 40ft ROW

Access Road/ Local Road

Total Local road is 52.8 km with 20 ft RoW. Figure 11.6 shows the layout design of primary road with 20 ft RoW.

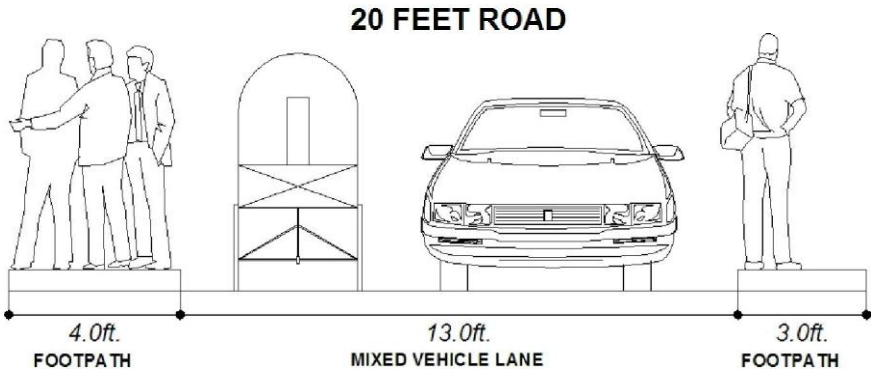


Fig 11-5: Local/Access Road Width 20ft ROW

11.4.1.2 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. Table 11.12 shows thesummary of road widening proposal.

Table 11-12: Summery of Road improvement Proposal in Akkelpur Paurashava

Road Type	Length (in meter)	Length (in km)	Percentage
Access/Local Road	51802.81	51.8	52.35
Secondary Road	35690.06	35.69	36.07
Primary Road	11455.31	11.46	11.58
	98948.18	98.95	100.00

Table 11.13 shows the detailed scenario of road widening proposal of Akkelpur Paurashava alongwith width of the existing roads.

Table 11-13: Road Improvement Proposal in Akkelpur Paurashava

Road ID	Width in ft		Length (in M)	Type of Road	Development Phase
	PW[1](Ex.) (m)	RoW[2] (Pr.) in ft			
WD-118	3.05	80	2314.594	Primary Road	Second Phase
WD-164	3.72	80	714.626	Primary Road	Second Phase
WD-351	5.75	80	749.210	Primary Road	First Phase
WD-376	3.72	80	4933.552	Primary Road	First Phase
WD-216	3.89	60	2498.377	Primary Road	First Phase
WD-238	3.09	50	2485.854	Secondary Road	First Phase
WD-237	3.70	50	2565.353	Secondary Road	Second Phase

Road ID	Width in ft		Length (in M)	Type of Road	Development Phase
	PW[1](Ex.) (m)	RoW[2] (Pr.) in ft			
WD-25	3.51	40	1891.320	Secondary Road	Second Phase
WD-41	2.66	40	2059.289	Secondary Road	Second Phase
WD-189	3.37	40	1640.171	Secondary Road	First Phase
WD-190	3.37	40	773.816	Secondary Road	Second Phase
WD-222	2.46	40	914.113	Secondary Road	First Phase
WD-298	2.35	40	858.313	Secondary Road	First Phase
WD-374	2.79	40	556.937	Secondary Road	Second Phase
WD-9	3.37	30	592.595	Secondary Road	First Phase
WD-27	3.37	30	2329.875	Secondary Road	First Phase
WD-38	3.05	30	1699.936	Secondary Road	First Phase
WD-93	4.52	30	725.854	Secondary Road	First Phase
WD-173	2.96	30	762.918	Secondary Road	Second Phase
WD-277	2.27	30	560.320	Secondary Road	Second Phase
WD-348	2.17	30	1027.482	Secondary Road	Second Phase
WD-349	2.17	30	878.059	Secondary Road	Second Phase
WD-355	3.09	30	1481.079	Secondary Road	Second Phase
WD-358	3.89	30	1063.152	Secondary Road	Second Phase
WD-361	2.17	30	769.923	Secondary Road	Second Phase
WD-371	3.70	30	1141.303	Secondary Road	Second Phase
WD-334	3.31	30	1342.121	Local Road	Second Phase
WD-33	2.51	20	808.532	Local Road	Second Phase
WD-43	1.99	20	546.934	Local Road	Second Phase
WD-142	3.61	20	643.898	Local Road	Second Phase
WD-382	4.52	20	500.383	Local Road	Second Phase

** Road length≥ 500 meter incorporated here. Detail was given in Appendix and Ward Action Plan.

1. PW (Ex.) : Paved Width of Existing Road
2. RoW (Pr.): Rights of Way of Proposed Road

Source: Upazila Towns Infrastructure Development Project and Proposed by Consulting Firm

Map 11-2: Proposed Road map of Akkelpur Paurashava

11.4.1.3 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 list 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 11-14**.

Table 11-14: List of Proposed Roads in Akkelpur Paurashava

Road ID	RoW in (Ft)	Road Type	Length in Meter	Phase-wise development
NR-25	40	Secondary Road	328.847	First Phase
NR-10	30	Secondary Road	215.388	First Phase
NR-21	30	Secondary Road	203.207	First Phase
NR-5	30	Secondary Road	241.187	First Phase
NR-23	20	Local Road	473.326	First Phase
NR-11	20	Local Road	330.733	First Phase
NR-13	20	Local Road	287.030	First Phase
NR-20	20	Local Road	259.653	First Phase
NR-22	20	Local Road	306.207	First Phase
NR-28	20	Local Road	212.528	First Phase
NR-30	20	Local Road	385.641	First Phase
NR-31	20	Local Road	365.003	First Phase
NR-32	20	Local Road	272.767	First Phase
NR-34	20	Local Road	271.951	First Phase
NR-52	20	Local Road	282.989	First Phase
NR-54	20	Local Road	220.503	First Phase
NR-58	20	Local Road	200.479	First Phase
NR-60	20	Local Road	288.315	First Phase
NR-62	20	Local Road	374.717	First Phase
NR-64	20	Local Road	676.368	First Phase
NR-65	20	Local Road	567.610	First Phase
NR-66	20	Local Road	542.136	First Phase

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

11.4.2 Plan for Transportation Facilities

11.4.2.1 Transportation Facilities Plan

Bus Terminal

There is a designated bus terminal in this Paurashava. So, there is no need to propose the new bus terminal rather than it is good to enlarge the existing terminal. Detail land use information of Bus Terminal is given in Table 10.18, Chapter 10 of this report.

Tempo/Rickshaw Stand

Tempo and Rickshaw 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. Detail land use information of Tempo Stand is given in Table 10.18, Chapter 10 of this report.

Table 11-15: List of Proposed Transport Facilities in Akkelpur Paurashava

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre	Phase-wise development		
					First Phase (1st to 5th yr)	Second Phase (6th to 10th yr)	Beyond 10th year
Bus Terminal	1	Amtraw (015_01)	594,653,654,655,656,657,665, 666,667,668,669,670,671,672	3.47	Land acquisition and establishment	Maintaining and improve facilities	
	3	Akkelpur (016_00)	1,2,3,4,5,6,15,16,209				
Tempo /Nasimon Stand	4	Akkelpur (016_00)	Partial- 641	0.07	Land acquisition and establishment	Maintaining and improve facilities	
	1	Amtraw (015_01,02)	598,607,609,610,1420, 1421,1427	1.03	Land acquisition and establishment	Maintaining and improve facilities	
Rickshaw/ Van Stand	8	Manikpara (029_00)	39,157,465	0.23	Land acquisition and establishment	Maintaining and improve facilities	
Total Proposal				**4.8**			

11.4.2.2 Parking and Terminal Facilities

There is no parking facilities provided in Akkelpur 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 one parking area is proposed at the north side of Akkelpur Paurashava (**Map 11-2**). 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
- Canteen

Proposed facilities accommodate in the truck terminal complex:

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

11.4.2.3 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 Akkelpur 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.

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

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.

Table 11-16: Traffic Control Facilities in Akkelpur Paurashava

Traffic Control System sub-division		Present	Remarks
Traffic Signs (Traffic signs are devices placed along, beside, or above a highway, roadway, pathway, or other route to guide, warn, and regulate the flow of traffic, including motor vehicles, bicycles, pedestrians and other travellers.)	Regulatory	None	Should be Installed
	Warning	None	
	Marker	None	
	Guide & Informational	None	
	Others	None	
Traffic Signals (Traffic signals are electrically operated traffic control devices which alternately direct traffic to stop and to proceed.)		None	
Traffic Police control Hour (Under this system, a person or a group of persons according to law by local/national authorities facilitate the movement of traffic and to prevent and/or report any breach of road traffic regulations on roadway.)		None	

Source: Transportation Surveyof Akkelpur Paurashava by AQUA, 2010

11.4.3 Waterway Development/Improvement Options

There is a potential scope of waterway network within the vicinity of the Akkelpur Paurashava and there isproposed two ghats from higher authority. Thus, waterway development option is not applicable at Akkelpur Paurashava.

11.4.4 Railway Development Option

There is no existing railway line in the vicinity of the Akkelpur Paurashava and there is no proposal for its establishment from higher authority. Thus, railway development option is not applicable at Akkelpur Paurashava.

11.5 Transportation System Management Strategy (TSM)

Traffic Management for Akkelpur Paurashava is not just to consideration of vehicle movement rather considering the suitability to walk comfortably, to ride bicycle, distance consideration, easy access to market, parking facilities, etc. Traffic management context for a local Town can be reconsidered as the following Figure:

11.5.1 Strategies for Facility Operations

- **Creation of major linkage**

As the town grows and the traffic intensifies on the streets, an efficient network of roads has to be built based on major North-South link. This would ensure direct connection between different curial nodes of the network and help reduce both travel length and time. This is a nonstop process and will be closely in interaction with the spatial development policies for the Town.

- **Lane-based traffic management**

Determining number of lanes on every street and their individual capacity and rooting the traffic management and any future expansion on that capacity assessment. Lanes can be designated for different modes. Use of every segment of the road has to be pre-designed and clearly defined e.g. movement, parking, pedestrian crossing etc.

- **Promote use of FFT (Fuel Free Transport) and discourage FDT (Fuel Dependent Transport)**

Use of fossil fuel and harmful emissions are a major environmental issue all over the world. That's where FFT can play a vital role. Modes like walking, bicycling are in general called 'green transport' for their environmental friendliness. Promotion of these means of mobility can eliminate long-term negative impacts of fuel-based vehicles and enhance health and safety of the inhabitants.

- **Promote Plantation on the Walking way besides of the Roads**

Embankment cum Roads and other major roads have been proposed for promoting plantation with street furniture.

- **Providing Properly Designed Pedestrian Ways**

Akkelpur Paurashava has no provisions of pedestrian ways, which is one of the major crucial problems for the Town in Transport sector. All necessary facilities should be provided for the pedestrians. A designed pedestrian ways must be integrated closely with other transportation elements so that walking becomes a recognized mode and becomes a pleasure and a place for brief social gatherings for the Paurashava dwellers.

- **Road space allocation:**

Road space should be allocated among different mode and use based on the hierarchy of the road and its adjacent land-use. This is essential for safety and effectiveness of the road.

- **Development & availability of Public Transport (PT)**

This should form the major share of the motorized vehicle. PT has to be available within comfortable walking distance from any part of the Paurashava. Maintenance of an efficient public transport provides a cheap and accessible solution for mass movement.

- **Preserve and utilize natural network (adjacent River/ Khals) as Transport Corridors**

Establishing the network of Khals and River as vital corridors of transportation, especially for goods movement would create a viable alternative to road transport and also help preserve this traditional mode. Water transport is usually cheap and as goods delivery generally has a lead time, waterways can play crucial role in this sector. It can also serve recreational purposes for the city dwellers.

- **Minimizing Transfer Times**

The present deficiencies in the inter-modal integration of the transport system are economically unsustainable in the long run. The current systems are time consuming to travel by more than one mode for the Town of Akkelpur Paurashava.

- **Integrating the Management of Land Use and Transportation in Akkelpur Paurashava**

The growth of the Town still concentrated to the core part of the area adjacent to the bazaar area which is just North Portion of the Municipality. To bring out a proper traffic and transport design

core part of the town have to manage with high consideration and the semi core and fringe area should have to design for future projection basis.

11.5.2 Strategies for Traffic Flow and Safety

The following strategies have been identified for Traffic flow and safety

- **Avoid dispersed and scattered development patterns**

Dispersed and scattered type of development promotes 'sprawl' and increases for travel. It raises the need for more and more transport corridors inducing ever greater traffic.

- **Consider traffic impact of land use and occupancy of structure while giving building construction and land use permit**

Kind of use for the any structure has to be clearly defined. 'Transportation Clearance' should be given considering the structure size and proposed use and has to be a compulsory criterion for receiving building permit.

- **Effective road network design has to consider for the mixed land-use areas that provide both places to live and work**

Mixed land use provides the commercial base for supporting viable public transit. For providing effective road network design the study has been proposed the road cross section according to the road categories.

- **Widening the existing Roads**

All existing Roads have to be widening according to the Land use Importance.

- **Provide parallel service roads along the National Highway and Ensure less Use of this Highway from Local Purposes**

Direct connection of over access roads, cattle using, haphazard way passenger/ vehicle over-crossing, adjacent tea shops/vegetable markets etc should be avoided. For this purpose service roads have been proposed for the High way to save from over connection of local roads and other high way related services.

- **Separate lane for NMT**

Provisions of Separate lane for NMT will help to avoid traffic jam and conflicts.

- **Pedestrian First**

All the roads of the Paurashava necessary facilities should be provided for the pedestrians. A designed pedestrian ways must be integrated closely with other transportation elements so that walking becomes a recognized mode and becomes a pleasure and a place for brief social gatherings for the city dwellers.

- **Parking Provision**

Auto Rickshaw, Rickshaw stoppage will be provided on the suitable place for the present need and also for growing future demand. Set up Rickshaw or Auto Rickshaw stops on street corners and other suitable locations.

11.5.3 Strategies for Traffic Management

The following strategies have been identified for Traffic Management

- **Formulate a Local Area Traffic Management Unit (LATMU)**

Designing, modeling and at last managing traffic and Transport is not an easy task. It needs important decisions of policy makers from both Public and Administrative representatives. For the Upazila Towns Mayor is the principle for taking any decisions whereas traffic and Transport related decisions require a Coordination Board where high official's opinion is very much important. For this purpose a small Town Transport Planning and management unit is require to manage traffic and transport situations.

- **Integrating the Management of Land Use and Transportation in Akkelpur Paurashava**

As transport is basically a function of land use, any proposed development should be examined with respect to the traffic impact it has on the locality. Kind of use for the any structure has to be clearly defined. 'Transportation Clearance' should be given considering the structure size and proposed use and has to be a compulsory criterion for receiving building permit.

The growth of the Town still concentrated to the core part of the area adjacent to the bazaar area which is just North Portion of the Municipality. To bring out a proper traffic and transport design core part of the town have to manage with high consideration and the semi core and fringe area should have to design for future projection basis. Mixed land-use creates vibrant, lively neighborhoods/communities and reduces the need for longer distance travel and commuting. Short distances travel also encourages use of sustainable alternatives like walking and bicycling. Mixed land use provides the commercial base for supporting viable public transit. This would also imply restricting development of new strictly single-use zones (like residential, commercial etc.)

Dispersed and scattered type of development promotes 'sprawl' and increases for travel. It raises the need for more and more transport corridors inducing ever greater traffic. Therefore, avoiding and discouraging this kind of development by various policy measures would help reduce creating new trips.

- **Developing an Integrated Transportation System**

As there is no transport studies have conducted before for the Upazila Towns, no serious effort has been made for the functional integration of different modes of transport. However, it is well known that without effective integration of transportation systems, economic benefit, convenience and comfort from transportation services cannot be derived.

- **Avoid dispersed and scattered development patterns**

Dispersed and scattered type of development promotes 'sprawl' and increases for travel. It raises the need for more and more transport corridors inducing ever greater traffic. Therefore, avoiding and discouraging this kind of development by various policy measures would help reduce creating new trips.

- **Need for Integration between Modes**

The main challenge in the area is to identify and link together the most appropriate modes for any journey. Unfortunately the existing modes (BUS -Try Auto Rickshaw -NMT) are acting independently of each other. As a result the passengers suffer due to the lack of inter-connection and scheduling and freight traffic faces delays and increased costs particularly when it is carried by waterways from outstations for destinations inside of the Paurashava. There is an urgent need for integration between modes for economic reasons and for convenience and comfort of the passengers. Traffic management is the It encompasses traffic engineering, but also includes policy making, planning and consultation processes and that's why a traffic management unit has to be launched. One traffic management unit will launch which will be under the UpazilaParishad and must be merged with the Paurashava for regulation, organization, guidance and control of all kinds of stationary and moving road users, and vehicles, including pedestrians, cyclists, motorcyclists, truck and cars, respecting the needs of abutting land uses.

- **Aspects of Access Control**

Maximum use should be made of the existing infrastructure before new roads are contemplated. In moving towards areas of vehicle restrictions and the management of demand a number of measures will be necessary in order to reduce congestion and pollution in the core part of the Town.

- **Minimizing Transfer Times**

The present deficiencies in the inter-modal integration of the transport system are economically unsustainable in the long run. The current systems are time consuming to travel by more than one mode for the Town of Akkelpur Paurashava.

11.6 Plan Implementation Strategies

11.6.1 Regulations to limplement the Transportation Plan

There is no specific policy provided for the local urban traffic and transport management for the small town of Bangladesh though there exists National Land Transport policy for Bangladesh. For this purposes to implement the transport plan national land transport policy can be followed. Again a traffic transport management authority must have to provide merge with Paurashava urban planning sector to manage transport related development and implementation.

The roles of the municipality will be largely unchanged. Their functions will still be to provide essential services for the population including in the transport sector – public transport, traffic management signal systems, parking control and management and street lighting. The development of transport systems and infrastructure within the municipalities will be in accordance with the Structure Plan that will be provided under the Master Plan.

- **Effective co-ordination in transport**

Better coordination to be established between the Pourashva and Departments under its control; & regulations will be formulated to achieve the goal of creating better working links between the Government and the public and private sectors. A committee has to develop to monitor the entire development project of the Paurashava to analysis about transport sector violation.

Government to promote clearer objectives and responsibilities for each sector in order to create more integrated working relationships.

- **Promoting the role of the transport users**

The Government will examine how best the interests of users can be represented within the existing national government and local authority system; The Government will establish a user role within its transport planning process.

- **Transport users should pay for the costs of services**

The Government makes arrangements to realize cost of transport operation and road maintenance from road users through new fiscal policies; to protect public interest, the Government will regulate tariffs for passenger and goods both in road and rail transport.

- **Subsidies for transport services**

The government should allow subsidy to the transport sector only on consideration of public interest.

11.6.2 Implementation, Monitoring, Evaluation and Coordination of the Plan

In Urban area planning the most significant role will be played by Paurashava planning Department. The Planning Department will carry out the entire work of project initiation and plan formulation. These works are complicated and time consuming, and require multidisciplinary professionals. But there is no provision of Planning Department in AkkelpurPaurashava. It is not possibly by the existing Paurashava personnel to undertake UAP programme after discharging all its regular office functions. This would necessitate strengthening of the institutional capacity of the traffic and transport Planning Department. Under the reorganized organogram of the Planning Department, a fully equipped planning department can be created to deal with all affairs of area planning for the 'C' category Paurashava.

Under the current government policy regarding public sector agencies, it is unlikely that a major reshuffling can be achieved in improvement of existing manpower position of the Planning Department. As a result a large part of the planning process may have to be done through private consultancy.

According to the Local Government (Paurashava) Act, 2009 Paurashava will in the prescribed manner, prepare and execute a Road Maintenance and Development Program. A Paurashava also maintain the measures on Street lighting, street watering, traffic control, and public vehicles. They will maintain such public streets and other means of public communication as may be necessary for the comfort and convenience of the inhabitants of the municipality and of the visitors thereto.

Chapter 12: Drainage and Environmental Management Plan

A. Drainage Plan

12.1 Introduction

The purpose of the Drainage Plan is to make an assessment of the present drainage facilities and the scope for future development within 4243.55 acres study area of theAkkelpur 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 Akkelpur 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 Akkelpur 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:

- Improvements to major drainage outfalls
- Improvement of the drainage network
- Management of available water resources
- Conservation of existing natural drainage channels

12.1.1 Goals and Objectives

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

- To allow smooth drainage of storm water and the waste water of the town.
- To develop a comprehensive drainage network with area coverage and capacity.
- To prevent encroachment to natural drainage system.
- To create awareness about disposing of solid waste in the drainage system.

12.1.2 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.

Method Used

Storm and used water: 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 run off of a particular area. The modified rational method shall be used for calculation of peak runoff for a definite frequency and duration from particular drainage basin. One limitation of this method is that it cannot be used for catchment area greater than 320 acres. The Natural Resources Conservation Service (NRCS) method formerly the US Soil Conservation Service (SCS) method shall be used.

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. The design flow rate by Modified Rational Formula is –

Q = CsC r IA

Where:

Q	=	Design runoff flow rate (cfs)
I	=	Rainfall intensity (in/hr)
Cs	=	Storage coefficient
Cr	=	Runoff coefficient
A	=	Drainage area (acres)

Rainfall Intensity (I): The rainfall intensity is the average rainfall rate for a particular drainage basin or sub-basin. The intensity is selected on the basis of the design rainfall duration and return period. The return period is established by design standards as a design parameter. Rainfall intensity with 5 years return period is generally employed for design of primary drains and canal improvement. Rainfall intensity with 3 years return period is employed for design of secondary drains. The design duration is equal to the time of concentration for the drainage area under consideration. Time of concentration is a critical parameter both for the Modified Rational Equation and SCS method. Time of concentration is generally defined as the longest runoff travel time for contributing flow to reach the outlet or design point, or other point of interest. It is frequently calculated along the longest flow path physically.

Estimating the time of concentration involves identification of an appropriate flow path or paths and estimating runoff travel times along the flow paths. Where post-development conditions include significant pervious surfaces, the time of concentration for just impervious portions of the basin may be required to calculate and compare peak flow response for the basin as a whole against that of the more rapidly-draining impervious surfaces alone. The Time of Concentration composed of the Initial Time of Concentration, sometimes referred to as the Inlet Time or Time of Entry and

the Travel Time. Initial Time of Concentration is that time required for runoff to travel from the most remote point in the drainage area to the first point of concentration. This can be determined using the Ki pitch equation. The Initial Time of Concentration must be five minutes or longer. In instances where Initial Times of Concentration are estimated to be shorter than five minutes, five minutes shall be applied.

The second part of the Time of Concentration is the Travel Time that takes the flow to travel along the drain. Channel flow occurs in channels carrying integrated flows, pipes (flowing partially full), and streams. Where storage is not significant, Travel Times can be estimated by applying Manning's Equation, and using estimates of channel characteristics and appropriate roughness values for pipe, channel, or stream features as tabulated in **Table-12-1**.

Table 12-1: Storage Coefficients for flat land

Characteristicsofsurface	StorageCoefficient		
	Slope <1: 1000	Slope <1: 500	Slope <1: 500
Residential urban	0.70	0.80	0.90
Commercial	0.80	0.90	1.00
Industrial	0.70	0.80	0.90
Residential Rural nature	0.60	0.70	0.80
Agricultural	0.50	0.60	0.70
Forest/woodland	0.30	0.40	0.50
Aquatic land	0.30	0.40	0.50
Pavedarea/road	0.80	0.90	1.00

Source: Countywide Comprehensive Plan (Master Drainage Plan) Exhibit-VIII

V= [1.49/n] [R 2/3] [S 1/2]

Where

V = Velocity of flow, feet/second
N = Manning's roughness coefficient for channel flow
S = Slope, feet/foot
R = Hydraulic radius, feet

And

T t = V / (60L)

Where

T t = Travel time, minutes
V = Velocity, feet/second
L = Length, feet

Storage Coefficient (Cs): Due to very flat topography of Bangladesh, the runoff is significantly slow. The rainfall after evaporation and infiltration accumulates first in the depressions, until these have been reached their capacity and then runoff. To take these effects a storage coefficient is used. The value of the storage coefficient is based on average ground slope and the nature of the ground surface. Some of the storage coefficients are listed in **Table-12-2**.

Table 12-2: Modified Rational Method Runoff Coefficients

Landusedesignation	RunoffCoefficient C_r
Residential rural	0.30
Residential semi urban	0.40
Residential urban	0.50~0.60
Apartment professional	0.70
Neighborhood Commercial	0.85
Community Commercial	0.85
Industrial	0.70~0.75
Slumarea	0.50~0.55
Agricultural exclusive	0.25
Forest and watershed	0.20~0.25
Public facilities	0.3~0.60
Forest/ woodland	0.25
Pavedarea/road	0.99

Source: Countywide Comprehensive Plan (Master Drainage Plan) Exhibit-VIII

Catchment Area:

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

a. The peak rate of runoff at any point is a direct function of the average rainfall for the time of concentration to that point.

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

c. 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.

Projection

In implementing various infrastructures for development, drainage is generally given less priority and is normally considered to be the last or final steps for development. Such scenario is particularly true for Bangladesh; although different types of drainage infrastructures are among others by far the heaviest impact on physical infrastructure network. As a result, physical environment, health, hygiene and standard of living suffer seriously. In development projects, Government, Semi-government and Public sector allocated funds are mostly spent on buildings, roads and other more visible infrastructures and drainage comes as the last item of development. By the time, drainage development begins to start, there appears shortage of fund, consequently as a matter of policy-do little or do-nothing situation appears and as eyewash very little is done for drainage development. In case of urban development, if drainage is not given priority, sufferings of the inhabitants will continuously increase with the passage of time.

Drainage development for urbanization should start with drains. Drains can be classified as Plot drains, Block drains, Tertiary drains, Secondary drains and Primary drains. Other natural drainage infrastructure is lowland, outfall areas, khals and rivers. Man-made drains are Plot, Block, Tertiary,

Secondary and Primary drains and others are natural drainage infrastructures. In planning for drainage network, care will be given on road network in terms of conflict of drainage and waterways with roads. In the following and subsequent sections major element, their principle, purpose and function of drainage infrastructures are discussed and presented in lower to higher order which will be considered as a method for drainage plan.

Plot Drains

Plot drains are provided around a building on a plot. In most cases, the drain is made of bricks and is rectangular in shape that can carry storm water generated in the plot and from the building. Plot drain is connected to the Block or Mohallah drain.

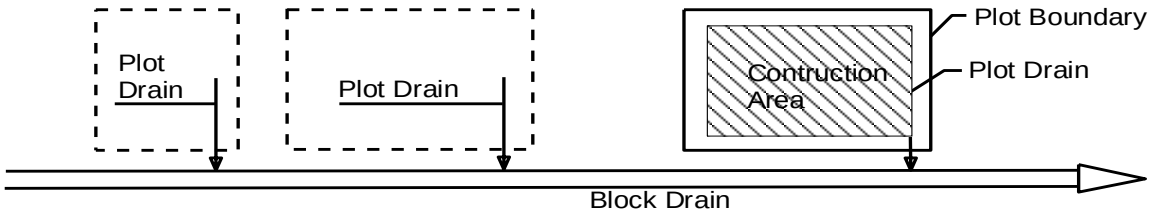


Fig 12-1: A sketch showing plot and block drain

Block Drain

Block drain is provided at the outside of a block that accommodates several buildings of the block. The block drains are made of bricks like plot drains but bigger in size so that it can serve the storm water generated within the block and the buildings and open areas within the block. Sometimes the block drain may serve few neighboring blocks or Mohallahs. Block drains carry storm water coming from the plot drains. Shape of the block drain is also rectangular, bigger than plot drains and its bottom is lower than plot drain. Sketch of the plot drain also shows the block or Mohallah drain under plot drain.

Other Drainage Related Infrastructures

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

i. Bridges, culverts, box culverts
ii. Drainage sluices, pipe sluices, siphons
iii. Flood protection embankments and flood walls
iv. Sluice gates, Regulators, Navigation lock
v. Flood protection and drainage structures.

i. Bridges, Culverts and Box Culverts

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

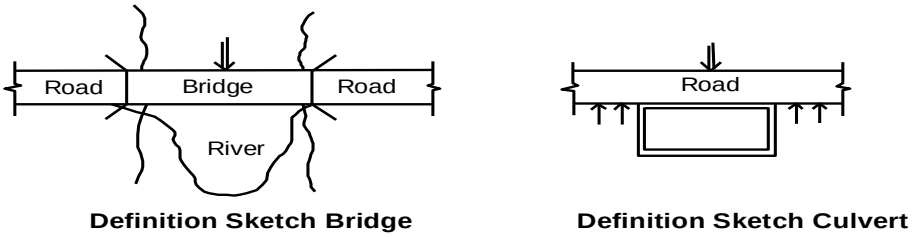


Fig 12-2: Bridge and culvert

ii. Drainage sluices, pipe sluices and siphons

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

A schematic view of Drainage sluice, pipe sluice and siphon on embankment which relieve drainage congestion.

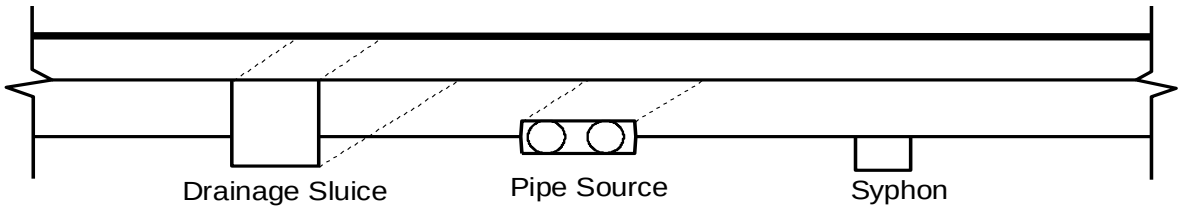


Fig 12-3: A schematic view of Drainage sluice, pipe sluice and siphon on embankment which relieve drainage congestion.

Primary Drain

Primary drains are also called main drains. Primary drains cover larger storm drainage area than tertiary and secondary drains. Sometimes primary drain bears local name. In ascending order its position is third. Its cross-section is larger than other types; carrying capacity is high and is constructed of brick, cement concrete and sometimes reinforced concrete. Primary drains may be of earthen structure provided sufficient land is available and land value is low. Contributing drainage water comes from tertiary and secondary drains. Primary drains discharge its drainage water to outfall, natural khal, river or large lowland area / Beels.

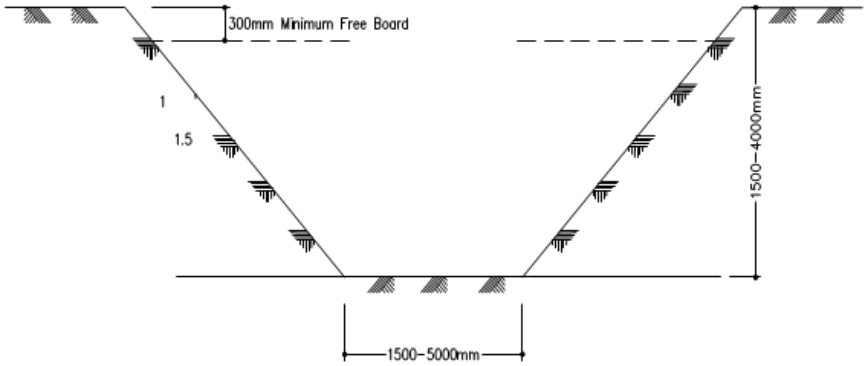


Fig 12-4: Typical Earthen drain

Secondary Drain

Secondary drains collect discharge from tertiary drains. One secondary drain may receive drainage discharges from several tertiary drains in its course. Size and capacity of secondary drain is much bigger than tertiary drains; its catchment area is much bigger than tertiary drain. Like tertiary drain, it may run parallel to bigger roads. Secondary drains may run along and through the middle of its storm water contributing area.

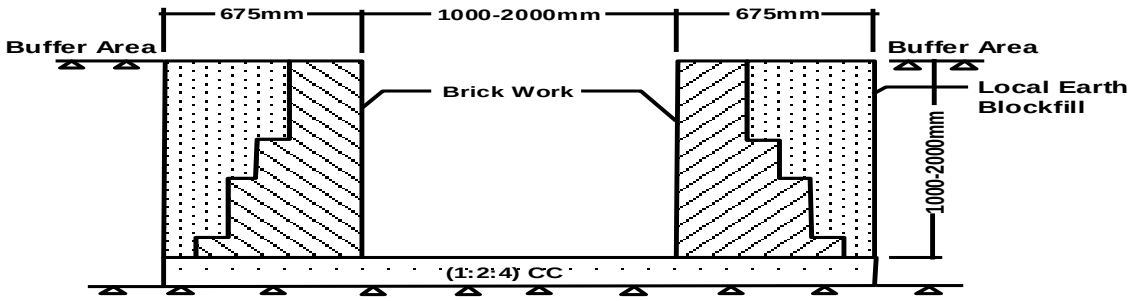


Fig 12-5: A Typical Secondary Drain

Tertiary Drain

Tertiary drain carry run-off or storm water received from the above mentioned plot drains and block or Mohallah drains. Their catchment area or storm water contributing area is bigger than Mohallah drains. In most Paurashava areas it is difficult to find such naming or classifications. However, such classifications can be seen in references. Tertiary drains generally are the under jurisdiction of Paurashava. Those drains or drainage networks are constructed and maintained directly by the Paurashava.

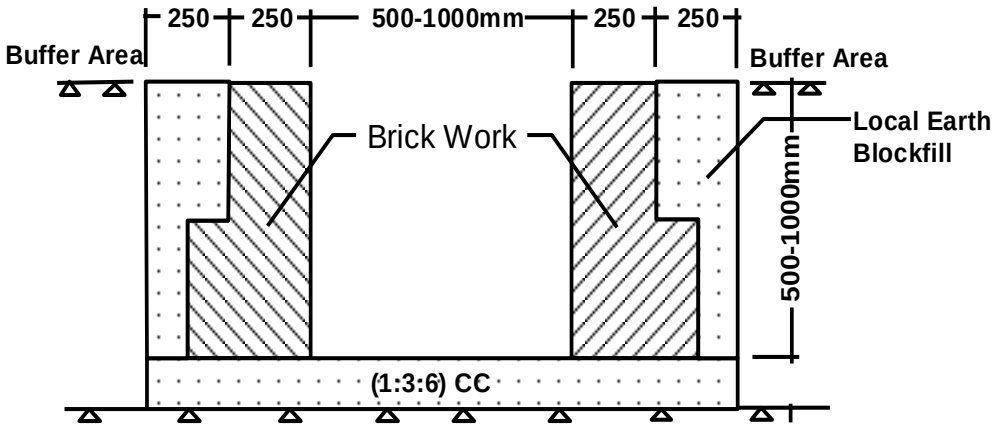


Fig 12-6: A Typical Tertiary Drain

Reservoirs

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

Quaternary Drain

Quaternary Drains had to be introduced in this particular project due to the complexity of the existing system. These drains are the smallest parts of a large drainage system. It takes the discharge of a small area to a tertiary drain. These are the smallest drains considering the depth and width.

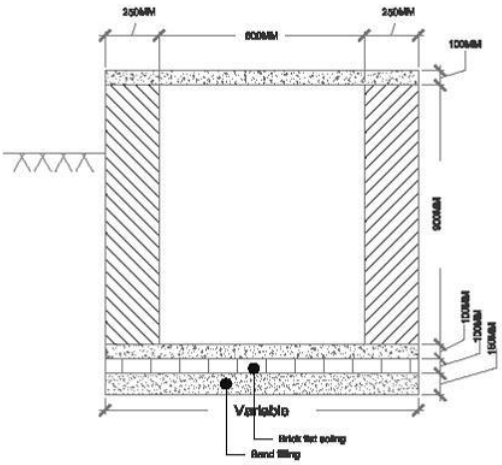


Fig 12-7: A Typical Quaternary Drain

Other kinds of drainage infrastructure are lowland, outfall areas, khals and rivers. Man made drains are Plot, Block, Tertiary, Secondary and Primary drains and others are natural drainage infrastructures. In planning for drainage network, care should be given for road network in terms of

conflict of drainage and waterways with roads. In the following and subsequent sections major element, their principle, purpose and function are discussed and presented in lower to higher order.

Drainage Khals and Waterways

Khals and waterways are natural channels and act as drainage elements. In every mouza more or less such natural channel, khals and waterways carry the excess storm water to the connecting river lying further in the down stream. Sometimes old and silted-up khals are re-excavated to improve drainage efficiency. Most of the natural khals carry the local storm water particularly runoff from the Mouza / Mouzas those it passes through. Khals are narrow and deep in cross-sections; on the other hand waterways are shallow and wider. Physical feature survey maps, field survey maps (river, khal / drainage) show the drainage khals and waterways and their database shows the dimensions.

12.2 Existing Drainage Network

12.2.1 Introduction

For the preparation of Drainage Plan, survey started through field reconnaissance and review of available document related to the study area. The Akkelpur 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.

12.2.2 Existing Drainage System/Network

The drainage system of the Akkelpur Paurashava has been surveyed and classified into three categories: (i) unlined natural canals and khals acting as primary drains, (ii) beels playing important role in acting as retention ponds and (iii) brick masonry secondary and tertiary drains and earthen shallow secondary drains. The natural primary drains of the Akkelpur Paurashava have emerged as a natural process following the natural slope of the ground, for the flow of storm runoff without human intervention.

Natural Drainage System:

The natural drainage network is composed with 614 water bodies in Akkelpur Paurashava out of which 361are ponds and 251 are ditches and 02 khals. Total area devoted to water bodies in Akkelpur Paurashava is around 144.37acres excluding river. It can also be seen that the ward 8 possess highest area for water bodies. In this ward there are 65 ponds and 35 ditches but river portion is bigger than any other ward.

There are natural drainage systems along roadside and the linkage between natural and man-made drainage system in somewhere. The existing one khals and river are covered the entire Paurashava of natural drainage system.

There are linkages between natural and man-made drainage system. But how much effective and active the linkage is with the poorly maintained man-made drains is a question. Almost half of the

depth of the man-made drain is filled with solid garbage's; as a result, the channel is not properly functioning.

Man-made Drains

The following table shows the ward-wise drainage coverage and type on the basis of construction pattern in Akkelpur Paurashava. From the table it is seen there exists Pucca and Katcha drains in Akkelpur Paurashava. The table also indicates that there is limited amount of drainage in Akkelpur Paurashava. In this Paurashava there is 13.37 km drain. Uncovered drains are mostly in existence with poor condition. Detail statistics of existing man-made drainage network is shown in the **Table-12-3**.

Table 12-3: Ward-Wise drainageNetwork of Akkelpur Paurashava

Ward No	Length(km)			
	Pucca		Katcha	
	km	%	km	%
1	0.47	4.11	0.02	0.72
2	1.61	14.26	0.31	14.82
3	1.34	11.88	0.35	16.84
4	3.00	26.54	0.22	10.42
5	1.59	14.06	0.04	1.69
6	1.05	9.26	0.22	10.47
7	0.60	5.30	0.00	0.00
8	1.09	9.64	0.58	28.19
9	0.56	4.96	0.35	16.84
Total	11.30	100.00	2.07	100.00

Source: Drainage and Environmental Survey in Akkelpur Paurashava, 2010

In Akkelpur there are no mentionable long drains with designated outfall. Only the following five drains can be considered as large drain compared to other drains (**Table 12-4**).

Table 12-4: Location, start and end of some drains in Akkelpur Paurashava

Sl No	Location	Type	Ward No	Length (m)	Width (m)	Start	End (Outfall)
1	Along Joypurhat-shantahar Road	Pucca	4	349.28	0.4	Along Joypurhat-shantahar Road	Pond
2	Along Joypurhat-shantahar Road	Katcha	3	669.41	0.9	Joypurhat-shantahar Road	Zero Ponit
3	Akkelpur dokkin para jame mosque	Katcha	7	240.16	0.4	Akkelpur dokkin para jame mosque	Pond
4	Thana Road	Semipucca	4	179.96	0.4	Zero Point	Tulshiganga River

Source: Drainage and Environmental Survey in Akkelpur Paurashava, 2010

The drains so far constructed in Akkelpur Paurashava are listed in Table-12-5 below. These drains are constructed by the Paurashava and the DPHE. The DPHE after construction handed over its drains to Paurashava for maintenance. Within the Paurashava total 4.20 km brick drains so far constructed.

Table 12-5: List of Existing Drains in Akkelpur Paurashava

SI No.	Type	Length(m)	Width(m)	Depth(m)
ID-2	Drain_Katcha	141.301	0.40	0.60
ID-4	Drain_Katcha	131.119	0.40	0.60
ID-5	Drain_Katcha	358.497	0.40	0.60
ID-7	Drain_Pucca	396.400	0.50	0.70
ID-10	Drain_Pucca	118.534	0.40	0.60
ID-12	Drain_Pucca	102.927	0.40	0.60
ID-20	Drain_Katcha	240.167	0.40	0.60
ID-24	Drain_Katcha	106.223	0.30	0.50
ID-25	Drain_Katcha	242.817	0.40	0.60
ID-33	Drain_Pucca	101.526	0.40	0.60
ID-35	Drain_Pucca	259.497	0.40	0.60
ID-36	Drain_Katcha	152.529	0.90	1.00
ID-38	Drain_Katcha	169.661	0.30	0.50
ID-39	Drain_Katcha	182.073	0.30	0.50
ID-46	Drain_Katcha	142.418	0.30	0.50
ID-49	Drain_Katcha	126.423	1.20	1.20
ID-50	Drain_Katcha	107.312	1.20	1.20
ID-51	Drain_Katcha	159.833	0.50	0.70
ID-52	Drain_Pucca	119.851	0.40	0.60
ID-55	Drain_Katcha	123.970	0.40	0.60
ID-61	Drain_Katcha	320.433	0.90	1.00
ID-76	Drain_Katcha	232.958	0.50	0.70
ID-92	Drain_Katcha	106.098	0.60	0.70
ID-95	Drain_Katcha	105.267	0.90	1.00
ID-96	Drain_Katcha	128.379	0.50	0.70
ID-98	Drain_Katcha	112.668	0.50	0.70
ID-102	Drain_Katcha	199.012	0.40	0.60
ID-105	Drain_Katcha	200.000	0.40	0.60
ID-117	Drain_Katcha	401.674	0.60	0.80
ID-123	Drain_Katcha	189.753	0.40	0.60
ID-126	Drain_Katcha	139.056	0.40	0.60
ID-137	Drain_Katcha	104.227	0.60	0.80
ID-144	Drain_Katcha	100.260	3.00	3.00
ID-151	Drain_Katcha	108.191	0.40	0.60
ID-160	Drain_Katcha	178.328	0.40	0.60
ID-169	Drain_Katcha	265.613	0.40	0.60
ID-170	Drain_Katcha	294.229	0.40	0.60
ID-2	Drain_Katcha	141.301	0.40	0.60

>100mdrain is Included here
Source: Drainage and Environmental Survey in Akkelpur Paurashava, 2010

12.2.3 Analysis on land level (Topography)

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 approximately at 35 meter intervals.

Maximum level of Akkelpur Paurashava is 18.90m located at ward no 6 and lowest point is recorded as 9.68m located at ward no 1. Average elevation of Akkelpur Paurashava area is derived as 16.30m.

Details statistical summary of land levels survey are shown in **Table 12-6** and **Table 12-7** below.

Table 12-6: Summary of Spot Level Data of Akkelpur Paurashava

Total Spot Level Points	40248
Highest Elevation	18.9m
Lowest Elevation	9.68m
Mean	16.30m
Standard Deviation	0.94

Source: Topographic Survey in Akkelpur Paurashava, 2010

Table 12-7: Characteristics of Land Levels of Akkelpur Paurashava

Ward No	Land Level Characteristics
Ward no 01	Low
Ward no 02	High
Ward no 03	Medium
Ward no 04	High
Ward no 05	Low
Ward no 06	Medium
Ward no 07	Medium
Ward no 09	Medium
Ward no 09	Medium

Source: Derived from Topographic Survey Data of Akkelpur Paurashava, 2010

General Contour Descriptions

AkkelpurPaurashava is situated in a highland area. More interpretation can be derived from a Surface Analysis. In the following there are two maps. The first **Map 12-1** shows the contour description and **Map 12-2** surface analysis of Akkelpur Paurashava. From Surface Analysis, it can be found that the middle part of the Paurashava is comparatively higher than other areas. The middle part comprises of parts of ward 2, 3 and 4. From the surface analysis map it is found that ward 1 and 5 is much lower compared to other wards. In the core area there are many commercial structures and also upazilla parisad office.

Table 12-8: Land Use Category with Spot Heights (mPWD) in Akkelpur Paurashava

LANDUSE	MIN	MAX	MEAN
Agriculture	13.50	18.90	16.13
Circulation Network	13.96	18.90	17.57
Commercial Activity	14.40	18.44	17.29
Community Service	15.16	18.90	17.03
Education and Research	14.70	18.30	17.38
Governmental Services	16.79	18.30	17.51
Industrial/Processing & Manufacturing	13.80	18.90	16.68
Miscellaneous	15.93	18.90	17.36
Mixed Use	16.30	18.21	17.46
Non Government Services	16.87	17.52	17.13
Recreational Facility	17.17	18.19	17.62
Residential	13.50	18.90	16.90
Service Activity	17.09	18.02	17.62
Transport and Communication	17.26	18.03	17.80
Urban Green Space	15.00	18.90	16.60
Waterbody	9.68	17.34	15.22

Source: Topographic Survey in Akkelpur Paurashava, 2010

Map 12-1: Contour Map of Akkelpur Paurashava

Map 12-2: Surface Analysis (IDW method) Map of Akkelpur Paurashava

12.2.4 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 planimeter from topographic maps and by field survey. In determining the total runoff of a catchment area the following assumptions to be made:

- 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.
- The recurrence interval of the peak discharge is same as the recurrence interval of the average rainfall intensity.
- 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 are 2 numbers of khal passing through the Akkelpur Paurashava. Those are the only natural drainage channels which receives part of the runoff volume from part of the town.

It has been observed from the drainage network survey that 11.30 km brick masonry drains have been constructed by the Paurashava and the DPHE during last few years. Some of the drains are working properly but most of them are temporarily connected to ditches or discharging to paddy field. These drains have been constructed in an unplanned way and without considering proper outfalls. The drains are constructed as piece meal, no proper size and gradient has been maintained. As a result, with the expansion of township some of them already have to abandon. The common run-off coefficients of different types of areas are listed in **Table 12-5** below.

Table 12-9: Common Run – off coefficients for Different Types of Area

Type of Drainage Area		Run-off Coefficient: C
Business	Downtown areas	0.70 – 0.95
	Neighborhood area	0.50 – 0.70
Residential	Single – family areas	0.30 – 0.50
	Multi – units, detached	0.40 – 0.60
	Multi – units, attached	0.60 – 0.75
	Suburban	0.25 – 0.40
	Apartment dwelling areas	0.50 – 0.70
Industrial	Light areas	0.50 – 0.80
	Heavy areas	0.60 – 0.90
	Parks, cemeteries, playgrounds	0.10 – 0.35
	Rail road yard areas	0.20 – 0.40
	Unimproved areas	0.10 – 0.30
	Streets; Driveways and roofs	0.10 – 0.95
Lawns	Sandy soil, flat, 2%	0.05 – 0.10
	Sandy soil, avg, 2 – 7%	0.10 – 0.15
	Sandy soil, steep, 7%	0.15 – 0.20
	Heavy soil, flat, 2%	0.13 – 0.17
	Heavy soil, avg, 2 – 7%	0.18 – 0.22
	Heavy soil, steep, 7%	0.25 – 0.35

Source: Handbook of Hydrology, by - David R. Maidment

12.3 Plans for Drainage Management and Flood Control

12.3.1 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 khals to remain their natural form. To solve the overall drainage problem of the Akkelpur Paurashava a Drainage Plan has to prepare as integral part of Paurashava Master Plan. During preparation of land use plan special emphasis to be given to retain the existing water bodies. Special attention to be given to protect the khash lands of khals and beel from illegal encroachment and no circumstances it shall be allowed to change their nature. As part of the Drainage Plan the Paurashava to be divided into several drainage zones. Runoff from each drainage zones shall reach to the primary drains. The existing tertiary drains those will match with the proposed network will be rehabilitated, those not have to abandon.

12.3.1.1 Drain Network Plan

The activity for the relevant authority will be assisted by the preparation of the drainage master plan for the Paurashava which details the necessary corridors, plot sizes and generalized locations for:

- Primary canal / khal (new and improved).
- Secondary and tertiary canal / khal (new and improved).
- Storage ponds.
- Silt traps.
- River embankment.

Initially, the Paurashava will encourage implementation of the first phase recommendation of the drainage master plan. A brief summary of the proposals to be undertaken in Phase-1 is given below. Reference should be made to the Map for identification of the drainage areas referred in the text.

Phase-1 (Storm water drainage)

- Local improvements and the removal of obstacles from existing canals in drainage areas marked as 1, 2, 3, 4 and 5. Works to include:
  - Redesign of hydraulically inefficient bends, entrances and exists.
  - Rising and / or widening of bridges and culverts to give unobstructed flows.
  - Returning the channels to a uniform cross-section by removal of encroachingproperties and structures.
  - Raising crossings over roadside channels to adjacent properties above the flood level of the waterway.
- Construction of silt traps in drainage areas. Minimum size of the plot required to house these silt traps in 20 meters by 20 meters.
- Improvements of primary canals in drainage areas.
- Improvements of secondary and tertiary canals in drainage areas.
- Construction of missing canals (new) in drainage areas.
- Construction of new secondary & tertiary canals in drainage areas.
- The provision of flood control regulators in drainage areas.

Phase-2 (Rain water and household drainage)

- Construction of surface drain linked with the residences, may be covered or uncovered.
- Provide linkages with secondary and tertiary drains.
- Out-fall of such drains may be nearby canals and low-lands.
- For discharging of rainwater from commercial areas, covered surface drain may be constructed and they will be linked with the secondary and tertiary canals.

12.3.1.2 Proposal for Improvement of the Existing Drainage Networks

There is 13.37 km existing main khals inAkkelpur Paurashava. This total 08 khals will be served as primarydrain. Based on this primary drain drainage network system of Akkelpur Paurashava will beestablished. Total 3.95 km Primary Drain, 13.3 km secondary drain and 22.77 km tertiary drain proposed in drainage development plan. Map 12.4 shows the drainage network Plan of Akkelpur Paurashava. Table 12.8 shows the summary of proposed drainage facilities at Akkelpur Paurashava. And Map 12.4 shows thedrainage network proposal for Akkelpur Paurashava. In additional the Tulshiganga flowing through thenorthern border of Akkelpur Paurashava will serve as the main out fall and main natural drainagenetwork.

The details of improvement of identified existing drains are shown in **Table 12-10**.

Table 12-10: Type of Drains for Improvement Proposal

Type of Drain	Length in km	%
Primary Drain	3.95	9.87
Secondary Drain	13.3	33.23
Tertiary Drain	22.77	56.9
Total	**40.02**	**100.00**

Source: Drainage and Environmental Survey in Akkelpur Paurashava, 2010

Drainage corridors: If a drainage network has to be installed, the drainage originating throughout the Paurashava would be carried by means of surface drains and culverts. These should be accommodated within road reserves.

General location required: For sewerage treatment plant, large plot will be needed, preferably on outskirts of the Paurashava. For sewerage pumping station, small plots throughout the Paurashava will be needed and a system should be introduced.

Maintaining of land slope: Important component of the drainage network is land slope, which was not maintained during the construction of existing drains. The slope of the Paurashava is found towards east and southeast. Slope of all drains should maintain this direction.

12.3.1.3 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 12-11**. 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. So the detail drainage master plan should get prior consideration while implementing this plan.

The proposed drains along with existing drains and other drainage infrastructures are shown in ***Map 12-3***.

Table 12-11: Proposal of New Drains

Type of Drain	Proposed Id	Proposed Width (m)	Proposed Depth (m)	Length (m)
Primary Drain	PD-1	3.00	2.00	2412.083
Primary Drain	PD-2	2.00	1.20	1538.734
Secondary Drain	SD-1	3.00	2.00	2403.058
Secondary Drain	SD-3	2.00	1.20	673.058
Secondary Drain	SD-4	2.00	1.20	743.162
Secondary Drain	SD-2	2.00	1.20	717.439
Secondary Drain	SD-5	2.00	1.20	422.179
Secondary Drain	SD-6	2.00	1.20	643.319
Secondary Drain	SD-7	2.00	1.20	557.596
Secondary Drain	SD-8	2.00	1.20	1204.628
Secondary Drain	SD-9	2.00	1.20	740.953
Secondary Drain	SD-12	2.00	1.20	455.655
Secondary Drain	SD-13	2.00	1.20	976.229
Secondary Drain	SD-15	2.00	1.20	331.076
Secondary Drain	SD-16	2.00	1.20	924.709
Secondary Drain	SD-18	2.00	1.20	867.752
Secondary Drain	SD-19	2.00	1.20	797.767
Tertiary Drain	TD-1	1.00	0.80	269.365
Tertiary Drain	TD-4	1.00	0.80	106.753
Tertiary Drain	TD-5	1.00	0.80	159.910
Tertiary Drain	TD-6	1.00	0.80	43.982
Tertiary Drain	TD-7	1.00	0.80	52.279
Tertiary Drain	TD-8	1.00	0.80	52.268
Tertiary Drain	TD-9	1.00	0.80	54.226
Tertiary Drain	TD-10	1.00	0.80	21.824
Tertiary Drain	TD-11	1.00	0.80	125.528
Tertiary Drain	TD-12	1.00	0.80	62.944
Tertiary Drain	TD-14	1.00	0.80	136.433
Tertiary Drain	TD-15	1.00	0.80	318.571
Tertiary Drain	TD-16	1.00	0.80	220.742
Tertiary Drain	TD-17	1.00	0.80	132.030
Tertiary Drain	TD-18	1.00	0.80	141.683
Tertiary Drain	TD-19	1.00	0.80	382.191
Tertiary Drain	TD-20	1.00	0.80	208.044
Tertiary Drain	TD-21	1.00	0.80	53.062
Tertiary Drain	TD-22	1.00	0.80	254.634
Tertiary Drain	TD-24	1.00	0.80	78.696
Tertiary Drain	TD-25	1.00	0.80	28.712
Tertiary Drain	TD-26	1.00	0.80	277.791
Tertiary Drain	TD-27	1.00	0.80	352.167
Tertiary Drain	TD-28	1.00	0.80	345.900
Tertiary Drain	TD-29	1.00	0.80	318.956
Tertiary Drain	TD-30	1.00	0.80	442.494
Tertiary Drain	TD-31	1.00	0.80	134.560
Tertiary Drain	TD-32	1.00	0.80	129.650
Tertiary Drain	TD-33	1.00	0.80	0.000
Tertiary Drain	TD-3	1.00	0.80	51.345
Tertiary Drain	TD-181	1.00	0.80	198.982
Tertiary Drain	TD-182	1.00	0.80	717.428
Tertiary Drain	TD-183	1.00	0.80	855.255
Tertiary Drain	TD-184	1.00	0.80	669.796
Tertiary Drain	TD-185	1.00	0.80	752.361
Tertiary Drain	TD-186	1.00	0.80	498.491

Details of Drain Proposals are given in Annexure.

12.3.1.4 Proposed Drainage Structure

Drainage structures includesculvert, bridge, box culvert etc. In the Drainage and Environmental Management plan there is no need of proposed bridge in this Paurashava.

Map 12-3: Drainage Plan Map of Akkelpur Paurashava

12.4 Plan Implementation Strategies

Akkelpur Paurashava is affected frequently by rainfall run-off due to inability of the existing secondary and tertiary drains to drain out the run-off efficiently. There are inadequate no of secondary and tertiary drains in Akkelpur Paurashava. Presently due to lack of adequate no of secondary and tertiary drains, most of the areas of the Paurashava are subjected to water logging during the intensive rainfall in the monsoon period. The existing secondary and tertiary drains may be improved and its different component needs to link with an overall integrated system. The existing borrow pit along the highway, secondary and tertiary drains are observed to suffer from continued negligence in respect of maintenance, clearing, removal of blocking etc.

The existing borrow pit/ drains will be incorporated into the proposed system to the extent to achieve available drainage system for the Paurashava. The drainage management plan of the Paurashava has been prepared for the peak monsoon period when the drainage system stands critical and drainage problem develops due to blocking, inadequate section of the khals and obstruction in the drainage path. Therefore, adequate numbers of new secondary and tertiary drains have to be constructed, following a systemic drainage network.

12.4.1 Regulations to implement the Drainage and Flood Plan

In preparing drainage management plan, the flowing design approach has been presented in this report. In the design approach, the Consultants have considered the practical aspects of desired results, cost efficiency, durability including ease of construction and maintenance. Visible social improvements for the urban population are considered to be the most important and mitigation of the annual flooding damage is considered to be the greatest tangible benefit. Reduction of diseases, infant Morrtality and increase of life span are considered to be the greatest intangible benefits.

In line with these considerations, the following broad approach has been adopted in preparing the drainage management plan for Akkelpur Paurashava.

Channel Improvement

Canal and channel improvement means the improvement and re-excavation of existing open channels. The existing all Khals need excavation and removal of all illegal structure along the path.

Land Acquisition

New land acquisition has to be kept to as absolute minimum due to the high cost and time required for acquisition. New land acquisition is negligible as most of the proposed drains passes through land owned by Paurashava or Khas land.

Storing and Detention Ponds

Existing borrow pits, ponds, low pockets within the urban areas and agricultural low lands within the fringe area, all act as retention ponds and all these serve to delay the peak floods during heavy storms. The retention areas also recharge the aquifer water level. In the absence of internal storage areas within the Paurashava area, the existing ponds (>= 0.25 acre) , proposed retention area, low pockets etc. continue to serve as reservoir in the coming years and the Paurashava should endeavor to remain these low lands in the future.

Drainage System Capacity

The drainage systems (tertiary and secondary drain) has been designed to handle the average runoff for 1.1 year recurrence interval for tertiary drain and 2 years recurrence interval for secondary drain from peak storms without overflowing considering the estimated development level as up to the year 2031. This means that fully built-up areas will be designed for the present situation, while areas, which are not fully built-up, will have excess capacity to handle rainfall of greater intensity during the developing period.

Drainage Channel Sections

The drainage system has been designed to handle the average annual run-off from peak storms with 100mm freeboard for tertiary drain and 150mm freeboard for secondary drain overtopping.

Three standard open channel sections are proposed to be used for the works, as shown in the following table. The rectangular pucca Type-1 drain is suitable for collection of run-off from medium size catchments areas and is proposed to be used for tertiary roadside drains and secondary drains in congested areas. Type-1 drain may be constructed from brick or reinforced concrete, as most appropriate and economical one.

The trapezoidal section of drain Type-2 and 3 are suitable for collection of run- off from medium and large catchments areas, and are to be used for secondary and primary drains in unconstructed areas. Drain Type- 2 is proposed to be pucca drain using nominal reinforced concrete with cement plaster surface to improve its flow characteristics and durability, add to reduce the long term costs of cleaning and maintenance. Drain Type-1 is also proposed to be a pucca drain using brick work lining, but may initially be constructed as an earthen (Katcha) drain suitable for future upgrading depending on the availability of land, flow requirements and cost. The bottoms of drains Type-2 and 3 are to be redesigned with a transverse slope of 1:8 (V: H) to keep the flow velocity as high as possible during the dry season.

Construction criteria and locations to be used are shown in the following **Table 12-12**.

Table 12-12: List of Construction Criteria and Locations

Sl. No.	Type of Drain	Construction Criteria	Locations to be Used
1.	Type- 1	Lined, Brick work	Tertiary and secondary improvement on the
2.	Type- 2	Lined, Brick	Secondary and primary drains
3.	Type- 3	Lined, Katcha Drain	Primary katcha drains

Trash Rack and Sumps

Trash racks and sumps are normally used to prevent debris (silt/ solid wastes) from entering into the drainage systems where major problems could occur as a result of debris accumulation. Trash racks and sumps are considered appropriate for the Paurashava situation. In the drainage management plan, locations for trash racks and sumps along the major road network will identify during preparation of final plan.

Preventive Maintenance Program

For the proper functioning of the drainage system, it is essential to have an appropriate maintenance program. The program must include inspection, enforcement, cleaning and repair. The frequency of inspection and cleaning will be dependent on the season of the year with more frequent inspection and cleaning at the start of the rainy season and on the importance of the drain. The maintenance programs are:

a) Inspection

- Open pucca drains - monthly in general; weekly in market areas
- Covered pucca drains - monthly with drains opened in February
- Kutcha drains - monthly
- All drains - following first heavy rainfall in year

b) Cleaning

- Open pucca drains - as required
- Covered pucca drains - in February when opened
- Kutcha drains and culverts - January to February prior to rains
- All drains - as revealed by inspection

The inspections will also show where repairs are required and where encroachment intothe drain and deliberate blocking of the drain is taking place. Appropriate action toenforce the regulations must be initiated immediately. The cleaning of permanently closed pucca drains and small culverts is difficult and time consuming. New drains should have removable covers to facilitate cleaning.

Responsibility of development and construction of khal/drains rests with Engineering Department. Whereas,the responsibility of cleaning and conservancy of drains is falls under the conservancy section under health department. Operation and maintenance of drains of the Paurashava involve the set vices in the following areas.

- Conservancy (Cleaning of drains)
- Mosquito killing
- Solid waste management
- Structural maintenance of drains

It is essential that the Paurashava should develop a routine preventive maintenance program for the drainage system. The structural improvements to be taken up under the project will provide a sustainable benefit. A failure to develop the capacity and methods related to preventative maintenance program will entirely eliminate the benefits of the program in the long run.

Though the needs and methods must ultimately be identified by the personnel responsible for the maintenance, it is suggested that the following guidelines should be followed for initial development of the staffing and equipment for a preventive maintenance program:

- drain should be cleaned once per month, but not less frequently than once per three month;
- task objective for I cleaner/sweeper should be 50m of primary / secondary drains, per day;
- supervisors should be provided at the rate of 1 Jamader for-each 10 sweepers, and I sanitary inspector for each 4 Jamaders;

- adequate equipment should be provided for efficient operations of cleaning crews, including wheel barrows and miscellaneous hand tools for each drain cleaner, 3 ton dump truck for waste transport and disposal.

Based on this, standard drain cleaning crews consisting of 51 cleaners, 5 Jamaders and 2 sanitary inspectors will be adequate to carry out the routine preventive maintenance operation required to keep the system in good operating condition.

12.4.2 Implementation, Monitoring, Evaluation & Coordination of the Plan

In some specific area of Akkelpur Paurashava, there are some scattered low-lying areas which are subjected to water-logging during and after heavy rainfall in a year between July and August normally for 30-40 days. The depth of stagnant water varies between 0.25 m to 0.35m and usually lasts for 4.00 to 6.00 hours. The water—logging situation is likely to further aggravate in the years to come with increasing urbanization. The primary causes of this water-logging are as follows:

- Lack of cleaning and maintenance of the khals/drains
- Unplanned and under designed existing drainage system
- Obstruction and encroachments in the khals/ drains
- Lack of construction and integration of tertiary, secondary drains and primary khals
- Due to non-existence of drains in different places.

In order to address the above mentioned problem the following proposals have been made in the drainage master plan:

- The proposed drainage system for Akkelpur Paurashava has been planned with a view to discharges most, of the storm run-off in the Khal and river by gravity flow and no pumping is necessary.
- Under the provision of proposed drainage master plan, major khals constitute the storm water run-off delivery system and have been defined as the primary khals. Timely undertaking of the drainage master plan including study is considered a timely venture to know the drainage issues within Akkelpur Paurashava and to formulate and investment project to reduce sufferings of the Paurashava residents.
- The proposed drainage management plan is justified technically, economically and socially. The priority program is recommended for implementation considering the present serious drainage problems faced by the Paurashava residents. The project after implementation will mitigate the major drainage problems in the core and semi-core area where the density of population varies from high to medium.
- The proposed drainage master plan is likely to be co-coordinated with other utility providing organizations to avoid over-lapping and duplication. As such, very close co-ordination with DPHE, BWDB and other utility organizations should be maintained during the project implementation so that, disruption does not take place in utility services.
- It is recommended that cost of the first phase of the project priority program is funded as grant financing to Paurashava by ADB because the Paurashava is not in a position to implement this project from their own resources.
- The revenue collection of Akkelpur Paurashava is moderate. The Akkelpur Paurashava authority' is unable to make assessment of tax timely. Akkelpur Paurashava shall have to improve significantly in revenue collection and the efficient financial management so that

the Akkelpur Paurashava can properly maintain the drainage system including the control of environmental sanitation.

- Financial sustainability is possible by increasing revenue collection efficiency with activities like more arrear collection & re-assessment of taxes in regular intervals. Re-assessment in every 5 years is recommended. Re-assessment process should commence sufficiently in advance so that appeal process could be completed prior to the effective date. Distress warrants against big-defaulters both in terms of amount due and years overdue may be executed in order to achieve good Governance & financial sustainability.

B. Environmental Management Plan

12.5 Introduction

Improvement of the environmental system has been identified as one of the highest priority needs of the Paurashava authority as well as the resident. This is an essential part for the future development of the urban areas. The main objectives of the environmental study are to assess the existing environmental condition in the Akkelpur Paurashava and to identify the future requirements of the control over environmentally critical and vulnerable areas and living things.

12.5.1 Goals and Objectives

Following are the overall objectives of environmental management plan:

- To create a sustainable living environment.
- To create awareness among citizens about livable environment.

12.5.2 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.

12.6 Existing Environmental Condition

12.6.1 Introduction

The urban environment of the Akkelpur 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.

12.6.2 Geo-morphology

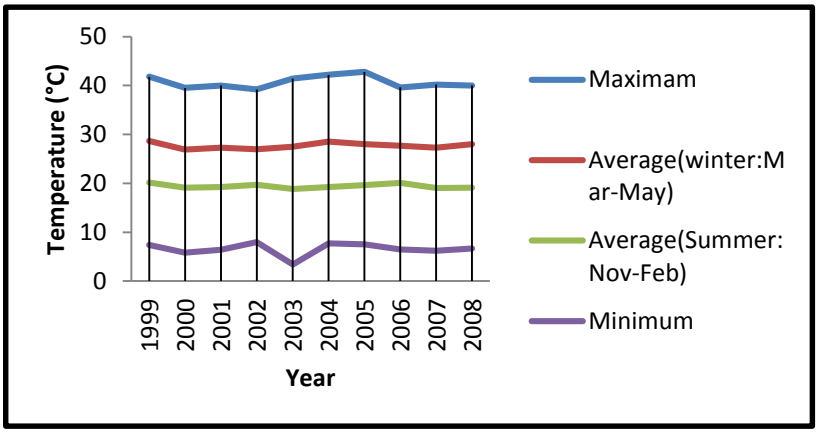
Geological condition

It is known from the agricultural officer of Akkelpur Upazila that there are several types of soils in this area. According to agricultural office at Akkelpur there is 2/3 of the soil is loomy soil. Besides, doash and sandy soil are also found there.

Morphological condition

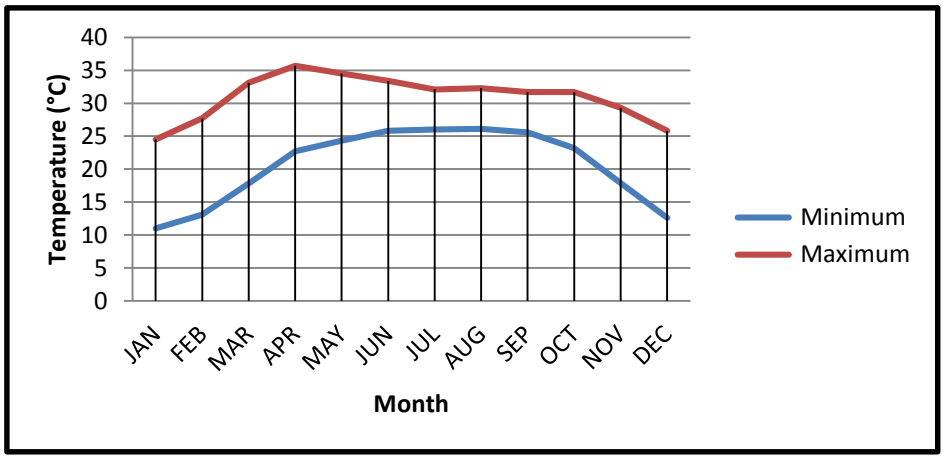
Temperature

Temperature is a measurement of the average kinetic energy of the molecules in an object or system and can be measured with a thermometer or a calorimeter. It is a means of determining the internal energy contained within the system. The following figure shows the temperature characteristics of last 10 years in Akkelpur Paurashava. From the figure it is seen that maximum temperature has an increasing trend over the years.



Source: Based on Data from Bangladesh Meteorological Department, Dhaka, 2009

Fig 12-8: Temperature characteristics of last 10 years in Akkelpur Paurashava



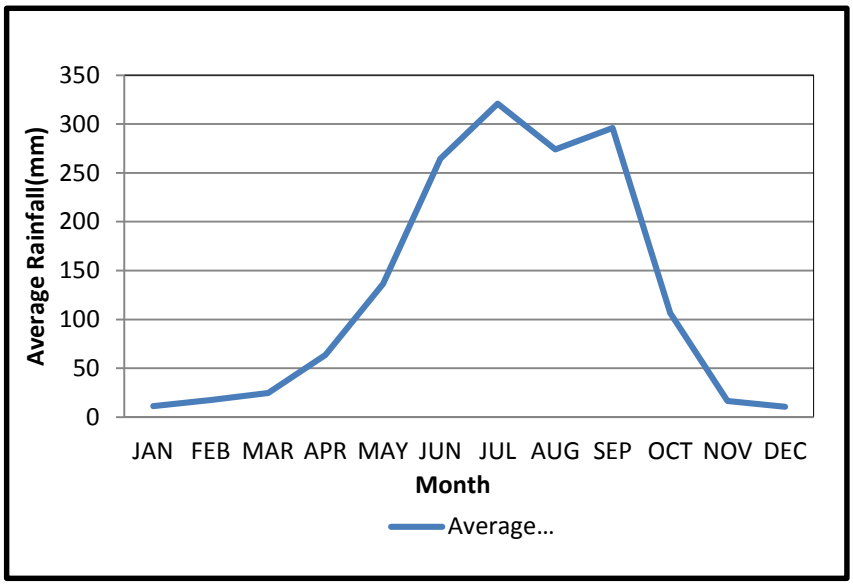
Source: Based on Data from Bangladesh Meteorological Department, Dhaka, 2009

Fig 12-9: Normal Maximum and Minimum Temperature Characteristics across the year in Akkelpur Paurashava

The following figure shows the Normal Maximum and Minimum Temperature Characteristics across the year in Akkelpur Paurashava. From the figure it is seen that there exist maximum temperature in the month of April.It is also observed that in the mid-year (from April to October) the temperature is higher compared to other section of the year.

Rainfall

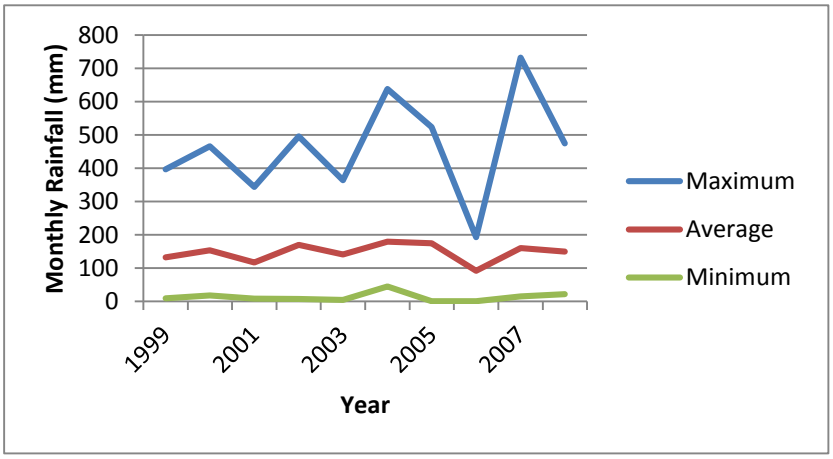
Rainfall is the amount of precipitation of any type, primarily liquid. It is usually the amount that is measured by a rain gauge. The following figure shows the Average Rainfall Characteristics across the year in Akkelpur Paurashava. From the figure it is seen that the highest rainfall occurs mainly in the month of June, July and August.



Source: Based on Data from Bangladesh Meteorological Department, Dhaka, 2009

Fig 12-10: Average Rainfall Characteristics across the year in Akkelpur Paurashava

The following figure shows the rainfall characteristics of last 10 years in Akkelpur Paurashava. From the figure it is seen that maximum rainfall has an increasing trend over the years and it becomes highest in the year 2007.

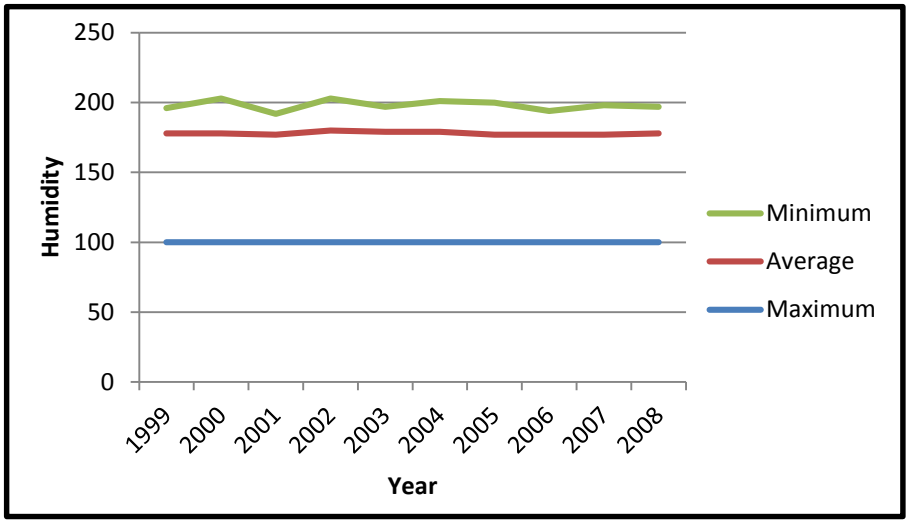


Source: Source: Based on Data from Bangladesh Meteorological Department, Dhaka, 2009

Fig 12-11: Rainfall Characteristics for last 10 years in Akkelpur Paurashava

Humidity

The following figure shows the humidity characteristics of last 10 years in Akkelpur Paurashava. From the figure it is seen that there is no much change in humidity in Akkelpur over the years.



Source: Based on Data from Bangladesh Meteorological Department, Dhaka, 2009

Fig 12-12: Humidity characteristics of last 10 years in Akkelpur Paurashava

12.6.3 Solid Waste and Garbage disposal

The solid waste and garbage disposal of Akkelpur Paurashava includes house hold waste, industrial waste, kitchen market waste, clinic/hospital waste, latrine waste, brickfield waste and fertilizer/chemical related waste.

The production of solid waste in Akkelpur Paurashava per person per day is around 250gm and the total Paurashava production is 7.20 ton/day. The household waste is thrown by the people to roadside drains or open spaces adjacent to their 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.

12.6.4 Waste Management System

Akkelpur Paurashava is lacking for sewerage system and people are used to dispose household sewer to the surface drains and or surface water bodies. This Paurashava does not possess good solid waste management system. Only there is only one vehicle and 4 van for solid waste disposal although those are not properly functioning. There are 8 sweepers for solid waste collection. In this Paurashava, there are 28 permanent dustbins and designated site for solid waste dumping. The Paurashava does collect waste from bazaar and from dustbin. Only roadside waste are collected and these wastes are thrown generally at various holes and borrow pits. When generally holes and borrow pits created due to earthwork for road construction then these holes and borrow pits are used for the solid waste dumping. Inadequate maintenance of human, domestic and market wastes, open and poor drainage system, water logging etc. create serious environmental degradation within the Paurashava area.

It is revealed from the field observation that the existing environmental condition of the Akkelpur Paurashava is poor. Most of dwellers of the Paurashava used to dispose solid waste near the household, nearby ditches, canals drains and or vacant lands degrading the living environment.

12.6.5 Pollutions

12.6.5.1 Water

Water pollution is the presence of pollutants, particles or contaminants in water beyond the level which is desirable for drinking. Saltwater encroachment associated with overMastering of aquifers or natural leaching deposits are natural sources of groundwater pollution. Most concern over groundwater contamination has centered on pollution associated with human activities. Human groundwater contamination can be related to waste disposal (private sewage disposal systems, land disposal of solid waste, municipal wastewater, wastewater impoundments, land spreading of sludge, brine disposal from the petroleum industry, mine wastes, deep-well disposal of liquid wastes, animal feedlot wastes, and radioactive wastes).

In Akkelpur Paurashava there is no significant level of ground water pollution. Here both groundwater and surface water are free from significant pollutant. One of the main reasons behind this is the absence of industrial effluents in this area and the presence of Tulshiganga River. Besides the generation of solid waste and municipal waste water is not a huge amount. It can be mentioned that several years ago a very little amount of arsenic was identified in ground water although which falls under acceptable level.

12.6.5.2 Air

Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or damages the natural environment into the atmosphere. An air pollutant is known as a substance in the air that can cause harm to humans and the environment. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or manufactured. Sources for air pollution include stationary sources such as smoke stacks of power plants, manufacturing facilities and waste incinerators, as well as furnaces and other types of fuel-burning heating devices, mobile sources such as motor vehicles and other sources such as chemicals, dust and fumes from agricultural and industrial processing.

In AkkelpurPaurashava, some sorts of pollutant are found to be exposed in the air causing air pollution. For instance, emissions from vehicle exhausts of old and poorly maintained buses and trucks, loading, unloading, and carrying of sand and soil without any dust preventive measures are found within the Paurashava. However, the amount of pollution is insignificant and within acceptable level. It can be mentioned that within this Paurashava area there is nobrickfield, which is the vital source of air pollution. According to the Paurashava authority, there are are about 5 flour mills and about 15 rice mills which expose some amount of air pollutant.

12.6.5.3 Sound

Sound pollution is a type of energy pollution in which distracting, irritating, or damaging sounds are freely audible. It is displeasing human, animal or machine-created sound that disrupts the activity or balance of human or animal life. The source of most outdoor sound pollution is mainly

construction and transportation systems, including motor vehicle noise, aircraft noise and rail noise. Indoor and outdoor sound pollution sources include car alarms, emergency service sirens, mechanical equipment, fireworks, compressed air horns, grounds keeping equipment, barking dogs, appliances, lighting hum, audio entertainment systems, electric megaphones, and loud people. In Akkelpur Paurashava, the source of sound pollution is found to be little. In this Paurashava there is a little incident of much construction work. The movement of motorized vehicle is also less. So sound pollution in this Paurashava is not significant and disturbing.

12.6.5.4 Arsenic

In Akkelpur Paurashava, there is no significant level of ground water pollution. Here both groundwater and surface water are free from significant pollutant. One of the main reasons behind this is the absence of industrial effluents in this area and the presence of Tulshiganga River in this Upazila. Joypurhat Districts are partially belong to Geologic District of Residual Deposits Aquifers located within above Geo-district are safe from Arsenic contamination.

12.6.6 Natural Calamities and Localized Hazards

12.6.6.1 Cyclone

In Akkelpur Cyclone is not a regular phenomenon. In fact till now no record is found regarding the occurrence of Cyclone passing through this Paurashava.

12.6.6.2 River Erosion

Being one of the major floodplain areas of the country Akkelpur Town annually experiences riverbank erosion hazard due to sudden and rapid channel shifting. Consequently, valuable cultivable land is lost; also village settlements, markets and towns are destroyed.

In Akkelpur the local channels of the mighty Tulshiganga River have episodically and capriciously wandered across the landscape, eroding their banks, destroying everything in their paths and accreting land elsewhere.

It can be mentioned that the Akkelpur Paurashava, being situated apart from the Tulshiganga River, till not destroyed by the River bank erosion. But if the River bank of the Tulshiganga River continues to erode then within a few years the River will reach at Akkelpur Paurashava destroying the properties in this Paurashava.

12.6.6.3 Flood

Akkelpur Paurashava is normally not affected by flood due to absence of any significant adjacent river. Some part of the area inundated in rainy season. The people in this area have little sufferings due to annual flood.

12.6.6.4 Earthquake

Like Cyclone, Earthquake in this area is not a regular phenomenon. Although several Earthquake were observed in this area over the past decades but the intensity was very low and damages occurred due to Earthquake.

12.6.6.5 Water Logging

Inundation occurs in some parts of the Paurashava due to localized storm that is affecting the drainage system of the Paurashava and creating a worse environment for the residents living in those areas.

The depth of inundation and duration varies from place to place. However, it is ranged from 0.5m to 2.5m in depth and the duration of water logging varies from 6 hrs to 20 hrs and even it lasts for several days. The reasons for water logging are as follows:

a) Absence of planned drainage system.
b) Absence of integrated drainage network of tertiary and secondary drains with primary drainage system.
c) Existing drains with low discharge capacity.
d) Indiscriminate disposal of solid waste into the drainage system that reduces the flow capacity of the whole system.
e) Lack of proper initiative for cleaning and maintenance of existing drainage system.

It is known from the local people that the Paurashava authority did not take any substantial initiative to remove or to reduce the problem of water logging.

12.6.6.6 Fire Hazard

In this Paurashava no mentionable fire hazard occurred in the last decade. Due to more urbanization in this area a fire service station is proposed in third phase of this plan.

12.7 Plans for Environmental Management and Pollution Control

12.7.1 Proposals for Environmental Issues

12.7.1.1 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 East corner of Ward-9 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 finally they 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 **Fig 12-13**.

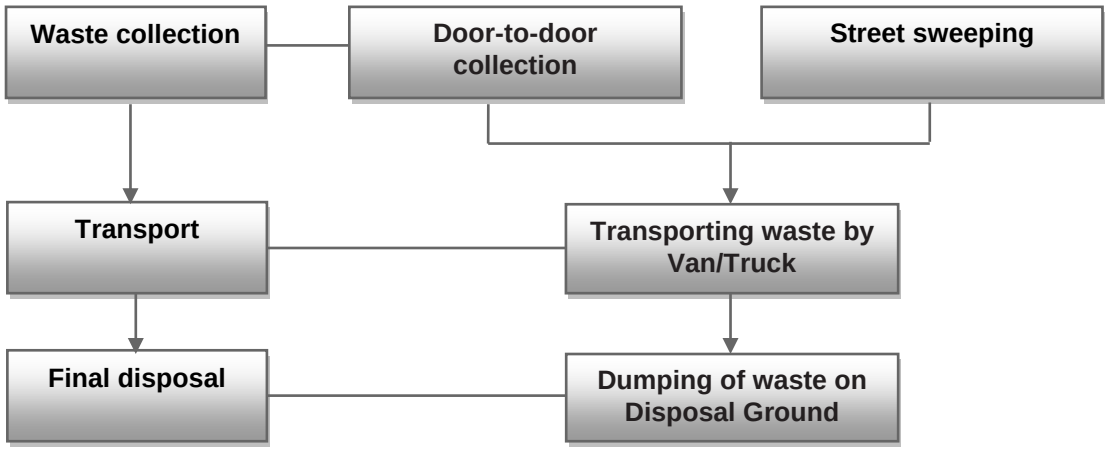


Fig 12-13: Overview of the Solid Waste Management Plan

12.7.1.2 Plan for Protecting Open Space, Wet-Land and Relevant Features

Parks and Recreational Places

A few play fields are the main recreational sites in the area. However, with implementation of this plan, new open space, playground, parks, lake, etc. will provide more leisure places for the people.

Enhancement Activities:

- Ensure new open space, playground, parks, increasing facilities to visit the river bank etc. to increase recreational facilities in the Paurashava area.

All the Development proposals for Drainage and Environment Management Plan are given in **Chapter 10, Table 10.17** and **Table 10.19.**

Map 12-4: A Brief of Solid Waste Management Proposal of Akkelpur Paurashava

Map 12-5: Location of Existing and Proposed Open Spaces of Akkelpur Paurashava

- Develop khal side as walking area with properly designed modern facilities to attract outside visitors also.

Responsible Organizations: Paurashava, Bangladesh Parjatan Corporation

Loss of Wetlands

Wetlands are mainly affected first by the urbanization process. Earth filling fills up the ponds, low land, khals. Waste water affects the aquatic ecosystem and makes the ponds, khals unproductive and as a result the aquatic plants, fishes and animals have to die or migrate to other places. Suitable urban facility attracts more residential development with the cost of filling of low cost wetland. There is no strict regulation on earth filling of ponds. However, Wetlands Conversation Act exists in Bangladesh, which is applicable only to natural beels and khals. Number of ponds in Akkelpur Paurashava is reduced every year to accommodate housing and commercial structures. Wetlands play an important role as a reservoir of rain and flood water. They are also important to maintain the balance of ecosystems and for replenishing the ground water level through seepage.

Mitigation:

- Cutting of drainage outlets to the khals and ponds.
- Avoiding wetlands during road alignment fixation.
- Stopping housing estate, industries and other development works in wetlands through earth filling.
- Stopping earth filling of ponds in Paurashava area through creation of public awareness.
- Strict implementation of The Act (36 of 2000) for Conservation of Play field, Open space, Park and Natural Water Reservoir in Mega City, Divisional Town, District Town and Paurashavas of Bangladesh.

Responsible Organizations: Paurashava, DOE and NGO

12.7.1.3 Proposals for Pollution Control

12.7.1.3.1 Industrial

Industrialization is not prominent economic sector in Akkelpur Paurashava. With implementation of this project and establishment of Industrial Zone nearby with road, drainage, water, gas, electricity and telephone facilities will attract the promoter and NBRs to invest here and help in industrialization in the project area.

Enhancement Activities:

- Arrangement for gas pipe line in the industrial zone.
- Efluent treatment plan must be set up in heavy industry.
- Arrangement for water, electricity, telephone, fire-service and drainage facility in industrial zone.
- Arrangement for soft-loan for agro-industry, garments, electronics, IT etc.
- Strengthening the activities of Akkelpur Shilpa and Banik Samity (KSBS).
- Invite the national and foreign investors to visit and invest in industrial zone.
- Initiate the local entrepreneurs through incentives for industrialization.
- The existing brick fields can continue next 10 year and after that they have to relocate outside the Paurashava boundary. The existing brick field must follow Brick manufacturing (Control) Act, 1989.

- Any new brick field cannot permit in the Paurashava area.

Responsible Organizations: Board of Investment, Banks, Akkelpur Shilpa and Banik Samity

12.7.1.3.2 Air/Water/Land/Sound

Noise Pollution

Noise is unacceptable level of sound that creates annoyance, hampers mental and physical peace and may induce severe damage to the health. Along with the increasing degree of air and water pollution, noise pollution is also emerging as a new threat to the inhabitants of Paurashava. Motorized traffic is one of the major sources of noise pollution in urban areas. Although there are many sources of noise, which include industries, construction works and indiscriminate use of loud speakers, motorized traffic is the principal source of creating noise in urban areas. With the increase in the number of motorized vehicles in the city, the hazard of noise pollution has increased and exceeded the level of tolerance. The noisiest area in Akkelpur Paurashava is Alampur Chowrasta intersection

Exposure to high level of noise may cause severe stress on the auditory and nervous system of the city dwellers, particularly the children. Regular exposure to loud noise damages the hearing capability and has adverse effects on health, like increasing mental stress and blood pressure and sleeplessness, resulting in poor work performance. With expansion of urban area, the noise pollution will be increased for increasing motor vehicles, market places, industries etc.

Mitigation:

- Stop using hydraulic horn in buses, trucks and other motor vehicles.
- Declare some areas like hospitals, schools, parks, etc. as silent zone.
- Strict implementation of law.
- To control abnormally high noise from saw mill the old machines should be repaired or replaced.
- Foundation of machines should be specially prepared to reduce noise.
- Special type of silencer may be attached with the machines to reduce noise.
- Welding and blacksmith workshops can be fenced with classes to protect the passersby from possible pollution effects.
- People constantly working in welding and blacksmith workshops should wear earplugs and glasses. Regular medical checkups can be carried out to identify possible health problems.

Responsible Organizations: Paurashava, BRTA, Akkelpur Upazila Health Complex, Motor Owners Association and Labor Unions, etc.

Air Pollution

Almost all the project area has the same level of air quality. As from the standard of The Environment Conservation Rules, 1997 (ECR, 1997) the air quality of the category “Residential and rural” has the density of different air particles in the project area as follows:

- Suspended Particulate Maters (SPM) = 200 microgram per cusec meter,
- Sulpher-dioxide = 80 microgram per cusec meter,

- Carbon Monoxide = 2000 microgram per cusec meter and
- Oxides nitrogen = 80 microgram per cusec meter.

Mitigation:

- Use catalytic converter in buses, trucks, taxis and tempos.
- Use CNG instead of petrol.
- Set up 120 ft. high stack in brickfields and use filter to reduce the CO, SO2 and NO2 gases in atmosphere.
- Stop the operation of brick-fields which have grown near the homesteads, bazars and growth centers.
- Impose ban on movement of stone and sand carrying trucks using the tertiary and access roads.

Responsible Organizations: Paurashava, DOE, BRTA, DC office, Motor Owner and Labor Unions, etc.

Drainage Congestion

Drainage congestion may increase further with the present trend of development. Faulty design, slope problem in head and tail area, solid-waste and rubbish dumping, encroachment and un-authorized structures, siltation, lack of renovation and re-excavation are the main causes of drainage congestion. As a result discharge of new drainage network will create severe drainage problem in Paurashava area, particularly in monsoon period.

Mitigation:

- Excavation of the primary drainage networks specially the existing and the proposed khals.
- Re-excavate the water retention and detention area with link khals proposed in the master plan.
- Remove all un-authorized structures, developed on drainage structures.
- Make proper drainage network in new area considering the slope and local topographical condition.
- Strictly prohibit the people in dumping of rubbish and solid waste in drain.
- Regular cleaning and maintenance by the concerned authorities.

Responsible Organizations: Paurashava, LGED

Surface Water Pollution

The surface water quality of khals, ponds and ditches are polluted in respect of pH, turbidity and coliform bacteria with national standard. The present pollution level of these sites is found to be low except coliform bacteria. The main causes of surface water pollution are industrial wastewater, sanitary sewage, solid waste dumping. The present trend of development in the project area, the surface water pollution level may further increase for high volume of discharge of wastewater, sanitary sewerage, over spilling of pit and septic tank, industrial effluents, surface run-off of katcha bazars, indiscriminate solid and medical waste dumping.

Mitigation:

- Stop katcha, hanging and pit latrines.

- Create underground sewerage system for Paurashava area.
- Use pucca latrine with septic tank and soak well.
- Prohibit indiscriminate dumping of medical and solid waste in drainage, khals and river.
- Improve sanitation condition of slaughter house, fish market and katcha bazars.
- Prohibit the direct discharge of Paurashava waste water to any Canals, low lying areas and river.
- Establish waste water and sewerage treatment plant.

Responsible Organizations: Paurashava, LGED and DOE

Groundwater Depletion

Groundwater level of Paurashava has a considerable lowering over the last few decades. It has been calculated that in 2031 the lowering of ground water level might be 20m. Eventually fall of groundwater table is a common phenomenon in project area during dry period (Feb.-May). With expansion of urbanization and industrialization, the groundwater table may further fall if present tradition of using groundwater is continued.

Mitigation:

- Use khals water for pipeline supply to households and industries.
- Use of surface water treatment plant to purify the river water and use as drinking water.
- Introduce rainwater harvesting system and use in the project area.
- Stop land filling of ponds and water bodies (area more than 0.25 acre) to maintain the groundwater level through recharge and leaching process.

Responsible Organizations: Paurashava, DPHE, and NGOs

Groundwater Pollution

Groundwater pollution due to manganese, iron and hardness is a major problem in the project area. With expansion of urban area, more dependency on groundwater sources may increase the pollution level of sub-surface water.

Mitigation:

- Use surface water of khals for supply water system.
- Introduce rain water harvesting system.
- Reduce dependency on groundwater.
- Preserve surface water in ponds, khals, ditches and rivers for irrigation.

Responsible Organization: Paurashava, LGED, BWDB, DOE and NGOs

12.7.1.3.3 Other Pollution

Any pollution other than mentioned above is not yet identified at Akkelpur Paurashava.

12.7.2 Natural Calamities and Hazard Mitigation Proposals

12.7.2.1 Plan for Addressing Natural Calamities (Structural and non structural measures)

Earthquake

Like Cyclone, Earthquake in this area is not a regular phenomenon. It is low vulnerable region in Bangladesh.Unplanned and unregulated urbanization and disregard to BNBC rules in building construction aggravate the situation more. With the implementation of master plan the planned urbanization will strictly follow the actual zoning plan and following of BNBC rule will minimize the earthquake damage. In DMDP Urban Area Plan Volume- II, (Part-3, Interim Planning Rules) development restriction considering the geological fault line areas states “Structures above 2 storey’s situated within 500 meters of a geological fault is not allowed unless built to the BNBC standards for Seismic Zone 3 (BNBC Section 6 Chapter 2.25)”. Similar measures are also suggested for Akkelpur Paurashava.

Enhancement Activities:

- Ensure all new buildings are designed and constructed following the guideline of BNBC.
- Development of a comprehensive plan for managing post earthquake situation.
- Train community workers who would carry out the initial search and rescue efforts.
- Launch a massive public awareness campaign.

Responsible Organizations: Paurashava, Civil Surgeon, Civil Defense, Fire Service and DOE

Change in Topography

Topographically Akkelpur Paurashava is flat and gentle sloping. The natural topography of Paurashava area has already been changed for urbanization. The present trend of development like roads, drainage, bridge/culvert, housing and industrial estates and bazars will radically change the natural topography and land use pattern of the area. The agricultural area will be converted into urban and semi-urban area. The present green scenic beauty will disappear, water bodies will be lost and general slope will be diminished for earth cutting due to rapid urbanization. The current effort of master plan will ensure sustainable development.

Mitigation:

- Careful planning to minimize the change of topography.
- Avoid water bodies during construction of roads, housing and industrial estates.
- Practice good architectural/engineering design during planning of housing estates, buildings and the intersections of main roads.
- Enhancement of plantation and gardening to increase the scenic beauty of the city.
- Preserve the natural greenery, ponds, khals and large water bodies.

Responsible Organizations: Paurashava, DOE and Forest Department

Land Use Change

With the implementation of master plan, the Peripheral-urban and agricultural land use will be controlled and conserved using landuse control mechanism.

Mitigation:

- Careful planning to reduce change of agricultural land use and rural set up.
- Conserve water bodies and productive agricultural land free from haphazard urban development.

- Economical use of land.

Responsible Organizations: Paurashava and Ministry of Agriculture& Livestock, DOE

12.7.2.2 Plan for Addressing Hazards

Traffic Congestion

Traffic congestion is space-based problem. It occurs at particular junction and or at a particular land use area. Urbanization and growth of population will increase movement of vehicles in and around the Paurashava. Number of rickshaws will also increase to meet the people's demand. Rickshaws will be the main cause of traffic congestion in Akkelpur Paurashava in future.

Mitigation:

- Phase wise implementation of proposed road network.
- Strict implementation of traffic rules to improve traffic management.

Responsible Organization: Paurashava, LGED, RHD

Fire Hazard

In future the probability of fire may increase for more offices, institutions, markets, growth centers and industries. Electric short-circuit is mainly responsible for fire hazards in urban area. However, human error may also cause for fire sometimes. Slums and some industries like garments and plastic products are more susceptible to fire hazards. The present fire station facility is not enough to cope with future fire hazards.

Mitigation:

- Set up one new fire station at proposed location
- Collect modern fire prevention devices.
- Refrain people from using low quality electrical wire in buildings and industries.
- Ensure periodical checking of electric lines.
- Create awareness of people about fire hazards.
- Ensure fire-fighting devices in new industries, high-rise buildings and markets.
- Strict implementation of BC rule.
- Large and medium scale water bodies should be conserved for quick and huge supply of water at the time of emergency.

Responsible Organizations: Paurashava, PDB, DOE and Fire Service and Civil Defense

Loss of Habitat

The habitat for fauna and wildlife has been losing day by day in the Paurashava area. For urbanization and industrialization, agricultural land will be disappear, water bodies will be filled up, rivers and khals will be polluted and trees will be cut down for new settlement. Birds, fishes and other animals will permanently lose their habitat and food in the urban area.

Mitigation:

- Careful planning to avoid the sensitive ecosystem.
- Minimum use of land for urbanization.
- Preservation of water bodies and khals.

- Initiate people to avoid tree cutting and vegetation clearing.

Responsible Organizations: Paurashava, DoE and NGOs

Loss of Biodiversity

Continuous expansion of the urban area will enhance the urban development in this area. Urban elements like roads, infrastructure development, housing, commercial places, industrialization etc. will replace the existing green natural environment to manmade environment. Trees will be cut down, water bodies will be filled up and polluted; garden and bush will disappear for urban expansion in new area. Wild animals, birds and fishes will lose their habitats and as a result a big loss of biodiversity will happen for urban expansion in the Paurashava area.

Mitigation:

- Avoid critical ecological area and refugee sites from development works.
- Aware people for keeping some trees and bushes around the homesteads.
- Increase tree plantation in roadsides along the river and khals and homesteads.
- Preserve the lakes for aquatic birds and fishes and some bush areas as wildlife refuge sites.
- Ban on hunting of birds and wildlife.

Responsible Organizations: Paurashava, Forest Department, Fisheries Department and NGO's

Loss of Capture Fisheries

The project area is mainly high and medium high land. Khals and low lands are very limited. Therefore, open water fisheries resources are low in the project area. Only 15-20% fish demand is met by the capture fisheries. Ponds and khals support the capture fisheries in the project area. Lowering of water level in the river also there is no water in the khals in dry season is a major reason of the damage of aquatic environment.

With the continuing urbanization, the capture fisheries will be remarkably reduced for loss of habitat due to water pollution of sewerage and drainage discharge, industrial effluent, solid waste dumping, earth filling and less flushing. Area of khals, beels and other water bodies will be reduced for land development and urbanization.

Mitigation:

- Stop direct drainage outfall to river, khals and beels.
- Set up sewerage and wastewater treatment plant.
- At the early monsoon, keep open the gates of sluices and regulators during spawning period of fish.
- Excavation of khals and natural water bodies
- Strict regulation on land filling of water body.

Responsible Organizations: Paurashava, and DOE

Loss of Ponds and Culture Fisheries

With urbanization and industrialization through this project, many ponds will be lost for land filling by the owners for increasing land value due to human pressure, settlement and development accordingly loss of fishes. There is no strict regulation on earth filling of ponds in the area.

Mitigation:

- Designate all ponds in Master Plan Map and protect the large ones according to the ecological importance and public interest.
- Protect the ponds having area more than 0.25 acre as per regulatory framework of Master Plan.
- Create public awareness about the importance of ponds and its role in culture fisheries, bathing and water reservoir for surface run-off during monsoon.

Responsible Organizations: Paurashava, DOE and DC (Land)

Loss of Productive Agricultural Land

The Master plan Project has included a vast area of agricultural land in the project area. Both highlands and lowlands fall into this project. After implementation of MP project, agricultural environment will be converted into un-productive urban and semi-urban area.

Mitigation:

The DOE EIA Guidelines emphasized on the avoidance of productive agricultural land during any development project. Therefore, it will be wise to consider more economical use of land to avoid some fertile lands. The land acquisition should be based on the growth rate of population. The designated agricultural land in the master plan must conserve from any type development or land use change. Strict rules and regulation must be imposed to control the agricultural land.

Responsible Organizations: Paurashava and DOE

12.8 Plan Implementation Strategies

12.8.1 Regulations to Implement the Environmental Management Plan

Drainage and Environmental Management plan should be performed under the clauses in the Local Government (Paurashava) Act, 2009 and other national rules existed in Bangladesh.

According to the second part of section 50-71 of Paurashava Ordinance:

Removal, collection and disposal of refuse

1) A Paurashava shall make adequate arrangements for the removal of refuse from all public streets, public latrines, urinals, drains, and all buildings and land vested in the Paurashava and for the collection and proper disposal of such refuse.
2) The occupiers of all other buildings and lands within the municipality shall be responsible for the removal of refuse from such buildings and lands subject to the general control and supervision of the Paurashava.
3) The Paurashava may cause public dust-bins or other suitable receptacles to be provided at suitable places and where such dust-bins or receptacles are provided, the Paurashava may, by public notice, require that all refuse accumulating in any premises or land shall be deposited by the owner or occupier of such premises or land in such dust-bins or receptacles.
4) All refuse removed and collected by the staff of the Paurashava or under their control and supervision and all refuse deposited in the dust-bins and other receptacles provided by the Paurashava shall be the property of the Paurashava."

Latrines and urinals

1) "A Paurashava may, and if so required by the Government shall, provide and maintain, in sufficient number and in proper situation, public latrines and urinals for the separate use of each sex, and shall cause the same to be kept in proper order, and to be properly cleaned.
2) The occupier of any premises to which any latrine or urinal pertains shall keep such latrine or urinal in a proper state to the satisfaction of the Paurashava and shall employ such staff for the purpose as may be necessary, or as may be specified by the Paurashava.
3) Where any premises are without privy or urinal accommodation, or without adequate privy or urinal accommodation, or the privy or urinal is on any ground objectionable, the Paurashava notice require the owner of such premises.

The privy or urinal disposed in the Paurashava's dustbin or disposal ground is the property of Paurashava."

12.8.2 Implementation, Monitoring, Evaluation and Coordination of the Plan

Resettlement

Resettlement is a burning question for any urban development project. For Master Plan Project land will be required for roads, markets & bazars, educational organizations, housing & industrial estates, open spaces, play grounds, parks, lakes, etc. Therefore, land acquisition is required from people in the project area. People have been living in their homesteads for many years in ancestral way and reluctant to leave their croplands and homesteads. The project authority should take proper care during land acquisition. Requisition of sensitive and conflict land area should be done in consultation with the landowners, local ward commissioners/ members/ chairmen and political persons. Without appropriate rehabilitation and compensation, no one should be evacuated from his homesteads. Slum people do not have the land right, they should be rehabilitated in new places with full compensation of housing and occupation.

Compensation

Land acquisition should be discussed with individuals affected and through participation of local people. The compensation of each affected landowner should be paid in the shortest possible time. If anyone loses his/her occupation/business/income source for land acquisition, it should be incorporated in compensation package. This would necessitate amendment of compensation rules. Persons losing their homesteads for housing project may be rehabilitated with due compensation and sanction of one plot in housing estate.

Section 12 of the Environment Conservation Act (ECA) 1995 stipulates that "no industrial unit or project shall be established or undertaken without obtaining environmental clearance from the Director General, Department of Environment, in the manner prescribed by the rules."

The Environment Conservation Rules (ECR) 1997 have been prepared under the clause (2) (f) of the section 20 of Environment Conservation Act (ECA) 1995. The requirements of EIA for new development projects came into enforcement under the ECR 1997. These are the first set of rules promulgated under the Environment Conservation Act 1995. Among other things, these rules set out the requirements for and procedures to obtain environmental clearance. This also explains the requirements for IEE/EIA according to different categories (green, orange/amber or red) of industrial and development interventions.

During the implementation of Master plan, environmental clearance procedure will be guided by the Environment Conservation Rules 1997 of the Department of Environment. Paurashava will have the authority to approve the plan as per agreed principles in the Master plan but the owner of the plot will be obliged to get clearance from the DOE before actual implementation.

For implementation of the mitigation plan emphasis has to be laid on implementing the mitigation measures. Appropriate institutional set up will be required to implement the measures. Government must allocate sufficient budget for this purpose.

Duration, Revision and Updating

The proposed Structure Plan along with a set of policy guidelines has been provided for a period of 20 years, 2011 through 2031. However, to suit in time and space, revision and updating of the environment management plan will be necessary at a regular interval.

Structure Plan should be regularly reviewed and updated during the end of every fifth year of the five-year term. In this way, four revisions will be carried out during its twenty years lifetime.

Chapter 13: Plan for Urban Services

This chapter describes the urban basic services development proposals for future development of the 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 development proposals deal with the basic urban services, like, water supply, drainage, sanitation, solid waste, telecommunication, electricity and gas, community facilities, education and health.

13.1 Water Supply

The Paurashava is taking step to develop its own network based water supply system. The entire water supply system of the Paurashava is based on household tube well and pond. As per the census 2001, about 93.10% household depend on tube well for their drinking water. However, many of the tube wells provide arsenic free drinking water. As a result lots of hand tube wells water is mostly used for washing purpose. Water from ponds is mainly used for washing.

Developing a network based supply system will depend on availability of fresh water aquifer. Detailed geological Investigation is required to find out fresh water aquifers. But here problem lies here to use of ground water. Safiuddin (2001) observed the serious arsenic contamination of groundwater in Bangladesh has come out recently as the biggest natural calamity in the world. The people in 59 out of 64 districts comprising 126,134 sq km of Bangladesh are suffering due to the arsenic contamination in drinking water (arsenic contamination is also found in the ground water of Akkelpur Paurashava). So in case of water supply for Akkelpur Paurashava, special emphasis will be given to use surface water rather than use of ground water. Paurashava should take a programme to preserve and maintain all major ponds at the Paurashava for the greater interest of the people at large. Total 8.02 acres land will be used for utility services. shows the planning schedule of Utility Services at Akkelpur Paurashava.

The town dwellers use ponds, khals and river water for their daily necessities other than drinking and cooking purpose. So it will require much less amount of water supply for the Paurashava town than city consumption. According to the estimation the total population in 2011 of Akkelpur Paurashava is 24227 and at the end of the project i.e. in 2031 this will be around 30242. Assuming that per day per capita water consumption of 100 liters, Technical loss 20% and Industrial/Commercial demand 20%.

By considering the above assumption, the total demand of water consumption of Akkelpur Paurashava will be 3024.4 cubic meter by 2031. This consideration has been taken by avoiding excess industrial and commercial demand so that there are no mentionable industrial establishments in this Paurashava.

As an alternative to drinking water supply harvesting of rain water may be explored. The idea of rainwater harvesting is unknown to the local people. NGOs working in rain water harvesting training and motivation may be engaged for this purpose. Paurashava may take initiative to prepare a programme for popularizing rain water harvesting among the Paurashava people.

13.2 Solid Waste Management

There will be 2 waste transfer stations with an area of 0.38 acres for collection of solid waste located at suitable locations. A dumping site will be developed over an area of 6.81 acres for final disposal of the solid waste. The waste dumping site is located in Ward-2 at the south-east corner boundary of the Paurashava. Detail land use information of waste transfer station and waste dumping station is given in Table 10.19, Chapter 10 of this report.

Table 13.1: Solid Waste Management Proposal

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre
Waste Transfer Station	4	Akkelpur (016_00)	Partial-787,788,791	0.19
	4	Akkelpur (016_00)	Partial-392,9999	0.17
Waste Dumping Area	9	Mokimpur (034_00)	240,241,242,243,261,277,278,279, 280,282,283,284,285,288,289 ,290,291,292,293,294,295,296,298	6.82
Total Proposal				**7.18**

13.3 Sanitation

According to BBS 2001, the present sanitation system of the Paurashava is composed of a variety of types, like, hanging latrine, pit latrines of different types, water sealed latrines and septic tank based sanitary latrine.

The record of sanitation condition is also not perfectly available. However, the Paurashava authority told that about 27.29% Households covered Pucca sanitary latrine and there is no open latrine in this Paurashava.

Due to prohibitive expenditure one should not expect establishing network and treatment plant based sewerage system in the town by the Paurashava. So, for long the sanitary system of the Paurashava will remain on site. To promote healthy sanitation, Paurashava should promote low cost sanitary latrines in the town together with awareness building for healthy sanitation. It is proposed to set up public toilets in public gathering areas, like, existing and proposed bus stand, bazar and the main town center. This will cause to set up 01 number of public toilets in the town.

13.4 Electricity and Gas

Power Development Board (PDB) is mainly responsible for electricity supply in the Paurashava, supported by the Rural Electrification Board (REB). PDB works for power production and distribution, while REB is responsible for distribution only. Both, PDB and REB have their own plans for power supply in the town, which is executed in phases, depending on demand for power. In its infrastructure plan has shown the future power supply network of the town. The required electricity facility within the Paurashava will be provided through existing power system master plan of both REB and PDB. But the greatest problem of power supply in the entire country remains to be handicapped by the shortage of supply due to low production.

Area for gas related facilities is not proposed in the plan, because there is no scope for installation gas facilities in this Paurashava within the planning period.

13.5 Telecommunication

The town enjoys the networks of all mobile and PSTN telecommunication companies operating in the country. Besides, there also exist landlines of BTCL, the national telephone company. Due to easy and cheaper access to mobile, the demand for land lines has decreased substantially.

Map 13-1: Proposed Basic Urban Services of Akkelpur Paurashava

Chapter 14: Ward Action Plan

14.1 Introduction

This chapter presents Part-C of the report which contains Ward Action Plan of each individual Ward. First, the issues prevailing in different Wards have been briefly described followed by description of Development Proposals in first ward action plan (1st to 5th year of planning period) for each Ward.

14.1.1 Background

The Ward Action Plans are prepared under the framework of Structure Plan and Urban Area Plan. The Ward Action Plans contain details of development proposals at Ward level including the problems and opportunities existing therein and also include the proposals made in the upper level plan that is in the Urban Area Plan. The Ward Action Plans have been formulated for execution within a period of 5 years.

Ward Action Plan is a vital part of the current plan package as far as spatial development and development control is concerned. Absence of Ward Action Plan not only hampers undertaking of development projects by planning authority, but also leads to uncontrolled and unwanted spatial development in the private sector. Land use zoning is also provided in the Ward Action Plan to enable detailed view of proposed land use and development.

14.1.2 Content and Form of Ward Action Plan

The Ward Action Plan is detailed area plan based on the policy framework, guideline indication of Structure Plan and more detailed guideline of Urban Area Plan. The provision of Ward Action Plan is inherent in the Structure Plan with some specific purposes. The Ward Action Plan is to:

a) Provide basic micro level infrastructure and services in the study area through systematic planning, under the framework of Structure Plan and proposals of the Urban Area Plan;
b) Create congenial environment to promote economic activities;
c) Improve drainage system and protect natural water channels from encroachment; and
d) Create service centers to promote urban growth.

14.1.3 Linkage with Structure and Urban Area Plan

Ward Action Plan is the 3rd component of the Master Plan package. The other two upper level components are Structure Plan and Urban Area Plan. Structure Plan lay down the framework of the future plan including strategy and the sectorial policies. The Urban Area Plan and the Ward Action Plan detail out development proposals under the framework of Structure Plan.

14.1.4 Approach & Methodology

The methodology could be illustrated through tri-step process for the assessment of Ward Action Plan. 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.

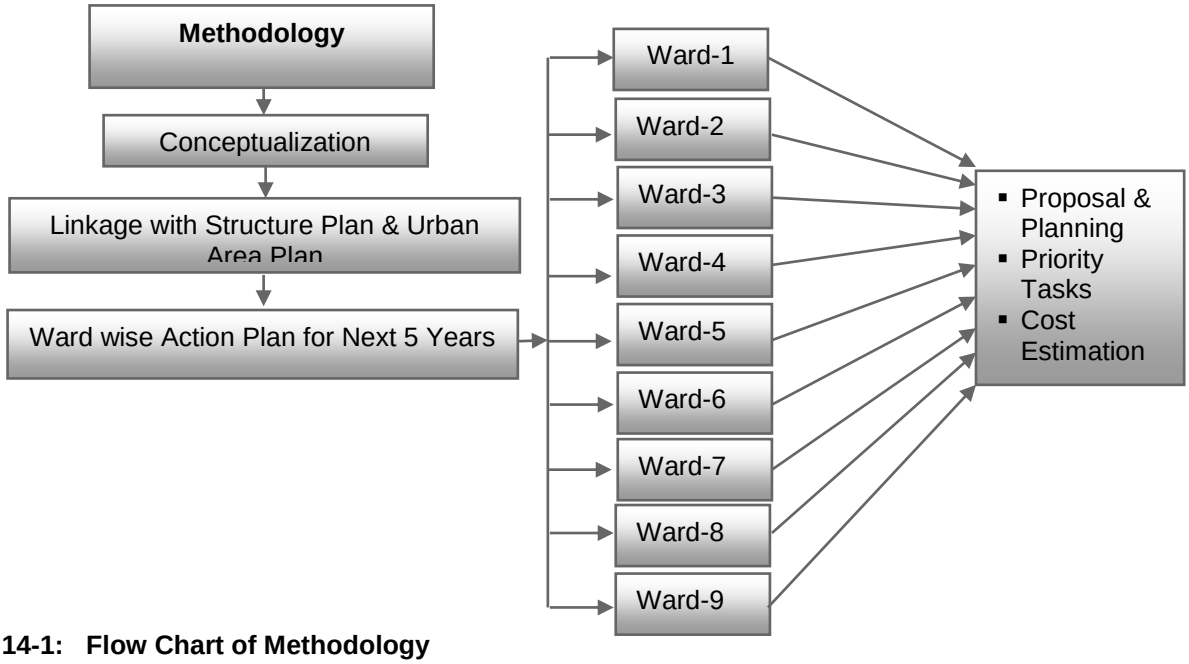


Fig 14-1: Flow Chart of Methodology

14.2 Derivation of the Ward Action Plan

The Ward Action Plan is derived from the conceptual framework, and guidelines and strategies for development under Structure Plan and detailed proposals of Urban Area Plan. Ward Action Plan is aimed to provide detailed infrastructure plan to guide the physical development of Akkelpur town including its all economic and social activities. This plan adheres to the policy directives spelled out in the Structure Plan.

14.2.1 Revisiting Structure Plan and Urban Area Plan

To guide long term growth of the Paurashava, potential locations of major development areas are identified and the Structure Plan Area is broadly classified into nine categories, namely Established Urban Area, Sub Urban Area, New Urban Area, Recreational Facility, Circulation Network, Restricted Area, Urban Peripheral Area, Agriculture Area and Water Retention Area. The Urban Area Plan is prepared under the framework of Structure Plan and the infrastructure identified for improvement and development are listed as proposals in the Urban Area Plan. The broad classification of lands in the Structure Plan and detailed proposals in the Urban Area Plan form the basis for Ward Action Plan.

14.2.2 Ward Wise Action Plan for Next Five Years

The Ward Action Plan is prepared for each of the twelve Wards and is presented in order of their serial number. The Ward Action Plans are a series of detailed spatial development plans of different use and facilities. The plans comprise maps of appropriate scale supported by

explanatory report. The Ward Action Plans have been formulated for execution within a period of 5 years. They do not initially cover the entire Structure Plan area. While all sub-areas will eventually require Ward Action Plan, only priority areas are to be dealt with initially. The aim of a Ward Action Plan is to prevent haphazard urban development and ensure livable environment in areas that are likely to be urbanized soon. Initially Detailed Area Plan should be covered for only those areas where action is needed immediately or where development pressure is high.

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 Paurashavas policies; and suggesting how these could be improved. Ward Action Plan must be topical and relevant. The Paurashavas target is to ensure that they are reviewed on a 5 yearly cycle. A comprehensive Map of Ward Action Plan is shown in **Map 14-1**.

Map 14-1: Ward Action Plan Map of Akkelpur Paurashava

Ward Action Plan for Ward-01

14.3 Proposals and Plans for Ward-01

Ward No. 01 is located at the North-West part of Akkelpur Paurashava. The area of the Ward is 671.87acres. After reviewing and commensuration the policies and proposals of Structure Plan and Urban Area Plan the following proposalss are made in the Action Plan of Ward 01 for implementation.

14.3.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.1 shows the amount of landuse proposal in Ward no. 1. Table shoes that agriculture use is dominant in this ward followed by Urban Residential Zone.

Table 14-1: Landuse proposals for Ward No. 01

Zone	Area (Acres)	%
Agricultural Zone	492.95	73.37
Circulation Network	36.59	5.45
Commercial Zone	4.81	0.72
Community Facilities	0.30	0.04
Education & Research Zone	1.08	0.16
General Industrial Zone	0.01	0.00
Miscellaneous	0.07	0.01
Mixed Use Zone	15.40	2.29
Open Space	9.78	1.46
Rural Settlement	12.72	1.89
Transportation Facilities	3.23	0.48
Urban Deferred	6.38	0.95
Urban Residential Zone	71.94	10.71
Waterbody	16.61	2.47
Total	671.88	100

14.3.2 Road Network Development Plan

In road network development plan there is about 12.03 km road in ward no 01. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-2: Proposal of Roads for Ward-01

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Primary Road	Widening Road	WD-351	212.767	80	Pucca
Primary Road	Widening Road	WD-352	244.946	80	Pucca
Primary Road	Widening Road	WD-376	731.243	80	Pucca
Primary Road	Widening Road	WD-216	2498.377	60	Pucca
Secondary Road	Widening Road	WD-222	415.126	40	Pucca
Secondary Road	Widening Road	WD-358	489.229	30	Pucca
Secondary Road	New Road	NR-1	312.095	30	Pucca
Secondary Road	New Road	NR-12	430.530	30	Pucca
Local Road	Widening Road	WD-363	269.917	30	Pucca
Local Road	Widening Road	WD-282	352.863	20	Pucca
Local Road	Widening Road	WD-305	402.870	20	Pucca
Local Road	Widening Road	WD-327	263.197	20	Pucca
Local Road	Widening Road	WD-328	255.799	20	Pucca

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Local Road	Widening Road	WD-372	359.169	20	Pucca
Local Road	Widening Road	WD-386	254.676	20	Pucca
Local Road	New Road	NR-13	287.030	20	Pucca
Local Road	New Road	NR-34	266.485	20	Pucca

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

14.3.3 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 2101.92 meters of drains for ward no. 01 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-3: Proposal of Drain for Ward-01

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Primary Drain	PD-2	294.758	3.00	2.00	River	Pucca
Primary Drain	PD-2	20.319	3.00	2.00	River	Pucca
Primary Drain	PD-2	3.793	3.00	2.00	River	Pucca
Primary Drain	PD-2	3.793	3.00	2.00	River	Pucca
Primary Drain	PD-2	62.227	3.00	2.00	River	Pucca
Primary Drain	PD-2	39.050	3.00	2.00	River	Pucca
Secondary Drain	SD-2	154.355	2.00	1.20	Khal	Pucca
Secondary Drain	SD-2	6.584	2.00	1.20	Khal	Pucca
Secondary Drain	SD-6	0.060	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	35.870	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	15.935	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-12	27.086	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-12	352.133	2.00	1.20	SD-1	Pucca
Tertiary Drain	TD-1	52.542	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-1	16.863	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-1	16.863	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-1	70.855	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-27	223.218	1.00	0.80	SD-18	Pucca
Tertiary Drain	TD-27	9.367	1.00	0.80	SD-18	Pucca
Tertiary Drain	TD-27	113.873	1.00	0.80	SD-18	Pucca
Tertiary Drain	TD-28	210.217	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-28	117.380	1.00	0.80	SD-19	Pucca

14.3.4 Development Proposals

The urban services are the pre condition of any potential development. Super Market, Bus Terminal, Stadium etc are proposed here. The proposal for service facilities of ward no 01 is shown in table 14.4 together with mouza name and plot number.

Table 14-4: Proposal for Other Facilities of Ward-01

ID	Use	Area (Acres)	Mouza Name	Plot No.
SM	Super Market	4.73	Amtraw (015_02)	1480,1481,1482,1483,1495,1496,1497,1498,1499,1500,1505,1506,1507,1508,1509,1510,1511,1512,1514,1515,1516
WC-1	Ward Centre	1.88	Amtraw (015_02)	1507,1508,1511,1512,1513,1514,1515,1516,1517,1538,1539
ST-1	Stadium	9.75	Amtraw (015_01)	594,603,604,605,606,607,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,631,632,638,640,642,643,644,645,646,647,648,649,1121
BT	Bus Terminal (Part)	3.47	Akkelpur (016_00)	594,653,654,655,656,657,665, 666,667,668,669,670,671,672
TS-2	Tempo /Nasimon	1.03	Amtraw (015_01,02)	598,607,609,610,1420, 1421,1427

ID	Use	Area (Acres)	Mouza Name	Plot No.
	Stand			
LIH	Low Income Housing (Part)	6.95	Amtraw (15_01)	979,988,989,990,991,992,993,994,995,996,1011,1012, 1013,1014,1015,1016,1017,1018,1019,1020,1021,1022, 1023,1126,1127

Map 14-2: Proposed Landuse Plan Map of Ward-01

Map 14-3: Service and Drainage Network Map of Ward-01

Ward Action Plan for Ward-02

14.4 Proposals and Plans for Ward-02

Ward No. 02 is located at the extreme Northern of Akkelpur Paurashava. The area of the Ward is 549.25 acres. After reviewing and commensuration the policies and proposals of Structure Plan & Urban Area Plan the following proposals are made in the Action Plan of Ward-2.

14.4.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.5 shows the amount of landuse proposal in Ward no. 2. Table shoes that Agriculture is dominant in this ward followed by Urban Residential Zone.

Table 14-5: Landuse proposals for Ward No. 02

Zone	Area (Acres)	%
Agricultural Zone	320.22	58.30
Circulation Network	33.52	6.10
Commercial Zone	0.43	0.08
Community Facilities	1.47	0.27
Education & Research Zone	0.60	0.11
General Industrial Zone	1.39	0.25
Government Office	3.77	0.69
Miscellaneous	0.63	0.11
Mixed Use Zone	1.07	0.20
Open Space	7.25	1.32
Rural Settlement	34.64	6.31
Urban Residential Zone	96.66	17.60
Waterbody	47.59	8.66
Total	549.25	100

14.4.2 Road Network Development Plan

In road network development plan there is about 15.0 km road in ward no 02. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-6: Proposal of Roads for Ward-02

Road Type	Status	ID	Length (m)	Proposed Width(ft)	Proposal Type
Primary Road	Widening Road	WD-376	351.564	80	Pucca
Secondary Road	Widening Road	WD-238	2017.096	60	Pucca
Secondary Road	Widening Road	WD-348	1027.482	30	Pucca
Secondary Road	Widening Road	WD-349	878.059	30	Pucca
Secondary Road	Widening Road	WD-355	1343.999	30	Pucca
Secondary Road	Widening Road	WD-358	573.923	30	Pucca
Secondary Road	Widening Road	WD-361	769.923	30	Pucca
Secondary Road	Widening Road	WD-316	233.230	20	Pucca
Secondary Road	New Road	NR-30	383.164	20	Pucca
Secondary Road	New Road	NR-31	365.003	20	Pucca
Local Road	Widening Road	WD-347	295.374	30	Pucca
Local Road	Widening Road	WD-356	285.047	30	Pucca
Local Road	Widening Road	WD-22	498.453	20	Pucca
Local Road	Widening Road	WD-142	473.801	20	Pucca
Local Road	Widening Road	WD-239	358.923	20	Pucca
Local Road	Widening Road	WD-342	224.379	20	Pucca
Local Road	Widening Road	WD-368	460.873	20	Pucca
Local Road	Widening Road	WD-370	209.661	20	Pucca

Road Type	Status	ID	Length (m)	Proposed Width(ft)	Proposal Type
Local Road	Widening Road	WD-380	306.143	20	Pucca
Local Road	New Road	NR-32	272.767	20	Pucca

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

14.4.3 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 2678.28 meters of drains for ward no. 02 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-7: Proposal of Drain for Ward-02

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Primary Drain	PD-1	5.271	3.00	2.00	River	Pucca
Primary Drain	PD-2	160.005	3.00	2.00	River	Pucca
Primary Drain	PD-2	0.621	3.00	2.00	River	Pucca
Primary Drain	PD-2	0.621	3.00	2.00	River	Pucca
Primary Drain	PD-2	94.516	3.00	2.00	River	Pucca
Secondary Drain	SD-1	108.667	2.00	1.20	River	Pucca
Secondary Drain	SD-1	49.240	2.00	1.20	River	Pucca
Secondary Drain	SD-1	168.982	2.00	1.20	River	Pucca
Secondary Drain	SD-9	202.321	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	13.046	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	73.792	2.00	1.20	SD-2	Pucca
Tertiary Drain	TD-3	27.043	1.00	0.80	River	Pucca
Tertiary Drain	TD-3	24.301	1.00	0.80	River	Pucca

14.4.4 Development Proposals

The urban services are the pre condition of any potential development. Park, Playground, Market etc are proposed here. The proposal for service facilities of ward no 02 is shown in table 14-8 together with mouza name and plot number.

Table 14-8: Proposal for Other Facilities of Ward-02

ID	Use	Area (Acres)	Mouza Name	Plot No.
NM-1	Neighbourhood Market	0.13	Thangapur (032_00)	129-131
WC-2	Ward Centre	0.73	Raj Kanda (031_00)	191,192,193,194,195,196,197
PL-3	Playground	2.28	Raj Kanda (031_00)	141,142,149,153,154,155,156,157,165,166,360
CP	Central Park (Part)	1	Biharpur (030_00)	578,584
NP-3	Neighborhood Park	0.94	Biharpur (030_00)	229,230,231,232,233,239,440,578

Map 14-4: Proposed Landuse Plan Map of Ward-02

Map 14-5: Service and Drainage Network Map of Ward-02

Ward Action Plan for Ward-03

14.5 Proposals and Plans for Ward-03

Ward No. 03 is located at the west part of Akkelpur Paurashava. The area of the Ward is 82.19 acres. After reviewing and commensuration the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of Ward-3.

14.5.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.9 shows the amount of landuse proposal in Ward no. 3. Table shoes that Urban Residential Zone is dominant in this ward followed by Circulation Network.

Table 14-9: Landuse proposals for Ward No. 03

Zone	Area (Acres)	%
Circulation Network	13.28313	16.16
Commercial Zone	0.570471	0.69
Community Facilities	0.881533	1.07
Education & Research Zone	2.281882	2.78
Miscellaneous	0.14683	0.18
Mixed Use Zone	1.016284	1.24
Open Space	0.395615	0.48
Recreational Facilities	0.278498	0.34
Transportation Facilities	1.267861	1.54
Urban Deferred	13.91697	16.93
Urban Residential Zone	43.99985	53.53
Waterbody	4.153852	5.05
Total	82.19	100

14.5.2 Road Network Development Plan

In road network development plan there is about 5.74 km road in ward no 03. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-10: Proposal of Roads for Ward-03

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Primary Road	Widening Road	WD-351	536.443	80	Pucca
Primary Road	Widening Road	WD-376	536.831	80	Pucca
Local Road	Widening Road	WD-224	247.294	30	Pucca
Local Road	Widening Road	WD-310	212.561	20	Pucca
Local Road	Widening Road	WD-382	500.383	20	Pucca
Local Road	New Road	NR-20	258.795	20	Pucca
Local Road	New Road	NR-21	203.207	20	Pucca
Local Road	New Road	NR-22	301.753	20	Pucca
Local Road	New Road	NR-23	408.887	20	Pucca

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

14.5.3 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 3794.79 meters of drains for ward no. 03 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-11: Proposal of Drain for Ward-03

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Primary Drain	PD-2	235.384	3.00	2.00	River	Pucca
Primary Drain	PD-2	116.859	3.00	2.00	River	Pucca
Primary Drain	PD-2	5.728	3.00	2.00	River	Pucca
Primary Drain	PD-2	5.728	3.00	2.00	River	Pucca
Primary Drain	PD-2	138.930	3.00	2.00	River	Pucca
Secondary Drain	SD-1	22.234	2.00	1.20	River	Pucca
Secondary Drain	SD-1	22.811	2.00	1.20	River	Pucca
Secondary Drain	SD-2	117.043	2.00	1.20	Khal	Pucca
Secondary Drain	SD-2	358.325	2.00	1.20	Khal	Pucca
Secondary Drain	SD-2	81.133	2.00	1.20	Khal	Pucca
Secondary Drain	SD-15	164.425	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-15	105.286	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-15	0.092	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-15	0.092	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-15	61.272	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-18	203.841	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	42.178	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	42.178	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	74.701	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	1.689	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	1.689	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	469.777	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	469.777	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	15.319	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	0.004	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	0.004	2.00	1.20	Khal	Pucca
Secondary Drain	SD-18	60.155	2.00	1.20	Khal	Pucca
Tertiary Drain	TD-1	22.409	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-1	22.862	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-22	210.302	1.00	0.80	River	Pucca
Tertiary Drain	TD-22	44.332	1.00	0.80	River	Pucca
Tertiary Drain	TD-27	5.710	1.00	0.80	SD-18	Pucca
Tertiary Drain	TD-28	18.303	1.00	0.80	SD-19	Pucca

14.5.1 Development Proposals

The urban services are the pre condition of any potential development. Clinic, ward centerl etc are proposed here. The proposal for service facilities of ward no 03 is shown in table 14.12 together with mouza name and plot number.

Table 14-12: Proposal for Other Facilities of Ward-03

ID	Use	Area (Acres)	Mouza Name	Plot No.
CLN	Clinic	0.56	Akkelpur (016_00)	Partial-261-264
WC-3	Ward Centre	0.45	Akkelpur (016_00)	41,45,261,262,263,264
BT	Bus Terminal (Part)	1.27	Akkelpur (016_00)	1,2,3,4,5,6,15,16,209

Map 14-6: Proposed Landuse Plan Map of Ward-03

Map 14-7: Service and Drainage Network Map of Ward-03

Ward Action Plan for Ward-04

14.6 Proposals and Plans for Ward-04

Ward No. 04 is located at the extreme middle part of Akkelpur Paurashava. The area of the Ward is 159.18 acres. After reviewing and commensuration the policies and proposals of Structure Plan & Urban Area Plan the following proposals are made in the Action Plan of Ward-4 for implementation within next 5 years up to 2016. Action Plan Map for Ward-4 is shown in **Map 14-5**.

14.6.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.13 shows the amount of landuse proposal in Ward no. 4. Table shoes that Urban Residential Zone is dominant in this ward followed by Circulation Network.

Table 14-13: Landuse proposals for Ward No. 04

Zone	Area (Acres)	%
Agricultural Zone	0.02	0.01
Circulation Network	26.77	16.82
Commercial Zone	4.06	2.55
Community Facilities	0.94	0.59
Education & Research Zone	5.44	3.42
General Industrial Zone	0.73	0.46
Government Office	6.54	4.11
Health Services	4.60	2.89
Miscellaneous	0.26	0.17
Mixed Use Zone	5.97	3.75
Open Space	2.89	1.81
Transportation Facilities	0.57	0.36
Urban Residential Zone	84.02	52.78
Utility Services	0.47	0.30
Waterbody	15.89	9.98
Total	159.19	100

14.6.2 Road Network Development Plan

In road network development plan there is about 11.32 km road in ward no 04. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-14: Proposal of Roads for Ward-04

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Primary Road	Widening Road	WD-376	1179.122	80	Pucca
Secondary Road	Widening Road	WD-189	467.092	40	Pucca
Secondary Road	Widening Road	WD-222	498.987	40	Pucca
Secondary Road	Widening Road	WD-298	655.151	40	Pucca
Secondary Road	Widening Road	WD-93	222.832	30	Pucca
Local Road	Widening Road	WD-9	592.595	30	Pucca
Local Road	Widening Road	WD-154	325.648	20	Pucca
Local Road	Widening Road	WD-206	333.848	20	Pucca
Local Road	Widening Road	WD-210	435.249	20	Pucca
Local Road	Widening Road	WD-245	203.990	20	Pucca
Local Road	New Road	NR-25	328.847	20	Pucca

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

14.6.3 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 8931.52 meters of drains for ward no. 04 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-15: Proposal of Drains for Ward-04

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Primary Drain	PD-2	498.580	3.00	2.00	River	Pucca
Primary Drain	PD-2	72.808	3.00	2.00	River	Pucca
Primary Drain	PD-2	72.808	3.00	2.00	River	Pucca
Primary Drain	PD-2	659.481	3.00	2.00	River	Pucca
Secondary Drain	SD-1	634.818	2.00	1.20	River	Pucca
Secondary Drain	SD-1	32.183	2.00	1.20	River	Pucca
Secondary Drain	SD-1	32.183	2.00	1.20	River	Pucca
Secondary Drain	SD-1	499.799	2.00	1.20	River	Pucca
Secondary Drain	SD-3	280.458	2.00	1.20	River	Pucca
Secondary Drain	SD-3	22.972	2.00	1.20	River	Pucca
Secondary Drain	SD-3	369.628	2.00	1.20	River	Pucca
Secondary Drain	SD-4	169.037	2.00	1.20	SD-14	Pucca
Secondary Drain	SD-4	0.805	2.00	1.20	SD-14	Pucca
Secondary Drain	SD-4	0.805	2.00	1.20	SD-14	Pucca
Secondary Drain	SD-4	41.769	2.00	1.20	SD-14	Pucca
Secondary Drain	SD-5	11.692	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-5	410.487	2.00	1.20	SD-1	Pucca
Secondary Drain	SD-6	248.028	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-6	246.504	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-6	4.311	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-6	4.311	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-6	144.416	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-7	5.037	2.00	1.20	River	Pucca
Secondary Drain	SD-7	1.748	2.00	1.20	River	Pucca
Secondary Drain	SD-9	89.602	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	15.004	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	15.004	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	158.390	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	12.123	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-9	124.870	2.00	1.20	SD-2	Pucca
Secondary Drain	SD-12	76.437	2.00	1.20	SD-1	Pucca
Tertiary Drain	TD-4	93.312	1.00	0.80	River	Pucca
Tertiary Drain	TD-4	4.281	1.00	0.80	River	Pucca
Tertiary Drain	TD-4	9.160	1.00	0.80	River	Pucca
Tertiary Drain	TD-5	108.866	1.00	0.80	River	Pucca
Tertiary Drain	TD-5	1.943	1.00	0.80	River	Pucca
Tertiary Drain	TD-5	47.029	1.00	0.80	River	Pucca
Tertiary Drain	TD-6	40.085	1.00	0.80	River	Pucca
Tertiary Drain	TD-6	3.896	1.00	0.80	River	Pucca
Tertiary Drain	TD-7	33.309	1.00	0.80	River	Pucca
Tertiary Drain	TD-7	2.566	1.00	0.80	River	Pucca
Tertiary Drain	TD-7	16.404	1.00	0.80	River	Pucca
Tertiary Drain	TD-8	14.055	1.00	0.80	River	Pucca
Tertiary Drain	TD-8	38.213	1.00	0.80	River	Pucca
Tertiary Drain	TD-9	17.516	1.00	0.80	River	Pucca
Tertiary Drain	TD-9	36.711	1.00	0.80	River	Pucca
Tertiary Drain	TD-10	14.547	1.00	0.80	River	Pucca
Tertiary Drain	TD-10	0.954	1.00	0.80	River	Pucca
Tertiary Drain	TD-10	6.324	1.00	0.80	River	Pucca
Tertiary Drain	TD-11	82.204	1.00	0.80	River	Pucca
Tertiary Drain	TD-11	43.324	1.00	0.80	River	Pucca
Tertiary Drain	TD-12	7.640	1.00	0.80	River	Pucca
Tertiary Drain	TD-12	53.035	1.00	0.80	River	Pucca
Tertiary Drain	TD-12	2.269	1.00	0.80	River	Pucca
Tertiary Drain	TD-14	109.552	1.00	0.80	River	Pucca
Tertiary Drain	TD-14	0.504	1.00	0.80	River	Pucca

Tertiary Drain	TD-14	0.008	1.00	0.80	River	Pucca
Tertiary Drain	TD-14	0.008	1.00	0.80	River	Pucca
Tertiary Drain	TD-14	26.369	1.00	0.80	River	Pucca
Tertiary Drain	TD-15	178.434	1.00	0.80	SD-2	Pucca
Tertiary Drain	TD-15	140.137	1.00	0.80	SD-2	Pucca
Tertiary Drain	TD-16	174.973	1.00	0.80	SD-2	Pucca
Tertiary Drain	TD-16	10.388	1.00	0.80	SD-2	Pucca
Tertiary Drain	TD-16	35.381	1.00	0.80	SD-2	Pucca
Tertiary Drain	TD-17	118.010	1.00	0.80	SD-3	Pucca
Tertiary Drain	TD-17	7.018	1.00	0.80	SD-3	Pucca
Tertiary Drain	TD-17	7.018	1.00	0.80	SD-3	Pucca
Tertiary Drain	TD-17	7.003	1.00	0.80	SD-3	Pucca
Tertiary Drain	TD-18	88.221	1.00	0.80	SD-3	Pucca
Tertiary Drain	TD-18	21.804	1.00	0.80	SD-3	Pucca
Tertiary Drain	TD-18	31.659	1.00	0.80	SD-3	Pucca
Tertiary Drain	TD-31	73.996	1.00	0.80	River	Pucca
Tertiary Drain	TD-31	44.113	1.00	0.80	River	Pucca
Tertiary Drain	TD-31	44.113	1.00	0.80	River	Pucca
Tertiary Drain	TD-31	0.905	1.00	0.80	River	Pucca
Tertiary Drain	TD-31	15.547	1.00	0.80	River	Pucca
Tertiary Drain	TD-32	40.828	1.00	0.80	River	Pucca
Tertiary Drain	TD-32	40.828	1.00	0.80	River	Pucca
Tertiary Drain	TD-32	86.640	1.00	0.80	River	Pucca

14.6.4 Development Proposals

The urban services are the pre condition of any potential development. Ward Center, Public Toilet, Tempo Stand etc are proposed here. The proposal for service facilities of ward no 04 is shown in table 14-16 together with mouza name and plot number.

Table 14-16: Proposal for Other Facilities of Ward-04

ID	Use	Area (Acres)	Mouza Name	Plot No.
TS-1	Tempo/Nasimon Stand	0.07	Akkelpur (016_00)	Partial- 641
WC-4	Ward Centre	0.41	Akkelpur (016_00)	650,651,652
PT-1	Public Toilet	0.11	Akkelpur (016_00)	717,723,724
WTS-1	Waste Transfer Station	0.19	Akkelpur (016_00)	Partial-787,788,791
WTS-2	Waste Transfer Station	0.17	Akkelpur (016_00)	Partial-392,9999

Map 14-8: Proposed Landuse Plan Map of Ward-04

Map 14-9: Service and Drainage Network Map of Ward-04

Ward Action Plan for Ward-05

14.7 Proposals and Plans for Ward-05

Ward No. 05 is located at the south-east part of Akkelpur Paurashava. The area of the Ward is 434.48 acres. After reviewing and commensuration the policies and proposals of Structure Plan & Urban Area Plan the following proposals are made in the Action Plan of Ward-05.

14.7.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.17 shows the amount of landuse proposal in Ward no. 5. Table shoes that Agriculture is dominant in this ward followed by Urban Residential Zone.

Table 14-17: Landuse proposals for Ward No. 05

Zone	Area (Acres)	%
Agricultural Zone	353.62	81.39
Circulation Network	16.11	3.71
Commercial Zone	0.62	0.14
Community Facilities	0.27	0.06
Education & Research Zone	3.12	0.72
General Industrial Zone	0.32	0.07
Miscellaneous	0.07	0.02
Mixed Use Zone	0.66	0.15
Open Space	2.27	0.52
Transportation Facilities	0.62	0.14
Urban Residential Zone	49.26	11.34
Utility Services	0.13	0.03
Waterbody	7.42	1.71
Total	434.48	100

14.7.1 Road Network Development Plan

In road network development plan there is about 6.36 km road in ward no 05. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-18: Proposal of Roadsfor Ward-05

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Secondary Road	Widening Road	WD-38	1684.800	30	Pucca
Secondary Road	Widening Road	WD-93	503.022	30	Pucca
Secondary Road	Widening Road	WD-128	262.372	30	Pucca
Secondary Road	New Road	NR-5	241.187	20	Pucca
Secondary Road	New Road	NR-7	284.764	30	Pucca
Local Road	Widening Road	WD-7	236.624	20	Pucca
Local Road	Widening Road	WD-109	210.584	20	Pucca
Local Road	Widening Road	WD-166	410.826	20	Pucca
Local Road	New Road	NR-6	293.177	20	Pucca

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

14.7.2 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 2654.06 meters of drains for ward no. 05 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-19: Proposal of Drainfor Ward-05

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Secondary Drain	SD-4	110.819	2.00	1.20	SD-14	Pucca
Secondary Drain	SD-4	167.677	2.00	1.20	SD-14	Pucca
Secondary Drain	SD-4	85.662	2.00	1.20	SD-14	Pucca
Secondary Drain	SD-4	167.394	2.00	1.20	SD-14	Pucca
Tertiary Drain	TD-1	83.834	1.00	0.80	SD-19	Pucca
Tertiary Drain	TD-20	75.211	1.00	0.80	SD-4	Pucca
Tertiary Drain	TD-20	32.371	1.00	0.80	SD-4	Pucca
Tertiary Drain	TD-20	4.579	1.00	0.80	SD-4	Pucca
Tertiary Drain	TD-20	95.883	1.00	0.80	SD-4	Pucca
Tertiary Drain	TD-21	7.368	1.00	0.80	River	Pucca
Tertiary Drain	TD-21	45.694	1.00	0.80	River	Pucca
Tertiary Drain	TD-25	27.983	1.00	0.80	River	Pucca

14.7.3 Development Proposals

The urban services are the pre condition of any potential development. Primary School, Playground, Ward Center etc are proposed here. The proposal for service facilities of ward no 05 is shown in table 14-20 together with mouza name and plot number.

Table 14-20: Proposal for Other Facilities of Ward-05

ID	Use	Area (Acres)	Mouza Name	Plot No.
PS-1	Primary School	2.8	Hastab Santapor (017_01))	110,111,114,115,116,117, 118,119,120,122,143
WC-5	Ward Centre	0.67	Hastab Santapor (017_02)	838,839,841,842,843,844,846
PL-2	Playground	1.75	Hastab Santapor (017_02)	842,844,846,847,848,849,882,1568
LIH	Low Income Housing (Part)	3.18	Hastab Santapor (17_01)	1,2,3,4,5,6,66,

Map 14-10: Proposed Landuse Plan Map of Ward-05

Map 14-11: Service and Drainage Network Map of Ward-05

Ward Action Plan for Ward-06

14.8 Proposals and Plans for Ward-06

Ward No. 06 is located south part of Akkelpur Paurashava. The area of the Ward is 400.97 acres. After reviewing & commensuration the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of Ward-06.

14.8.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.21 shows the amount of landuse proposal in Ward no. 6. Table shoes that Agriculture is dominant in this ward followed by Rural Settlement.

Table 14-21: Landuse proposals for Ward No. 06

Zone	Area (Acres)	%
Agricultural Zone	243.71	60.78
Circulation Network	20.47	5.11
Commercial Zone	0.33	0.08
Community Facilities	1.13	0.28
Education & Research Zone	0.31	0.08
General Industrial Zone	0.60	0.15
Government Office	1.13	0.28
Health Services	4.32	1.08
Miscellaneous	0.09	0.02
Mixed Use Zone	1.17	0.29
Open Space	5.75	1.44
Recreational Facilities	0.47	0.12
Rural Settlement	55.34	13.80
Urban Residential Zone	48.07	11.99
Waterbody	18.09	4.51
Total	400.97	100

14.8.1 Road Network Development Plan

In road network development plan there is about 10.58 km road in ward no 06. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-22: Proposal of Roads for Ward-06

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Secondary Road	Widening Road	WD-189	1173.079	40	Pucca
Secondary Road	Widening Road	WD-190	773.816	40	Pucca
Secondary Road	Widening Road	WD-27	2329.875	30	Pucca
Local Road	Widening Road	WD-32	375.248	20	Pucca
Local Road	Widening Road	WD-33	808.532	20	Pucca
Local Road	Widening Road	WD-37	303.971	20	Pucca
Local Road	Widening Road	WD-68	379.663	20	Pucca
Local Road	Widening Road	WD-70	246.615	20	Pucca
Local Road	Widening Road	WD-79	237.162	20	Pucca
Local Road	Widening Road	WD-85	229.199	20	Pucca
Local Road	Widening Road	WD-86	317.110	20	Pucca
Local Road	Widening Road	WD-88	201.302	20	Pucca
Local Road	Widening Road	WD-105	224.991	20	Pucca
Local Road	Widening Road	WD-108	254.730	20	Pucca

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

14.8.2 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 1806.46 meters of drains for ward no. 06 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-23: Proposal of Drain for Ward-06

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Tertiary Drain	TD-19	281.310	1.00	0.80	River	Pucca
Tertiary Drain	TD-19	8.628	1.00	0.80	River	Pucca
Tertiary Drain	TD-19	3.491	1.00	0.80	River	Pucca
Tertiary Drain	TD-19	3.491	1.00	0.80	River	Pucca
Tertiary Drain	TD-19	46.647	1.00	0.80	River	Pucca
Tertiary Drain	TD-19	42.114	1.00	0.80	River	Pucca
Tertiary Drain	TD-24	56.571	1.00	0.80	River	Pucca
Tertiary Drain	TD-24	22.125	1.00	0.80	River	Pucca
Tertiary Drain	TD-25	0.729	1.00	0.80	River	Pucca
Tertiary Drain	TD-29	1.538	1.00	0.80	River	Pucca
Tertiary Drain	TD-29	6.106	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	1.489	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	70.168	1.00	0.80	River	Pucca

14.8.3 Development Proposals

The urban services are the pre condition of any potential development. Neighbourhood Park, Neighbourhood Park, Hospital etc are proposed here. The proposal for service facilities of ward no 06 is shown in table 14.24 together with mouza name and plot number.

Table 14-24: Proposal for Other Facilities of Ward-06

ID	Use	Area (Acres)	Mouza Name	Plot No.
WC-6	Ward Centre	1.17	Hastab Santapor (017_02)	1048,1210,1212,1213,1214,1216,1217,1218,1219,1272
NM-3	Neighbourhood Market	0.48	Hastab Santapor (017_02)	943, 966-969
NP-2	Neighbourhood Park	4.76	Hastab Santapor (017_02)	214,215,216,217,218,219,220,222,223,224,231,264,265,543,544,545,546,547,548,554,555,561,596
MCH	Mother & Child Care Hospital	4.32	Hastab Santapor (017_02)	1219,1225,1226,1227,1228,1229,1230,1231,1232,1233,1234,1238,1264,1268, 1270,1271,1272

Map 14-12: Proposed Landuse Plan Map of Ward-06

Map 14-13: Service and Drainage Network Map of Ward-06

Ward Action Plan for Ward-07

14.9 Proposals and Plans for Ward-07

Ward No. 07 is located at the southern part of Akkelpur Paurashava. The area of the Ward is 485.26 acres. After reviewing and commensuration the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of Ward-07.

14.9.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.25 shows the amount of landuse proposal in Ward no. 7. Table shoes that Agriculture is dominant in this ward followed by Urban Residential Zone.

Table 14-25: Landuse proposals for Ward No. 07

Zone	Area (Acres)	%
Agricultural Zone	357.0814	73.58
Circulation Network	23.0792	4.76
Commercial Zone	0.832703	0.17
Community Facilities	1.092785	0.23
Education & Research Zone	0.646196	0.13
General Industrial Zone	0.104718	0.02
Miscellaneous	0.179076	0.04
Mixed Use Zone	1.351032	0.28
Open Space	4.193606	0.86
Rural Settlement	28.48898	5.87
Urban Residential Zone	51.0687	10.52
Waterbody	17.14924	3.53
Total	485.26	100

14.9.1 Road Network Development Plan

In road network development plan there is about 10.62 km road in ward no 07. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-26: Proposal of Roads for Ward-07

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Secondary Road	Widening Road	WD-25	1134.402	40	Pucca
Secondary Road	Widening Road	WD-41	314.622	40	Pucca
Secondary Road	Widening Road	WD-374	226.846	40	Pucca
Secondary Road	Widening Road	WD-35	403.457	20	Pucca
Local Road	Widening Road	WD-63	253.277	40	Pucca
Local Road	New Road	NR-59	208.569	30	Pucca
Local Road	Widening Road	WD-34	1110.807	20	Pucca
Local Road	Widening Road	WD-39	361.124	20	Pucca
Local Road	Widening Road	WD-55	287.612	20	Pucca
Local Road	Widening Road	WD-65	251.869	20	Pucca
Local Road	Widening Road	WD-69	229.297	20	Pucca
Local Road	New Road	NR-52	219.412	20	Pucca

** Road length≥ 200 meter incorporated here. Detail was given in Appendix

14.9.2 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 4387.33 meters of drains for ward no. 07 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-27: Proposal of Drain for Ward-07

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Secondary Drain	SD-7	454.126	2.00	1.20	River	Pucca
Secondary Drain	SD-7	25.087	2.00	1.20	River	Pucca
Secondary Drain	SD-7	22.724	2.00	1.20	River	Pucca
Secondary Drain	SD-7	48.875	2.00	1.20	River	Pucca
Secondary Drain	SD-8	57.856	2.00	1.20	River	Pucca
Secondary Drain	SD-8	0.003	2.00	1.20	River	Pucca
Secondary Drain	SD-8	0.003	2.00	1.20	River	Pucca
Secondary Drain	SD-8	15.113	2.00	1.20	River	Pucca
Secondary Drain	SD-8	174.467	2.00	1.20	River	Pucca
Secondary Drain	SD-8	492.693	2.00	1.20	River	Pucca
Secondary Drain	SD-8	100.214	2.00	1.20	River	Pucca
Secondary Drain	SD-8	320.423	2.00	1.20	River	Pucca
Secondary Drain	SD-8	43.859	2.00	1.20	River	Pucca
Secondary Drain	SD-13	25.257	2.00	1.20	SD-8	Pucca
Secondary Drain	SD-13	44.025	2.00	1.20	SD-8	Pucca
Secondary Drain	SD-13	550.121	2.00	1.20	SD-8	Pucca
Secondary Drain	SD-16	8.083	2.00	1.20	SD-11	Pucca
Secondary Drain	SD-16	50.312	2.00	1.20	SD-11	Pucca
Tertiary Drain	TD-5	2.071	1.00	0.80	River	Pucca
Tertiary Drain	TD-26	103.346	1.00	0.80	SD-8	Pucca
Tertiary Drain	TD-26	15.174	1.00	0.80	SD-8	Pucca
Tertiary Drain	TD-26	39.490	1.00	0.80	SD-8	Pucca
Tertiary Drain	TD-29	184.506	1.00	0.80	River	Pucca
Tertiary Drain	TD-29	7.082	1.00	0.80	River	Pucca
Tertiary Drain	TD-29	45.935	1.00	0.80	River	Pucca
Tertiary Drain	TD-29	73.788	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	156.268	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	11.810	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	11.810	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	1.064	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	151.749	1.00	0.80	River	Pucca
Tertiary Drain	TD-30	49.946	1.00	0.80	River	Pucca
Tertiary Drain	TD-183	276.752	1.00	0.80	River	Pucca
Tertiary Drain	TD-183	2.675	1.00	0.80	River	Pucca
Tertiary Drain	TD-183	2.675	1.00	0.80	River	Pucca
Tertiary Drain	TD-183	550.724	1.00	0.80	River	Pucca
Tertiary Drain	TD-183	25.103	1.00	0.80	River	Pucca

14.9.1 Development Proposals

The urban services are the pre condition of any potential development. Neighborhood Park, Playground, Market etc are proposed here. The proposal for service facilities of ward no 07 is shown in table 14.28 together with mouza name and plot number.

Table 14-28: Proposal for Other Facilities of Ward-07

ID	Use	Area (Acres)	Mouza Name	Plot No.
NP-1	Neighborhood Park	2.76	Kesobpur (026_00)	1,6,7,8
WC-7	Ward Centre	1.35	Kesobpur (026_00)	1,3,4,5,6,10,11,12
PL-1	Playground	1.24	Kesobpur (026_00)	3,4,53,54,55,56,57,62
NM-2	Neighbourhood Market	0.39	Kesobpur (026_00))	Partial 830-834,836-839,842

Map 14-14: Proposed Landuse Plan Map of Ward-07

Map 14-15: Service and Drainage Network Map of Ward-07

Ward Action Plan for Ward-08

14.10 Proposals and Plans for Ward-08

Ward No. 08 is located at the south-east part of Akkelpur Paurashava. The area of the Ward is 746.11 acres. After reviewing and commensuration the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of Ward-08.

14.10.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.29 shows the amount of landuse proposal in Ward no. 8. Table shoes that Agriculture is dominant in this ward followed by Urban Residential Zone.

Table 14-29: Landuse proposals for Ward No. 08

Zone	Area (Acres)	%
Agricultural Zone	562.61	75.40
Circulation Network	33.65	4.51
Commercial Zone	1.21	0.16
Community Facilities	2.83	0.38
Education & Research Zone	11.61	1.56
General Industrial Zone	0.60	0.08
Government Office	1.28	0.17
Miscellaneous	1.10	0.15
Mixed Use Zone	1.00	0.13
Open Space	3.94	0.53
Recreational Facilities	0.07	0.01
Rural Settlement	25.11	3.37
Transportation Facilities	0.23	0.03
Urban Residential Zone	68.38	9.16
Utility Services	0.37	0.05
Waterbody	32.12	4.30
Total	746.11	100

14.10.1 Road Network Development Plan

In road network development plan there is about 12.01 km road in ward no 08. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-30: Proposal of Roadsfor Ward-08

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Primary Road	Widening Road	WD-118	874.147	80	Pucca
Primary Road	Widening Road	WD-376	1645.662	80	Pucca
Secondary Road	Widening Road	WD-237	981.248	50	Pucca
Secondary Road	Widening Road	WD-25	630.202	40	Pucca
Secondary Road	Widening Road	WD-41	356.362	40	Pucca
Local Road	Widening Road	WD-334	1006.964	30	Pucca
Local Road	New Road	NR-53	357.119	30	Pucca
Local Road	Widening Road	WD-43	546.934	20	Pucca
Local Road	Widening Road	WD-44	467.554	20	Pucca
Local Road	Widening Road	WD-61	284.195	20	Pucca
Local Road	Widening Road	WD-99	342.524	20	Pucca
Local Road	Widening Road	WD-101	283.709	20	Pucca
Local Road	Widening Road	WD-193	349.428	20	Pucca
Local Road	New Road	NR-58	200.479	20	Pucca

Road Type	Status	ID	Length (m)	Proposed Width (ft)	Proposal Type
Local Road	New Road	NR-66	542.136	20	Pucca

** Road length≥ 200m incorporated here. Detail was given in Appendix

14.10.2 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 5565.46 meters of drains for ward no. 08 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-31: Proposal of Drain for Ward-08

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Primary Drain	PD-1	108.574	3.00	2.00	River	Pucca
Primary Drain	PD-1	192.391	3.00	2.00	River	Pucca
Primary Drain	PD-1	7.046	3.00	2.00	River	Pucca
Primary Drain	PD-1	7.046	3.00	2.00	River	Pucca
Primary Drain	PD-1	40.309	3.00	2.00	River	Pucca
Primary Drain	PD-1	512.311	3.00	2.00	River	Pucca
Primary Drain	PD-1	149.678	3.00	2.00	River	Pucca
Primary Drain	PD-1	35.451	3.00	2.00	River	Pucca
Primary Drain	PD-1	33.963	3.00	2.00	River	Pucca
Secondary Drain	SD-13	171.457	2.00	1.20	SD-8	Pucca
Secondary Drain	SD-13	53.792	2.00	1.20	SD-8	Pucca
Secondary Drain	SD-13	131.578	2.00	1.20	SD-8	Pucca
Secondary Drain	SD-16	109.030	2.00	1.20	SD-11	Pucca
Secondary Drain	SD-16	514.501	2.00	1.20	SD-11	Pucca
Secondary Drain	SD-16	242.784	2.00	1.20	SD-11	Pucca
Secondary Drain	SD-19	29.117	2.00	1.20	River	Pucca
Secondary Drain	SD-19	20.148	2.00	1.20	River	Pucca
Tertiary Drain	TD-26	56.308	1.00	0.80	SD-8	Pucca
Tertiary Drain	TD-26	51.351	1.00	0.80	SD-8	Pucca
Tertiary Drain	TD-26	12.123	1.00	0.80	SD-8	Pucca
Tertiary Drain	TD-182	56.823	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	22.151	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	22.151	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	37.620	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	76.366	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	28.311	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	364.152	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	179.558	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	90.758	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	47.112	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	211.921	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	63.824	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	63.824	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	60.886	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	60.886	1.00	0.80	River	Pucca
Tertiary Drain	TD-186	23.989	1.00	0.80	River	Pucca

14.10.1 Development Proposals

The urban services are the pre condition of any potential development. Central Park, Fire Service, Cattle Hat etc are proposed here. The proposal for service facilities of ward no 08 is shown in table 14-32 together with mouza name and plot number.

Table 14-32: Proposal for Other Facilities of Ward-08

ID	Use	Area (Acres)	Mouza Name	Plot No.
CP	Central Park (Part)	3.84	Manikpara (029_00)	39,155,156,461,462,463,464,467,603,604
WC-8	Ward Centre	1.0	Manikpara (029_00)	340,341,342,343,344,360,361,362,363,364
RS-1	Rickshaw/ Van Stand	0.23	Manikpara (029_00)	39,157,465
FS	Fire Service	1.00	Manikpara (029_00)	Partial-159-162
CTH	Cattle Hat	0.72	Manikpara (029_00)	Partial 157,158, 160
VTI	Vocational Trainning Inst.	10.96	Manikpara (029_00)	204,209,210,211,212,213,214,215,216 ,217,218,220,221,231,232,233,234,235, 236,237,238,239,240,241,242,243,244, 245,247,248,249,250,251,252,253,254,255, 256,257,258,259,260,261,262,263,264,265,266,273, 274,275,276,277,278,279,280,281,282,283, 286,287,288,289,290,291,292,293,294,296,298,299,

Map 14-16: Proposed Landuse Plan Map of Ward-08

Map 14-17: Service and Drainage Network Map of Ward-08

Ward Action Plan for Ward-09

14.11 Proposals and Plans for Ward-09

Ward No. 09 is located at the eastern part of Akkelpur Paurashava. The area of the Ward is 713.89 acres. After reviewing and commensuration the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of Ward-09.

14.11.1 Proposed Landuse Zoning

The category wise proposals are presented here. Table 14.33 shows the amount of landuse proposal in Ward no. 9. Table shoes that Agriculture is dominant in this ward followed by rural settlement.

Table 14-33: Landuse proposals for Ward No. 09

Zone	Area (Acres)	%
Agricultural Zone	497.21	69.65
Circulation Network	42.17	5.91
Commercial Zone	0.90	0.13
Community Facilities	1.97	0.28
Education & Research Zone	1.16	0.16
General Industrial Zone	38.02	5.33
Government Office	0.17	0.02
Miscellaneous	0.11	0.02
Mixed Use Zone	0.75	0.11
Open Space	1.85	0.26
Rural Settlement	69.45	9.73
Urban Residential Zone	17.47	2.45
Utility Services	7.04	0.99
Waterbody	35.62	4.99
Total	713.89	100

14.11.1 Road Network Development Plan

In road network development plan there is about 15.15 km road in ward no 09. All of the roads of this Pourashava will be constructed as a pucca road in different phases of plan. Road widening is considered for all the existing road.

Table 14-34: Proposal of Roads for Ward-09

Road Type	Status	ID	Length (m)	Proposed Width (FT)	Proposal Type
Primary Road	Widening Road	WD-118	1440.447	80	Pucca
Primary Road	Widening Road	WD-164	714.626	80	Pucca
Primary Road	Widening Road	WD-376	489.131	80	Pucca
Secondary Road	Widening Road	WD-238	468.758	60	Pucca
Secondary Road	Widening Road	WD-236	358.944	50	Pucca
Secondary Road	Widening Road	WD-237	1584.105	50	Pucca
Secondary Road	Widening Road	WD-277	560.320	30	Pucca
Secondary Road	Widening Road	WD-371	1141.303	30	Pucca
Secondary Road	New Road	NR-64	676.368	20	Pucca
Secondary Road	Widening Road	WD-173	762.918	30	Pucca
Local Road	Widening Road	WD-244	430.826	30	Pucca
Local Road	Widening Road	WD-334	274.202	30	Pucca
Local Road	Widening Road	WD-21	481.280	20	Pucca
Local Road	Widening Road	WD-75	460.141	20	Pucca
Local Road	Widening Road	WD-100	235.984	20	Pucca
Local Road	Widening Road	WD-119	253.554	20	Pucca

Road Type	Status	ID	Length (m)	Proposed Width (FT)	Proposal Type
Local Road	Widening Road	WD-124	255.956	20	Pucca
Local Road	Widening Road	WD-170	425.561	20	Pucca
Local Road	Widening Road	WD-291	385.363	20	Pucca
Local Road	Widening Road	WD-312	245.459	20	Pucca
Local Road	Widening Road	WD-330	258.803	20	Pucca
Local Road	New Road	NR-60	288.315	20	Pucca
Local Road	New Road	NR-62	374.717	20	Pucca
Local Road	New Road	NR-65	404.181	20	Pucca

** Road length≥ 200m incorporated here. Detail was given in Appendix

14.11.2 Drainage Development Plan

Drain is necessary for discharge all its waste water and storm water. The plan proposes 4414.42 meters of drains for ward no. 09 which will be developed during the different phase. The natural sources of drainage are playing the critical roles in drainage plan.

Table 14-35: Proposal of Drain for Ward-09

Drain Type	ID	Length (m)	Average Width (m)	Depth Width (m)	Outfall	Construction Type
Primary Drain	PD-1	142.940	3.00	2.00	River	Pucca
Primary Drain	PD-1	88.869	3.00	2.00	River	Pucca
Primary Drain	PD-1	7.109	3.00	2.00	River	Pucca
Primary Drain	PD-1	7.109	3.00	2.00	River	Pucca
Primary Drain	PD-1	691.657	3.00	2.00	River	Pucca
Primary Drain	PD-1	1.268	3.00	2.00	River	Pucca
Primary Drain	PD-1	1.268	3.00	2.00	River	Pucca
Primary Drain	PD-1	38.824	3.00	2.00	River	Pucca
Primary Drain	PD-1	38.824	3.00	2.00	River	Pucca
Primary Drain	PD-1	232.900	3.00	2.00	River	Pucca
Primary Drain	PD-1	123.522	3.00	2.00	River	Pucca
Secondary Drain	SD-19	2.811	2.00	1.20	River	Pucca
Secondary Drain	SD-19	498.356	2.00	1.20	River	Pucca
Secondary Drain	SD-19	247.337	2.00	1.20	River	Pucca
Tertiary Drain	TD-181	42.765	1.00	0.80	River	Pucca
Tertiary Drain	TD-181	156.217	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	107.006	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	63.980	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	1.710	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	1.710	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	315.219	1.00	0.80	River	Pucca
Tertiary Drain	TD-182	112.919	1.00	0.80	River	Pucca
Tertiary Drain	TD-184	33.367	1.00	0.80	River	Pucca
Tertiary Drain	TD-184	62.050	1.00	0.80	River	Pucca
Tertiary Drain	TD-184	62.050	1.00	0.80	River	Pucca
Tertiary Drain	TD-184	223.442	1.00	0.80	River	Pucca
Tertiary Drain	TD-184	350.937	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	7.630	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	42.959	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	42.959	1.00	0.80	River	Pucca
Tertiary Drain	TD-185	53.385	1.00	0.80	River	Pucca

14.11.3 Development Proposals

The urban services are the pre condition of any potential development.Community Center, Waste Dumping, Industrial Area etc are proposed here. The proposal for service facilities of ward no 09 is shown in table 14.36 together with mouza name and plot number.

Table 14-36: Proposal for Other Facilities of Ward-09

ID	Use	Area (Acres)	Mouza Name	Plot No.
CC	Community Centre	0.97	Chokropara (028_01)	63,64,65,479
WC-9	Ward Centre	0.75	Chokropara (028_02)	23,24,61,479,543,544
WDG	Waste Dumping Area	6.82	Mokimpur (034_00)	240,241,242,243,261,277,278,279, 280,282,283,284,285,288,289 ,290,291,292,293,294,295,296,298
GIZ	General Industrial Zone	31.74	Mokimpur (034_00))	105,106,107,108,109,110,146,147,148,162,211, 212,213,316,317,318,319,320,326,336,337, 339,340,341,342,343,344,345,346,348, 349,350,353,355,356,357,358,359,360,361, 362,363,365,366,367,368,370,373,375,376,387, 596,598,599,720,728

Map 14-18: Proposed Landuse Plan Map of Ward-09

Map 14-19: Service and Drainage Network Map of Ward-09

14.12 Implementation Guidelines

14.12.1 Tasks of Paurashava Authority

As a planning and development authority Paurashava shoulders the responsibilities of undertaking and implementing Ward wise Action Plans. Discussion meetings and negotiations with local leaders will have to be carried out relentlessly for successful execution of any detailed area plan through their active participation. The Paurashava must have the Planning Unit.

14.12.2 Institutional Strengthening

In Ward wise planning the most significant role will be played by Paurashava Authority. The Planning Section must have to launch in the Paurashava which will carry out the entire work of project initiation and plan formulation. These works are complicated and time consuming, and require multidisciplinary professionals.

14.12.3 Role of Municipal Authority

According to the Local Government (Paurashav) Act 2009, Paurashava may, and if so required by the prescribed authority shall, draw up a Master Plan for the municipality within five years of its establishment. The Paurashava should have to ply an important role by implementing all the priority tasks without any delaying other wise the plan proposals will be inactive for implementation in wrong periods.

14.12.4 Publicity and Circulation of the Plans and Documents

In order to enable greater access of the Paurashava inhabitants, the plan documents must have wide circulation. This is necessary to create awareness among people about city planning and development. The plan document should be sent to every public office. Copies of plans and reports should be made available for purchase by people in general. This will be a step forward in promoting good governance through enabling beneficiary participating in planning and development activities.

14.13 Concluding Remarks

This master plan is developed a comprehensive vision for Akkelpur in context with its location, natural resources, and visions of the community. Akkelpur Master Plan will describe a strategy to address the need for facility improvements and for capital investments to support current and future development of the Paurashava. The community will be involved every step of the way. It wills guild the future development of the Paurashava.

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 Akkelpur 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.

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.

Annexure

Annexure-A: Land Use Permission

Annexure- A: Land use Permission

a. Urban Residential Land Use

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A.1: Land Use Permitted

Permitted Urban Residential Uses
Artisan's Shop
Assisted Living or Elderly Home
Confectionery Shop
Barber Shop
Child Daycare \ Preschool
Cleaning \ Laundry Shop
Communication Service Facilities
Communication Tower Within Permitted Height
Condominium or Apartment
Cottage
Cyber Café
Daycare Center (Commercial or Nonprofit)
Drug Store or Pharmacy
Employee Housing (Guards \ Drivers) \ Ancillary Use
General Store
Grocery Store
High School
Household Appliance and Furniture Repair Service (No Outside Storage)
Housing For Seasonal Firm Labor
Landscape and Horticultural Services
Mosque, Place Of Worship
Newspaper Stand
Nursery School
Orphanage
Eidgah
Photocopying and Duplicating Services (No Outside Storage)
Pipelines and Utility Lines
Playing Field
Primary School
Private Garages (Ancillary Use)
Project Identification Signs
Property Management Signs
Public Transport Facility
Satellite Dish Antenna
Shelter (Passers By)
Shoe Repair or Shoeshine Shop (Small)
CBO Office
Special Dwelling
Temporary Tent
Temporary tent for Permitted Function
Newspaper Stand
Specialized School: Dance, Art, Music, Physically Challenged & Others
Transmission Lines
Urban-Nature Reserve
Utility Lines
Woodlot
Children's Park (Must Have Parking)
ATM Booth
Water Pump \ Reservoir
Monument (Neighborhood Scale)
Bill Payment Booth
Boarding and Rooming House
Dormitory
Memorial Structure (Ancillary)
Neighborhood Center* *(Where Neighborhood Center exists)*
Permitted
Community Center
Doctor \ Dentist Chamber
Cultural Exhibits and Libraries
Fast Food Establishment \ Food Kiosk
Flowers, Nursery Stock and Florist Supplies
Fitness Centre
Gaming Clubs
Departmental Stores
Retail Shops \ Facilities

Source: Compiled by the Consultants

*Permission of Neighborhood Center Facilities in absence of formal neighborhood should be subject to Landuse Permit Committee

Land Use Conditionally Permitted

The following uses may be permitted or disallowed in this zone after review and approval by the authority/committee following appropriate procedure while the application meets the criteria mentioned in the requirement.

Table A.2: Land Use Conditionally Permitted

Conditionally Permitted Urban Residential Uses
Addiction Treatment Center
Amusement and Recreation (Indoors)
Funeral Services
Art Gallery, Art Studio \ Workshop
Automobile Driving Academy
Beauty and Body Service
Billiard Parlor \ Pool Hall
Book or Stationery Store or Newsstand
Building Maintenance \ Cleaning Services, No Outside Storage
Bus Passenger Shelter
Graveyard \ Cemetery
Coffee Shop \ Tea Stall
Correctional Institution
Courier Service
Crematorium
Plantation (Except Narcotic Plant)
Furniture & Variety Stores
Emergency Shelter
Energy Installation
Garages
Garden Center or Retail Nursery
Fire Brigade Station
Police Station
Temporary Rescue Shed
Guest House
Slaughter House
Static Transformer Stations
Tourist Home or Resort
Market (Bazar)
Optical Goods Sales
Outdoor Café
Outdoor Fruit and Vegetable Markets
Community Hall
Neighborhood Co-Operative Office
Overhead Water Storage Tanks
Row House
Paints and Varnishes Store
Parking Lot
Patio Homes
Photofinishing Laboratory
Post Office
Postal Facilities
Sports and Recreation Club
Tennis Club
Flood Management Structure
Telephone Sub Station
Electrical Sub Station

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted in this zone.

b. General Industry

Land use Permitted

General Industry land use category approve only Green and Orange-A category industry mentioned in *The Environmental Conservation Rule, 1997*.The following uses in the tables are proposed to be applicable for this zone only.

Table A.3: Land Use Permitted

Permitted General Industrial Activities
Confectionery Shop
Bank & Financial Institution
Bicycle Assembly, Parts and Accessories
Blacksmith
Bus Passenger Shelter
Communication Tower Within Permitted Height
Freight Transport Facility
Police Box \ Barrack
Fire \ Rescue Station
Grocery Store
Household Appliance and Furniture Repair Service
Machine Sheds
Meat and Poultry (Packing & Processing)
Mosque, Place Of Worship
Newspaper Stand
Photocopying and Duplicating Services
Pipelines and Utility Lines
Printing, Publishing and Distributing
Public Transport Facility
Restaurant
Retail Shops \ Facilities
Salvage Processing
Salvage Yards

Permitted General Industrial Activities
Satellite Dish Antenna
Sawmill, Chipping and Pallet Mill
Shelter (Passers By)
Television, Radio or Electronics Repair (No Outside Storage)
Transmission Lines
Truck Stop & Washing or Freight Terminal
Utility Lines
Wood Products
Woodlot
ATM Booth
Water Pump \ Reservoir
Effluent Treatment Plant
Social Forestry

Source: Compiled by the Consultants

Land Use Conditionally Permitted

The following uses may be permitted or denied in this zone after review and approval by the authority/committee following appropriate procedure.

Table A.4: Land Use Conditionally Permitted

Conditionally Permitted General Industrial Land Uses
Amusement and Recreation (Indoors)
Appliance Store
Plantation (Except Narcotic Plant)
Cyber Café
Daycare Center (Commercial or Nonprofit)
Doctor \ Dentist Chamber
Electrical and Electronic Equipment and Instruments Sales
Employee Housing
Energy Installation
Fast Food Establishment \ Food Kiosk
Garages
Grain & Feed Mills
Incineration Facility
Super Store
Lithographic or Print Shop
Motor Vehicle Fuelling Station \ Gas Station
Motorcycle Sales Outlet
Outdoor Fruit and Vegetable Markets
Outside Bulk Storage
Overhead Water Storage Tanks
Painting and Wallpaper Sales
Paints and Varnishes
Parking Lot
Parking Lot (Commercial)
Private Garages
Retail Shops Ancillary To Studio \ Workshop
Jute Mill

Source: Compiled by the Consultants

Restricted Uses

All other uses; except the permitted and conditionally permitted uses.

c. Commercial Zone

Land Use Permitted

Commercial zone is mainly intended for supporting the office and business works. There are several functions that are permitted in this zone.

Table A.5: Land Use Permitted

Permitted Commercial Activity
Accounting, Auditing or Bookkeeping Services
Billboards, Advertisements & Advertising Structure
Agri-Business
Agricultural Sales and Services
Ambulance Service
Antique Shop
Appliance Store
Auction Market
Auditorium, Coliseum, Meeting Halls, and Conference Facilities, Convention
Auto Leasing or Rental Office
Auto Paint Shop
Auto Parts and Accessory Sales (Indoors)
Auto Repair Shop (With Garage)
Automobile Wash
Automobile Sales
Confectionery Shop
Bakery or Confectionery Retail
Bank & Financial Institution
Bar (Licensed)
Barber Shop
Beauty and Body Service
Bicycle Shop
Billiard Parlor \ Pool Hall
Book or Stationery Store or Newsstand
Building Material Sales or Storage (Indoors)

Permitted Commercial Activity
Bulk Mail and Packaging
Bus Passenger Shelter
Cinema Hall
Communication Service Facilities
Communication Tower Within Permitted Height
Computer Maintenance and Repair
Computer Sales & Services
Conference Center
Construction Company
Courier Service
Cyber Café
Daycare Center (Commercial or Nonprofit)
Department Stores, Furniture & Variety Stores
Doctor \ Dentist Chamber
Drug Store or Pharmacy
Electrical and Electronic Equipment and Instruments Sales
Fast Food Establishment \ Food Kiosk
Freight Handling, Storage & Distribution
Freight Transport Facility
Freight Yard
General Store
Grocery Store
Guest House
Hotel or Motel
Inter-City Bus Terminal
Jewelry and Silverware Sales
Junk \ Salvage Yard
Super Store
Market (Bazar)
Mosque, Place Of Worship
Motorcycle Sales Outlet
Multi-Storey Car Park
Newspaper Stand
Outdoor Fruit and Vegetable Markets
Outdoor Recreation, Commercial
Parking Lot (Commercial)
Pet Store
Photocopying and Duplicating Services
Photofinishing Laboratory & Studio
Pipelines and Utility Lines
Post Office
Preserved Fruits and Vegetables Facility \ Cold Storage
Printing, Publishing and Distributing
Project Identification Signs
Property Management Signs
Public Transport Facility
Refrigerator or Large Appliance Repair
Resort
Restaurant
Retail Shops \ Facilities
Salvage Processing
Salvage Yards
Satellite Dish Antenna
Sawmill, Chipping and Pallet Mill
Shelter (Passers By)
Shopping Mall \ Plaza
Slaughter House
Software Development
Sporting Goods and Toys Sales
Taxi Stand
Telephone Exchanges
Television, Radio or Electronics Repair (No Outside Storage)
Theater (Indoor)
Transmission Lines
Utility Lines
Vehicle Sales & Service, Leasing or Rental
Veterinarian Clinics, Animal Hospitals, Kennels and Boarding Facilities
Warehousing
Wood Products
Woodlot
ATM Booth
Water Pump \ Reservoir
Agro-Based Industry (Rice Mill, Saw Mill, Cold Storage)
Social Forestry

Source: Compiled by the Consultants

Land Use Conditionally Permitted

Some functions are permitted with some condition in this zone.

Table A.6: Land Use Conditionally Permitted

Conditionally permitted commercial activities
Amusement and Recreation (Indoors)
Bicycle Assembly, Parts and Accessories
Broadcast Studio \ Recording Studio (No Audience)
Coffee Shop \ Tea Stall

Conditionally permitted commercial activities
Concert Hall, Stage Shows
Construction, Survey, Soil Testing Firms
Trade Shows
Craft Workshop
Plantation (Except Narcotic Plant)
Energy Installation
Firm Equipment Sales & Service
Agricultural Chemicals, Pesticides or Fertilizers Shop
Fitness Centre
Flowers, Nursery Stock and Florist Supplies
Forest Products Sales
Fuel and Ice Dealers
Garages
Garden Center or Retail Nursery
Police Box \ Barrack
Fire \ Rescue Station
Grain & Feed Mills
Household Appliance and Furniture Repair Service
Incineration Facility
Indoor Amusement Centers, Game Arcades
Indoor Theatre
Lithographic or Print Shop
Motor Vehicle Fuelling Station \ Gas Station
Musical Instrument Sales or Repair
Optical Goods Sales
Painting and Wallpaper Sales
Paints and Varnishes
Parking Lot
Patio Homes
Postal Facilities
Poultry
Private Garages
Professional Office
Retail Shops Ancillary To Studio \ Workshop
Stone \ Cut Stone Products Sales

Source: Compiled by the Consultants

Restricted Uses

All other uses except;, the permitted and conditionally permitted uses.

d. Rural Settlement

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A.7: Land Use Permitted

Permitted Rural Settlement
Agricultural Dwellings
Animal Husbandry
Animal Shelter
Graveyard \ Cemetery
Child Daycare \ Preschool
Primary School
Communication Tower Within Permitted Height
Cottage
Crematorium
Dairy Firming
General Store
Grocery Store
Handloom (Cottage Industry)
Housing For Seasonal Firm Labor
Mosque, Place Of Worship
Newspaper Stand
Nursery School
orphanage
Outdoor Religious Events (Eidgah)
Playing Field
Satellite Dish Antenna
NGO \ CBO Facilities
Special Dwelling (E.G. Dorm For Physically Challenged Etc.)
Temporary Shed \ Tent
Specialized School: Dance, Art, Music, Physically Challenged & Others
Static Electrical Sub Stations
Transmission Lines
Utility Lines
Woodlot
Plantation (Except Narcotic Plant)
Social Forestry
Memorial Structure

Source: Compiled by the Consultants

Land Use Conditionally Permitted

The following uses may be permitted or disallowed in this zone after review and approval by the authority/committee following appropriate procedure while the application meets the criteria mentioned in the requirement.

Table No. A.8: Land Use Conditionally Permitted

Conditionally permitted uses under Rural Settlement
Artisan's Shop (Potter, Blacksmith, and Goldsmith Etc.)
Research organization (Agriculture \ Fisheries)
Energy Installation
Fish Hatchery
Garden Center or Retail Nursery
Emergency Shelter
Sports and Recreation Club, Firing Range: Indoor

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted in this zone.

e. Mixed use zone

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A.11: Land Use Permitted

Permitted uses in Mixed Use Zone
Accounting, Auditing or Bookkeeping Services
Addiction Treatment Center
Billboards, Advertisements & Advertising Structure
Agricultural Sales and Services
Antique Store
Appliance Store
Art Gallery, Art Studio \ Workshop
Artisan's Shop
Assisted Living or Elderly Home
Auditorium, Coliseum, Meeting Halls, and Conference Facilities, Convention
Auto Leasing or Rental Office
Automobile Wash
Automobile Driving Academy
Confectionery Shop
Bakery or Confectionery Retail
Bank & Financial Institution
Barber Shop
Bicycle Shop
Billiard Parlor \ Pool Hall
Blacksmith

Permitted uses in Mixed Use Zone
Boarding and Rooming House
Book or Stationery Store or Newsstand
Bus Passenger Shelter
Child Daycare \ Preschool
Cleaning \ Laundry Shop
Commercial Recreational Buildings
Communication Service Facilities
Communication Tower Within Permitted Height
Community Center
Condominium or Apartment
Correctional Institution
Courier Service
Cyber Café
Daycare Center (Commercial or Nonprofit)
Doctor \ Dentist Chamber
Employee Housing
Fabric Store
Fast Food Establishment \ Food Kiosk
Funeral Services
General Store
Grocery Store
Guest House
Hospital
Jewelry and Silverware Sales
Landscape and Horticultural Services
Mosque, Place Of Worship
Newspaper Stand
Nursery School
Photocopying and Duplicating Services
Pipelines and Utility Lines
Primary School
Project Identification Signs
Property Management Signs
Public Transport Facility
Resort
Satellite Dish Antenna
Shelter (Passers By)
Shoe Repair or Shoeshine Shop (Small)
Slaughter House
Social organization
Software Development
Special Dwelling
Toys and Hobby Goods Processing and Supplies
Training Centre
Transmission Lines

Permitted uses in Mixed Use Zone
Utility Lines
Vehicle Sales & Service, Leasing or Rental
Warehousing
Woodlot
Children's Park
ATM Booth
Water Pump \ Reservoir
Social Forestry
Dormitory
Rickshaw \ Auto Rickshaw Stand

Source: Compiled by the Consultants

Land Use Conditionally Permitted

The following uses may be permitted or disallowed in this zone after review and approval by the authority/committee.

Table A.12: Land Use Conditionally Permitted

▪ Conditionally permitted uses in Mixed Use Zone
Agricultural Chemicals, Pesticides or Fertilizers Shop
Amusement and Recreation (Indoors)
Beauty and Body Service
Broadcast Studio \ Recording Studio (No Audience)
Building Maintenance \ Cleaning Services, No Outside Storage
Building Material Sales or Storage (Indoors)
Graveyard \ Cemetery
Coffee Shop \ Tea Stall
Computer Maintenance and Repair
Computer Sales & Services
Concert Hall, Stage Shows
Conference Center
Construction Company
Construction, Survey, Soil Testing Firms
Cottage
Counseling Services
Craft Workshop
Crematorium
Plantation (Except Narcotic Plant)
Cultural Exhibits and Libraries
Department Stores, Furniture & Variety Stores
Drug Store or Pharmacy
Energy Installation
Fitness Centre
Flowers, Nursery Stock and Florist Supplies
Freight Handling, Storage & Distribution
Freight Transport Facility

▪ Conditionally permitted uses in Mixed Use Zone
Gaming Clubs
Garages
Garden Center or Retail Nursery
Commercial Office
Project Office
Government Office
Hotel or Motel
Household Appliance and Furniture Repair Service
Indoor Amusement Centers, Game Arcades
Indoor Theatre
Lithographic or Print Shop
Market (Bazar)
Health Office, Dental Laboratory, Clinic or Lab
Musical Instrument Sales or Repair
Optical Goods Sales
Outdoor Café
Outdoor Fruit and Vegetable Markets
Painting and Wallpaper Sales
Paints and Varnishes
Patio Homes
Photofinishing Laboratory & Studio
Poultry
Printing, Publishing and Distributing
Psychiatric Hospital
Retail Shops Ancillary To Studio \ Workshop
Radio \ Television or T&T Station With Transmitter Tower
Refrigerator or Large Appliance Repair
Restaurant
Retail Shops \ Facilities
Sporting Goods and Toys Sales
Sports and Recreation Club, Firing Range: Indoor
Telephone Exchanges
Television, Radio or Electronics Repair (No Outside Storage)

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted in this zone.

f. Education and Research Area

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A.13: Land Use Permitted

▪ Permitted uses under Education & Research Zone
Addiction Treatment Center

▪ **Permitted uses under Education & Research Zone**
Billboards, Advertisements & Advertising Structure
Art Gallery, Art Studio \ Workshop
Automobile Driving Academy
Confectionery Shop
Bus Passenger Shelter
Child Daycare \ Preschool
College, University, Technical Institute
Communication Service Facilities
Communication Tower Within Permitted Height
Conference Center
Correctional Institution
Cultural Exhibits and Libraries
Cyber Café
Freight Transport Facility
General Store
Grocery Store
High School
Hospital
Lithographic or Print Shop
Mosque, Place Of Worship
Multi-Storey Car Park
Newspaper Stand
Nursery School
Outdoor Religious Events
Photocopying and Duplicating Services
Post Office
Primary School
Professional Office
Project Identification Signs
Property Management Signs
Public Transport Facility
Satellite Dish Antenna
School (Retarded)
Scientific Research Establishment
Shelter (Passers By)
Specialized School: Dance, Art, Music & Others
Training Centre
Transmission Lines
Utility Lines
Vocational, Business, Secretarial School
Woodlot
ATM Booth
Water Pump \ Reservoir
Social Forestry
Dormitory
Veterinary School \ College and Hospital

Source: Compiled by the Consultants

Land Use Conditionally Permitted

The following uses may be permitted or denied in this zone after review and approval by the authority/committee.

Table A.14: Land Use Conditionally Permitted

Conditionally permitted uses under Education and Research Zone
Auditorium, Coliseum, Meeting Halls, and Conference Facilities, Convention
Bank & Financial Institution
Barber Shop
Boarding and Rooming House
Book or Stationery Store or Newsstand
Coffee Shop \ Tea Stall
Counseling Services
Courier Service
Plantation (Except Narcotic Plant)
Daycare Center (Commercial or Nonprofit)
Doctor \ Dentist Chamber
Drug Store or Pharmacy
Fast Food Establishment \ Food Kiosk
Flowers, Nursery Stock and Florist Supplies
Gallery \ Museum
Garages
Indoor Theatre
orphanage
Outdoor Café
Parking Lot
Pipelines and Utility Lines
Postal Facilities
Psychiatric Hospital

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted in this zone.

g. Government Office

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A.15: Land Use Permitted

Permitted uses under Government Office Zone
Accounting, Auditing or Bookkeeping Services
Billboards, Advertisements & Advertising Structure
Confectionery Shop

Permitted uses under Government Office Zone
Bus Passenger Shelter
Civic Administration
Communication Service Facilities
Communication Tower Within Permitted Height
Construction, Survey, Soil Testing Firms
Cultural Exhibits and Libraries
Cyber Café
Emergency Shelter
Freight Transport Facility
General Store
Project Office
Government Office
Grocery Store
Guest House
Multi-Storey Car Park
Newspaper Stand
Outdoor Religious Events
Photocopying and Duplicating Services
Post Office
Professional Office
Public Transport Facility
Satellite Dish Antenna
Scientific Research Establishment
Shelter (Passers By)
Training Centre
Transmission Lines
Utility Lines
Woodlot
ATM Booth
Water Pump \ Reservoir
Social Forestry

Source: Compiled by the Consultants

Land Use Conditionally Permitted

The following uses may be permitted or denied in this zone after review and approval by the authority/committee.

Table A.16: Land Use Conditionally Permitted

Conditionally permitted uses under Government office
Amusement and Recreation (Indoors)
Auditorium, Coliseum, Meeting Halls, and Conference Facilities, Convention
Bank & Financial Institution
Boarding and Rooming House
Book or Stationery Store or Newsstand

Conditionally permitted uses under Government office
Coffee Shop \ Tea Stall
Conference Center
Courier Service
Plantation (Except Narcotic Plant)
Daycare Center (Commercial or Nonprofit)
Detention Facilities
Doctor \ Dentist Chamber
Energy Installation
Fast Food Establishment \ Food Kiosk
Flowers, Nursery Stock and Florist Supplies
Freight Handling, Storage & Distribution
Freight Yard
Gallery \ Museum
Garages
Police Box \ Barrack
Fire \ Rescue Station
Lithographic or Print Shop
Mosque, Place Of Worship
Outdoor Café
Parking Lot
Parking Lot (Commercial)
Pipelines and Utility Lines
Postal Facilities

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted in this zone.

h. Agricultural Zone

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A17: Land Use Permitted

Permitted uses under Agricultural Zone
Food Grain Cultivation
Vegetable Cultivation
Cash Crop Cultivation
Horticulture
Arboriculture
Dairy Firming
Deep Tube Well
Shallow Tube Well
Irrigation Facilities (Irrigation Canal, Culvert, Flood Wall etc)
Temporary Structure (Agricultural)
Animal Shelter
Duckery
Aquatic Recreation Facility (Without

Permitted uses under Agricultural Zone
Structure)
Tree Plantation (Except Narcotic Plant)
Aquaculture
Static Transformer Stations
Transmission Lines
Utility Lines
Woodlot
Social Forestry

Source: Compiled by the Consultants

Land Use Conditionally Permitted

Table A18: Land Use Conditionally Permitted

Conditionally permitted uses under Agricultural Zone
Graveyard \ Cemetery
Communication Tower Within Permitted Height
Crematorium
Fish Hatchery
Garden Center or Retail Nursery
Poultry

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted in this zone.

j. Open Space

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A.19: Land Use Permitted

Permitted uses under Open Space
Botanical Garden & Arboretum
Bus Passenger Shelter
Caravan Park \ Camping Ground
Carnivals and Fairs
Circus
Plantation (Except Narcotic Plant)
Landscape and Horticultural Services
Open Theater
Park and Recreation Facilities (General)
Pipelines and Utility Lines
Playing Field
Special Function Tent
Tennis Club
Transmission Lines
Urban-Nature Reserve
Utility Lines
Woodlot

Permitted uses under Open Space
Zoo
Roadside Parking
Social Forestry
Memorial Structure

Source: Compiled by the Consultants

Landuse Conditionally Permitted

Table A 20: Land Use Conditionally Permitted

Conditionally permitted uses under open space
Communication Tower Within Permitted Height
Trade Shows
Fitness Centre
Flowers, Nursery Stock and Florist Supplies
Golf Course
Motorized Recreation
Outdoor Recreation Facilities
Outdoor Recreation, Commercial
Outdoor Sports and Recreation
Park Maintenance Facility
Retreat Center
Sports and Recreation Club, Firing Range: Indoor

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted.

k. Water Body

Retaining water is the main purpose of this type of Landuse.

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table A.21: Land Use Permitted

Permitted uses under Water Body
Aquatic Recreation Facility (Without Structure)
Fishing Club
Utility Lines
Water Parks
Memorial Structure

Source: Compiled by the Consultants

Land Use Conditionally Permitted

The following uses may be permitted or denied in this zone after review and approval by the authority/committee.

Table A.22: Land Use Conditionally Permitted

Conditionally permitted uses under water body
Plantation (Except Narcotic Plant)
Marina \ Boating Facility
Motorized Recreation

Source: Compiled by the Consultants

Restricted Uses

All uses except permitted and conditionally permitted uses are restricted.

Annexure-B: Details of Proposed Road

Table B1: Details of Road Widening Proposals of Akkelpur Paurashava (Phase 01: First to Fifth Year of Master Plan)

Type of Road	Existing Crest Width (m.)	Proposed RoW (ft.)	Proposed Road Id	Road Name	Length (m)
Local Road	3.37	30	WD-9		592.595
Secondary Road	3.37	30	WD-27		2329.875
Secondary Road	3.05	30	WD-38		1699.936
Secondary Road	4.52	30	WD-93	Joypurhat-shantahar Road	725.854
Secondary Road	2.94	30	WD-127		321.248
Secondary Road	1.72	30	WD-128		262.372
Secondary Road	3.37	40	WD-189		1640.171
Local Road	2.59	20	WD-206		333.848
Local Road	3.37	20	WD-210		435.249
Primary Road	3.89	60	WD-216		2498.377
Local Road	1.56	20	WD-218		78.815
Local Road	2.03	20	WD-220		179.443
Secondary Road	2.46	40	WD-222		914.113
Local Road	2.51	30	WD-224	Akkelpur Madrasa Road	394.847
Secondary Road	3.09	60	WD-238		2485.854
Local Road	2.53	20	WD-264		140.024
Secondary Road	3.00	20	WD-288		160.723
Secondary Road	2.35	40	WD-298		858.313
Secondary Road	2.46	40	WD-299		275.468
Local Road	2.92	30	WD-347		295.374
Primary Road	5.75	80	WD-351	Joypurhat Road	749.210
Primary Road	3.72	80	WD-352	Joypurhat Road	244.946
Primary Road	3.72	80	WD-376		4933.552

Source: Road Network Plan of Akkelpur Paurashava

Table B2: Details of New Roads in Road Network Plan of Akkelpur Paurashava (Phase 01: First to Fifth Year of Master Plan)

Type of Road	Proposed RoW (ft.)	Proposed Road Id	Length (m)
Secondary Road	30	NR-1	490.397
Local Road	20	NR-2	147.011
Local Road	20	NR-3	55.372
Local Road	20	NR-4	65.996
Secondary Road	20	NR-5	241.187
Local Road	20	NR-6	293.177
Secondary Road	30	NR-7	284.764
Local Road	20	NR-8	159.856
Local Road	20	NR-9	70.562
Local Road	20	NR-10	215.388
Local Road	20	NR-11	330.733
Secondary Road	30	NR-12	437.095
Local Road	20	NR-13	287.030
Local Road	20	NR-14	55.066
Local Road	20	NR-15	96.733
Local Road	20	NR-16	72.570
Local Road	20	NR-17	93.308
Local Road	20	NR-18	54.863
Local Road	30	NR-19	263.811
Local Road	20	NR-20	259.653
Local Road	20	NR-21	203.207
Local Road	20	NR-22	306.207
Local Road	20	NR-23	473.326
Local Road	20	NR-24	129.198
Local Road	20	NR-25	328.847
Local Road	20	NR-26	117.305
Local Road	20	NR-27	129.864
Local Road	20	NR-28	212.528
Secondary Road	20	NR-29	115.576
Secondary Road	20	NR-30	385.641
Secondary Road	20	NR-31	365.003
Local Road	20	NR-32	272.767
Local Road	20	NR-33	44.901
Local Road	20	NR-34	271.951

Type of Road	Proposed RoW (ft.)	Proposed Road Id	Length (m)
Local Road	20	NR-35	179.184
Local Road	20	NR-36	100.105
Local Road	20	NR-37	97.077
Local Road	20	NR-38	24.210
Local Road	20	NR-39	80.302
Local Road	20	NR-40	56.066
Local Road	20	NR-41	62.715
Local Road	20	NR-42	35.822
Local Road	20	NR-43	64.093
Local Road	20	NR-44	191.570
Local Road	20	NR-45	67.876
Local Road	20	NR-46	41.322
Local Road	20	NR-47	45.117
Local Road	20	NR-48	54.792
Local Road	20	NR-49	49.131
Local Road	20	NR-50	48.601
Local Road	20	NR-51	106.684
Local Road	20	NR-52	282.989
Local Road	20	NR-54	220.503
Local Road	20	NR-55	121.236
Local Road	20	NR-56	175.671
Local Road	20	NR-57	63.117
Local Road	20	NR-58	200.479
Local Road	20	NR-60	288.315
Local Road	20	NR-61	66.017
Local Road	20	NR-62	374.717
Local Road	20	NR-63	58.332
Secondary Road	20	NR-64	676.368
Local Road	20	NR-65	567.610
Local Road	20	NR-66	542.136

Table B3: Details of Road Widening Proposals of Akkelpur Paurashava (Phase 01: Sixth to Ten Year of Master Plan)

Road Type	Ex. Width	Pro. Width	Pro. Id	Remarks	Road Name	Length(m)
Local Road	2.06	20	WD-1	Widening Road		18.936
Local Road	2.01	20	WD-2	Widening Road		121.223
Local Road	1.99	20	WD-3	Widening Road		123.621
Local Road	2.01	20	WD-4	Widening Road		183.746
Local Road	2.09	20	WD-5	Widening Road		21.651
Local Road	2.54	20	WD-6	Widening Road		37.069
Local Road	4.02	20	WD-7	Widening Road		236.624
Local Road	2.07	20	WD-8	Widening Road		38.152
Local Road	2.08	20	WD-10	Widening Road		56.082
Local Road	2.59	20	WD-11	Widening Road		145.655
Local Road	1.37	20	WD-12	Widening Road		117.985
Local Road	3.00	20	WD-13	Widening Road		72.195
Local Road	4.52	20	WD-14	Widening Road	Joypurhat-shantahar Road	52.074
Local Road	4.52	20	WD-15	Widening Road	Joypurhat-shantahar Road	99.425
Local Road	3.10	20	WD-16	Widening Road		16.808
Local Road	3.01	20	WD-17	Widening Road		79.967
Local Road	2.52	20	WD-18	Widening Road		31.116
Local Road	1.79	20	WD-19	Widening Road		173.734
Local Road	1.53	20	WD-20	Widening Road		27.642
Local Road	2.95	20	WD-21	Widening Road		481.280
Local Road	2.04	20	WD-22	Widening Road		498.453
Local Road	3.60	20	WD-23	Widening Road		68.813
Local Road	2.56	20	WD-24	Widening Road		62.801
Secondary Road	3.51	40	WD-25	Widening Road	Gurki Road	1891.320
Local Road	3.23	20	WD-26	Widening Road		15.452
Local Road	3.00	20	WD-28	Widening Road		130.796
Local Road	3.00	20	WD-29	Widening Road		148.216
Local Road	1.55	20	WD-30	Widening Road		36.581
Local Road	2.60	20	WD-31	Widening Road		62.029
Local Road	2.60	20	WD-32	Widening Road		375.248
Local Road	2.51	20	WD-33	Widening Road		808.532
Local Road	1.01	20	WD-34	Widening Road	Kurgipara Jame Masjid Road	267.611

Road Type	Ex. Width	Pro. Width	Pro. Id	Remarks	Road Name	Length(m)
Secondary Road	3.97	20	WD-35	Widening Road		1941.004
Local Road	2.35	20	WD-36	Widening Road		53.341
Local Road	2.35	20	WD-37	Widening Road		303.971
Local Road	2.52	20	WD-39	Widening Road		283.320
Secondary Road	3.97	40	WD-40	Widening Road		161.516
Secondary Road	2.66	40	WD-41	Widening Road		2059.289
Local Road	1.99	20	WD-42	Widening Road		93.345
Local Road	1.99	20	WD-43	Widening Road		546.934
Local Road	1.94	20	WD-44	Widening Road		467.554
Local Road	1.94	20	WD-45	Widening Road		144.341
Local Road	2.03	20	WD-46	Widening Road		74.404
Local Road	3.37	20	WD-47	Widening Road		254.517
Local Road	4.33	20	WD-48	Widening Road		89.200
Local Road	2.03	20	WD-49	Widening Road		32.974
Local Road	2.11	20	WD-50	Widening Road		27.305
Local Road	2.10	20	WD-51	Widening Road		20.517
Local Road	2.06	20	WD-52	Widening Road		28.773
Local Road	2.08	20	WD-53	Widening Road		54.617
Local Road	2.03	20	WD-54	Widening Road		38.262
Local Road	3.02	20	WD-55	Widening Road		305.949
Local Road	2.04	20	WD-56	Widening Road		109.728
Local Road	2.02	20	WD-57	Widening Road		58.352
Local Road	2.07	20	WD-58	Widening Road		45.721
Local Road	2.07	20	WD-59	Widening Road		47.581
Local Road	2.04	20	WD-60	Widening Road		50.106
Local Road	1.60	20	WD-61	Widening Road		284.195
Local Road	2.14	20	WD-62	Widening Road		20.428
Secondary Road	2.99	40	WD-63	Widening Road	Kesobpur Road	452.228
Local Road	2.83	40	WD-64	Widening Road		81.093
Local Road	2.08	20	WD-65	Widening Road		219.616
Local Road	2.10	20	WD-66	Widening Road		94.457
Local Road	2.22	20	WD-67	Widening Road		239.330
Local Road	2.23	20	WD-68	Widening Road		379.663
Local Road	0.50	20	WD-69	Widening Road		256.079
Local Road	2.50	20	WD-70	Widening Road		246.615
Local Road	1.54	20	WD-71	Widening Road		116.804
Local Road	1.12	20	WD-72	Widening Road		190.367
Local Road	2.10	20	WD-72	Widening Road		31.723
Local Road	2.54	20	WD-73	Widening Road		106.518
Local Road	2.56	20	WD-74	Widening Road		115.613
Local Road	2.98	20	WD-75	Widening Road		460.141
Local Road	2.98	20	WD-76	Widening Road		286.250
Local Road	2.56	20	WD-77	Widening Road		195.413
Local Road	3.03	20	WD-78	Widening Road		126.417
Local Road	1.12	20	WD-79	Widening Road		237.162
Local Road	3.20	20	WD-80	Widening Road		35.764
Local Road	2.02	20	WD-81	Widening Road		85.860
Local Road	3.37	20	WD-82	Widening Road		47.398
Local Road	1.43	20	WD-83	Widening Road		50.565
Local Road	3.15	20	WD-84	Widening Road		36.281
Local Road	3.06	20	WD-85	Widening Road		231.425
Local Road	3.37	20	WD-86	Widening Road		317.110
Local Road	2.54	20	WD-87	Widening Road		30.991
Local Road	2.23	20	WD-88	Widening Road		202.450
Local Road	2.60	20	WD-89	Widening Road		48.706
Local Road	2.64	20	WD-90	Widening Road		156.560
Secondary Road	1.55	30	WD-91	Widening Road		38.706
Local Road	1.55	20	WD-92	Widening Road		29.637
Local Road	2.56	20	WD-93	Widening Road		60.598
Local Road	2.10	20	WD-94	Widening Road		24.818
Local Road	2.04	20	WD-95	Widening Road		58.977
Local Road	1.13	20	WD-96	Widening Road		147.016
Local Road	2.28	20	WD-97	Widening Road		9.099
Local Road	2.28	20	WD-98	Widening Road		69.634
Local Road	2.53	20	WD-99	Widening Road		342.524
Local Road	2.99	20	WD-100	Widening Road		235.984
Local Road	2.50	20	WD-101	Widening Road		283.709
Local Road	2.55	20	WD-102	Widening Road		79.037
Local Road	3.37	20	WD-103	Widening Road		112.678

Road Type	Ex. Width	Pro. Width	Pro. Id	Remarks	Road Name	Length(m)
Local Road	3.37	20	WD-104	Widening Road		66.589
Local Road	2.27	20	WD-105	Widening Road		226.312
Local Road	2.46	20	WD-106	Widening Road		80.166
Local Road	3.37	20	WD-107	Widening Road		22.423
Local Road	3.37	20	WD-108	Widening Road		255.790
Local Road	2.60	20	WD-109	Widening Road		210.584
Local Road	3.04	20	WD-110	Widening Road		38.672
Local Road	3.04	20	WD-111	Widening Road		127.369
Local Road	2.61	20	WD-112	Widening Road		15.623
Local Road	3.03	20	WD-113	Widening Road		106.254
Local Road	3.37	20	WD-114	Widening Road		50.601
Local Road	2.03	20	WD-115	Widening Road		34.764
Local Road	2.16	20	WD-116	Widening Road		39.625
Local Road	3.05	20	WD-117	Widening Road		136.199
Primary Road	3.05	80	WD-118	Widening Road	Chokropara Road	2314.594
Local Road	1.37	20	WD-119	Widening Road		253.554
Local Road	2.01	20	WD-120	Widening Road		173.675
Secondary Road	2.04	30	WD-121	Widening Road		71.314
Local Road	2.00	20	WD-122	Widening Road		22.099
Local Road	3.37	20	WD-123	Widening Road		31.597
Local Road	2.04	20	WD-123	Widening Road		71.571
Local Road	2.01	20	WD-124	Widening Road	Chakrapara Masjid Road	255.956
Local Road	2.52	20	WD-125	Widening Road		120.164
Local Road	2.12	20	WD-126	Widening Road		37.869
Local Road	3.13	20	WD-129	Widening Road		77.114
Local Road	2.06	20	WD-130	Widening Road		98.687
Local Road	3.61	20	WD-131	Widening Road		235.150
Local Road	2.55	20	WD-132	Widening Road		60.626
Local Road	2.03	20	WD-133	Widening Road		85.032
Local Road	2.94	20	WD-134	Widening Road		61.314
Local Road	2.34	20	WD-135	Widening Road		195.885
Local Road	2.52	20	WD-136	Widening Road		66.647
Local Road	1.30	20	WD-137	Widening Road		3.667
Local Road	3.37	20	WD-138	Widening Road		47.736
Local Road	2.94	20	WD-139	Widening Road		118.760
Local Road	4.05	20	WD-140	Widening Road		48.057
Local Road	4.82	20	WD-141	Widening Road		98.987
Local Road	3.61	20	WD-142	Widening Road		643.898
Local Road	3.61	20	WD-143	Widening Road		67.516
Local Road	3.03	20	WD-144	Widening Road		118.054
Local Road	2.54	20	WD-145	Widening Road		63.101
Local Road	3.37	20	WD-146	Widening Road		70.573
Local Road	2.53	20	WD-147	Widening Road		42.226
Local Road	3.37	20	WD-148	Widening Road		90.305
Local Road	4.16	20	WD-149	Widening Road		41.136
Local Road	3.06	20	WD-150	Widening Road		163.850
Local Road	2.62	20	WD-151	Widening Road		96.850
Local Road	1.50	20	WD-152	Widening Road		104.026
Local Road	2.05	20	WD-153	Widening Road		53.245
Local Road	3.02	20	WD-154	Widening Road		325.648
Local Road	2.55	20	WD-155	Widening Road		47.311
Local Road	3.02	20	WD-156	Widening Road		35.278
Local Road	3.04	20	WD-157	Widening Road		90.829
Local Road	3.02	20	WD-158	Widening Road		34.255
Local Road	3.09	20	WD-159	Widening Road		47.281
Local Road	1.57	20	WD-160	Widening Road		25.037
Local Road	2.84	20	WD-161	Widening Road		45.914
Local Road	1.50	20	WD-162	Widening Road		25.337
Local Road	1.55	20	WD-163	Widening Road		42.570
Primary Road	3.72	80	WD-164	Widening Road		714.626
Local Road	3.02	20	WD-165	Widening Road		127.496
Local Road	3.03	20	WD-166	Widening Road		450.133
Local Road	1.58	20	WD-167	Widening Road		39.802
Local Road	2.51	20	WD-168	Widening Road		70.319
Local Road	2.02	20	WD-169	Widening Road		177.991
Local Road	2.16	20	WD-170	Widening Road		425.561
Local Road	3.23	20	WD-171	Widening Road		138.621
Local Road	3.37	20	WD-172	Widening Road		113.295
Secondary Road	2.96	30	WD-173	Widening Road		762.918

Road Type	Ex. Width	Pro. Width	Pro. Id	Remarks	Road Name	Length(m)
Local Road	2.54	20	WD-174	Widening Road		58.012
Local Road	3.23	20	WD-175	Widening Road		40.183
Local Road	2.49	20	WD-176	Widening Road		26.495
Local Road	4.52	20	WD-177	Widening Road	Joypurhat-shantahar Road	152.455
Local Road	4.52	20	WD-178	Widening Road	Joypurhat-shantahar Road	117.744
Local Road	3.00	20	WD-179	Widening Road		136.095
Local Road	1.60	20	WD-180	Widening Road		38.626
Local Road	4.52	20	WD-181	Widening Road	Joypurhat-shantahar Road	52.448
Local Road	4.52	20	WD-182	Widening Road	Joypurhat-shantahar Road	52.762
Local Road	2.04	20	WD-183	Widening Road		50.446
Local Road	3.99	20	WD-184	Widening Road		43.774
Local Road	1.62	20	WD-185	Widening Road		45.556
Local Road	3.07	20	WD-186	Widening Road		23.038
Local Road	2.67	20	WD-187	Widening Road		81.141
Local Road	2.57	20	WD-188	Widening Road		182.842
Secondary Road	3.37	40	WD-190	Widening Road		773.816
Local Road	1.77	20	WD-191	Widening Road		34.644
Local Road	3.05	20	WD-192	Widening Road		10.412
Local Road	3.05	20	WD-193	Widening Road	Chokropara Road	349.428
Local Road	2.50	20	WD-194	Widening Road		21.126
Local Road	2.63	20	WD-195	Widening Road		39.754
Local Road	2.81	20	WD-196	Widening Road		30.942
Local Road	3.99	20	WD-197	Widening Road		43.505
Local Road	2.50	20	WD-198	Widening Road		26.724
Local Road	2.76	20	WD-199	Widening Road		42.502
Local Road	2.50	20	WD-200	Widening Road		20.561
Local Road	1.53	20	WD-201	Widening Road		24.649
Local Road	2.07	20	WD-202	Widening Road		20.847
Local Road	1.77	20	WD-203	Widening Road		63.491
Local Road	2.68	20	WD-204	Widening Road		20.419
Local Road	2.51	20	WD-205	Widening Road		62.731
Local Road	2.51	20	WD-207	Widening Road		206.482
Local Road	2.54	20	WD-208	Widening Road		82.220
Local Road	2.52	20	WD-209	Widening Road		79.399
Local Road	1.02	20	WD-211	Widening Road		106.447
Local Road	2.49	20	WD-212	Widening Road		144.661
Local Road	2.61	20	WD-213	Widening Road		31.928
Local Road	2.75	20	WD-214	Widening Road		32.502
Local Road	3.09	20	WD-215	Widening Road		18.315
Local Road	1.55	20	WD-217	Widening Road		135.313
Local Road	1.60	20	WD-219	Widening Road		60.248
Local Road	2.07	20	WD-221	Widening Road		115.327
Local Road	2.03	20	WD-223	Widening Road		25.997
Local Road	2.29	20	WD-225	Widening Road		34.021
Local Road	3.16	20	WD-226	Widening Road		17.413
Local Road	2.63	20	WD-227	Widening Road		14.633
Local Road	2.00	20	WD-228	Widening Road		24.987
Local Road	2.65	20	WD-229	Widening Road		70.627
Local Road	2.08	20	WD-230	Widening Road		106.795
Local Road	3.18	20	WD-231	Widening Road		21.870
Local Road	1.53	20	WD-232	Widening Road		42.585
Local Road	2.51	20	WD-233	Widening Road		138.455
Local Road	3.19	20	WD-234	Widening Road		24.560
Local Road	2.68	20	WD-235	Widening Road		61.111
Secondary Road	3.70	50	WD-236	Widening Road		358.944
Secondary Road	3.70	50	WD-237	Widening Road		2565.353
Local Road	3.09	20	WD-239	Widening Road		494.537
Local Road	2.04	20	WD-240	Widening Road		84.928
Local Road	2.07	20	WD-241	Widening Road		65.052
Local Road	2.39	30	WD-242	Widening Road		203.736
Local Road	2.65	20	WD-243	Widening Road		31.913
Local Road	2.50	30	WD-244	Widening Road		439.428
Local Road	3.99	20	WD-245	Widening Road		203.990
Local Road	3.16	20	WD-246	Widening Road		19.188
Local Road	2.10	20	WD-247	Widening Road		16.555
Local Road	5.75	20	WD-248	Widening Road	Joypurhat Road	54.080
Local Road	2.52	20	WD-249	Widening Road		28.766
Local Road	2.50	20	WD-250	Widening Road		317.025
Local Road	3.09	20	WD-251	Widening Road		60.116

Road Type	Ex. Width	Pro. Width	Pro. Id	Remarks	Road Name	Length(m)
Local Road	1.61	20	WD-252	Widening Road		27.184
Local Road	2.51	20	WD-253	Widening Road		107.884
Local Road	1.52	20	WD-254	Widening Road		93.138
Local Road	2.01	20	WD-255	Widening Road		88.129
Local Road	1.99	20	WD-256	Widening Road		54.719
Local Road	2.12	20	WD-257	Widening Road		16.920
Local Road	2.99	20	WD-258	Widening Road		87.770
Local Road	2.46	20	WD-259	Widening Road		114.031
Local Road	5.75	20	WD-260	Widening Road	Joypurhat Road	71.732
Local Road	3.01	20	WD-261	Widening Road		62.036
Local Road	1.54	20	WD-262	Widening Road		44.377
Local Road	2.10	20	WD-263	Widening Road		75.629
Local Road	3.00	20	WD-265	Widening Road		98.733
Local Road	2.00	20	WD-266	Widening Road		55.384
Local Road	2.33	20	WD-267	Widening Road		76.087
Local Road	1.68	20	WD-268	Widening Road		18.351
Local Road	2.50	20	WD-269	Widening Road		42.974
Local Road	2.40	20	WD-270	Widening Road		138.648
Local Road	2.08	20	WD-271	Widening Road		29.831
Local Road	5.75	20	WD-272	Widening Road	Joypurhat Road	33.362
Local Road	2.07	20	WD-273	Widening Road		39.766
Local Road	3.00	20	WD-274	Widening Road		46.728
Local Road	2.50	20	WD-275	Widening Road		74.848
Local Road	5.75	20	WD-276	Widening Road	Joypurhat Road	109.920
Secondary Road	2.27	30	WD-277	Widening Road		560.320
Local Road	5.75	20	WD-278	Widening Road	Joypurhat Road	124.805
Local Road	2.40	20	WD-279	Widening Road		81.215
Local Road	5.75	20	WD-280	Widening Road	Joypurhat Road	45.372
Local Road	5.75	20	WD-281	Widening Road	Joypurhat Road	80.167
Local Road	1.76	20	WD-282	Widening Road		352.863
Local Road	1.54	20	WD-283	Widening Road		90.171
Local Road	1.54	20	WD-284	Widening Road		114.651
Local Road	1.72	20	WD-285	Widening Road		77.011
Local Road	2.04	20	WD-286	Widening Road		49.664
Local Road	2.13	20	WD-287	Widening Road		36.756
Local Road	5.75	20	WD-289	Widening Road	Joypurhat Road	35.382
Local Road	2.50	20	WD-290	Widening Road		129.179
Local Road	2.50	20	WD-291	Widening Road		385.363
Local Road	2.17	20	WD-292	Widening Road		20.460
Local Road	5.75	20	WD-293	Widening Road	Joypurhat Road	193.402
Local Road	5.75	20	WD-294	Widening Road	Joypurhat Road	33.533
Local Road	2.06	20	WD-295	Widening Road		32.665
Local Road	2.08	20	WD-296	Widening Road		15.488
Local Road	1.85	20	WD-297	Widening Road		40.874
Local Road	2.04	20	WD-300	Widening Road		47.688
Local Road	2.11	20	WD-301	Widening Road		25.932
Local Road	2.56	20	WD-302	Widening Road		22.560
Local Road	5.75	20	WD-303	Widening Road	Joypurhat Road	59.606
Local Road	2.35	20	WD-304	Widening Road		69.555
Local Road	3.09	20	WD-305	Widening Road		409.841
Local Road	2.65	20	WD-306	Widening Road		65.935
Local Road	2.54	20	WD-307	Widening Road		62.639
Local Road	3.89	20	WD-308	Widening Road		19.347
Local Road	2.55	20	WD-309	Widening Road		60.960
Local Road	5.75	20	WD-310	Widening Road	Joypurhat Road	245.710
Local Road	1.50	30	WD-311	Widening Road		167.408
Local Road	2.70	20	WD-312	Widening Road		245.459
Local Road	2.00	20	WD-313	Widening Road		14.342
Local Road	1.50	20	WD-314	Widening Road		111.055
Local Road	1.79	30	WD-315	Widening Road		121.595
Secondary Road	2.99	20	WD-316	Widening Road		233.230
Local Road	2.02	20	WD-317	Widening Road		44.379
Local Road	5.75	20	WD-318	Widening Road	Joypurhat Road	77.028
Local Road	5.75	20	WD-319	Widening Road	Joypurhat Road	35.968
Local Road	3.09	20	WD-320	Widening Road		78.901
Local Road	3.09	20	WD-321	Widening Road		89.749
Local Road	3.09	20	WD-322	Widening Road		34.222
Local Road	3.00	20	WD-323	Widening Road		33.094
Local Road	3.00	20	WD-324	Widening Road		24.327

Road Type	Ex. Width	Pro. Width	Pro. Id	Remarks	Road Name	Length(m)
Local Road	3.09	20	WD-325	Widening Road		14.769
Local Road	2.01	20	WD-326	Widening Road		73.588
Local Road	2.46	20	WD-327	Widening Road		263.197
Local Road	2.03	20	WD-328	Widening Road		255.799
Local Road	3.09	20	WD-329	Widening Road		222.814
Local Road	2.27	20	WD-330	Widening Road		258.803
Local Road	3.00	20	WD-331	Widening Road		33.031
Local Road	3.02	20	WD-332	Widening Road		89.964
Local Road	3.00	20	WD-333	Widening Road		34.817
Local Road	3.31	30	WD-334	Widening Road		1342.121
Local Road	3.09	20	WD-335	Widening Road		35.782
Local Road	3.01	20	WD-336	Widening Road		74.734
Local Road	3.01	20	WD-337	Widening Road		119.299
Local Road	3.01	20	WD-338	Widening Road		164.906
Secondary Road	3.01	30	WD-339	Widening Road		67.478
Local Road	2.08	20	WD-340	Widening Road		38.270
Local Road	2.03	20	WD-341	Widening Road		64.705
Local Road	2.50	20	WD-342	Widening Road		224.379
Local Road	2.52	20	WD-343	Widening Road		185.038
Local Road	3.03	20	WD-344	Widening Road		88.940
Local Road	2.02	20	WD-345	Widening Road		45.284
Local Road	1.03	20	WD-346	Widening Road		28.091
Secondary Road	2.17	30	WD-348	Widening Road		1027.482
Secondary Road	2.17	30	WD-349	Widening Road		878.059
Local Road	2.02	20	WD-350	Widening Road		65.168
Local Road	2.57	20	WD-353	Widening Road		33.025
Local Road	2.02	20	WD-354	Widening Road		53.334
Secondary Road	3.09	30	WD-355	Widening Road		1481.079
Local Road	2.76	30	WD-356	Widening Road		367.501
Local Road	1.70	20	WD-357	Widening Road		157.730
Secondary Road	3.89	30	WD-358	Widening Road		1063.152
Local Road	3.13	20	WD-359	Widening Road		43.017
Local Road	2.26	20	WD-360	Widening Road		20.282
Secondary Road	2.17	30	WD-361	Widening Road		769.923
Local Road	3.06	20	WD-362	Widening Road		39.230
Local Road	2.86	30	WD-363	Widening Road		460.705
Local Road	2.86	30	WD-364	Widening Road		130.245
Local Road	3.02	20	WD-365	Widening Road		18.123
Local Road	3.08	20	WD-366	Widening Road		26.404
Local Road	3.10	20	WD-367	Widening Road		20.059
Local Road	2.35	20	WD-368	Widening Road		460.873
Local Road	3.08	20	WD-369	Widening Road		17.604
Local Road	1.65	20	WD-370	Widening Road	Thangapur Masjid Road	209.661
Secondary Road	3.70	30	WD-371	Widening Road	Mokimpor Road	1141.303
Local Road	3.00	20	WD-372	Widening Road		359.169
Local Road	2.07	20	WD-373	Widening Road		39.936
Secondary Road	2.79	40	WD-374	Widening Road		556.937
Local Road	2.06	20	WD-375	Widening Road		12.851
Local Road	2.01	20	WD--377	Widening Road		123.908
Local Road	2.56	20	WD-378	Widening Road		148.683
Local Road	1.70	20	WD-379	Widening Road		59.655
Local Road	1.52	20	WD-380	Widening Road		306.143
Local Road	3.14	20	WD-381	Widening Road		21.806
Local Road	4.52	20	WD-382	Widening Road	Joypurhat-shantahar Road	500.383
Local Road	3.37	20	WD-383	Widening Road		174.737
Local Road	2.49	20	WD-384	Widening Road		94.739
Local Road	2.83	40	WD-385	Widening Road		29.959
Local Road	2.07	20	WD-386	Widening Road		254.676

Source: Road Network Plan of AkkelpurPaurashava

Table B4: Details of New Roads in Road Network Plan of Akkelpur Paurashava (Phase 01: Sixth to Tenth Year of Master Plan)

Type of Road	Proposed RoW (ft.)	Proposed Road Id	Length (m)
Local Road	30	NR-53	357.119
Local Road	30	NR-59	1099.060

Source: Road Network Plan of AkkelpurPaurashava

Annexure-C: Proposed Drain Inventory

Table C1: Details of Drainage Network Proposals of Akkelpur

Type of Drain	Proposed Id	Proposal Status	Proposed Width (m)	Proposed Depth (m)	Length (m)	Outfall
Primary Drain	PD-1	New Drain	3.00	2.00	2412.083	River
Primary Drain	PD-2	New Drain	3.00	2.00	2403.058	River
Secondary Drain	SD-1	New Drain	2.00	1.20	1538.734	River
Secondary Drain	SD-3	New Drain	2.00	1.20	673.058	River
Secondary Drain	SD-4	New Drain	2.00	1.20	743.162	SD-14
Secondary Drain	SD-2	New Drain	2.00	1.20	717.439	Khal
Secondary Drain	SD-5	New Drain	2.00	1.20	422.179	SD-1
Secondary Drain	SD-6	New Drain	2.00	1.20	643.319	SD-2
Secondary Drain	SD-7	New Drain	2.00	1.20	557.596	River
Secondary Drain	SD-8	New Drain	2.00	1.20	1204.628	River
Secondary Drain	SD-9	New Drain	2.00	1.20	740.953	SD-2
Secondary Drain	SD-12	New Drain	2.00	1.20	455.655	SD-1
Secondary Drain	SD-13	New Drain	2.00	1.20	976.229	SD-8
Secondary Drain	SD-15	New Drain	2.00	1.20	331.076	SD-1
Secondary Drain	SD-16	New Drain	2.00	1.20	924.709	SD-11
Secondary Drain	SD-18	New Drain	2.00	1.20	867.752	Khal
Secondary Drain	SD-19	New Drain	2.00	1.20	797.767	River
Tertiary Drain	TD-34	Existing Drain	1.00	0.80	24.107	River
Tertiary Drain	TD-35	Existing Drain	1.00	0.80	141.301	River
Tertiary Drain	TD-36	Existing Drain	1.00	0.80	70.053	River
Tertiary Drain	TD-37	Existing Drain	1.00	0.80	131.119	River
Tertiary Drain	TD-38	Existing Drain	1.00	0.80	29.005	River
Tertiary Drain	TD-39	Existing Drain	1.00	0.80	396.400	River
Tertiary Drain	TD-40	Existing Drain	1.00	0.80	55.267	River
Tertiary Drain	TD-41	Existing Drain	1.00	0.80	126.051	River
Tertiary Drain	TD-42	Existing Drain	1.00	0.80	89.477	River
Tertiary Drain	TD-43	Existing Drain	1.00	0.80	102.927	River
Tertiary Drain	TD-44	Existing Drain	1.00	0.80	240.167	River
Tertiary Drain	TD-45	Existing Drain	1.00	0.80	56.175	River
Tertiary Drain	TD-46	Existing Drain	1.00	0.80	97.730	River
Tertiary Drain	TD-47	Existing Drain	1.00	0.80	81.008	River
Tertiary Drain	TD-48	Existing Drain	1.00	0.80	242.817	River
Tertiary Drain	TD-49	Existing Drain	1.00	0.80	39.552	River
Tertiary Drain	TD-50	Existing Drain	1.00	0.80	53.308	River
Tertiary Drain	TD-51	Existing Drain	1.00	0.80	92.463	River
Tertiary Drain	TD-52	Existing Drain	1.00	0.80	82.710	River
Tertiary Drain	TD-53	Existing Drain	1.00	0.80	82.348	River
Tertiary Drain	TD-54	Existing Drain	1.00	0.80	94.711	River
Tertiary Drain	TD-55	Existing Drain	1.00	0.80	101.526	River
Tertiary Drain	TD-56	Existing Drain	1.00	0.80	169.661	River
Tertiary Drain	TD-57	Existing Drain	1.00	0.80	182.073	River
Tertiary Drain	TD-58	Existing Drain	1.00	0.80	63.851	River
Tertiary Drain	TD-59	Existing Drain	1.00	0.80	66.985	River
Tertiary Drain	TD-60	Existing Drain	1.00	0.80	50.629	River
Tertiary Drain	TD-61	Existing Drain	1.00	0.80	52.710	River
Tertiary Drain	TD-62	Existing Drain	1.00	0.80	51.335	River
Tertiary Drain	TD-63	Existing Drain	1.00	0.80	142.418	River
Tertiary Drain	TD-64	Existing Drain	1.00	0.80	66.024	River
Tertiary Drain	TD-65	Existing Drain	1.00	0.80	59.800	River
Tertiary Drain	TD-66	Existing Drain	1.00	0.80	126.423	River
Tertiary Drain	TD-67	Existing Drain	1.00	0.80	159.833	River
Tertiary Drain	TD-68	Existing Drain	1.00	0.80	119.851	River
Tertiary Drain	TD-69	Existing Drain	1.00	0.80	44.309	River
Tertiary Drain	TD-70	Existing Drain	1.00	0.80	37.719	River
Tertiary Drain	TD-71	Existing Drain	1.00	0.80	123.970	River
Tertiary Drain	TD-72	Existing Drain	1.00	0.80	34.860	River
Tertiary Drain	TD-73	Existing Drain	1.00	0.80	36.438	River
Tertiary Drain	TD-74	Existing Drain	1.00	0.80	56.237	River
Tertiary Drain	TD-75	Existing Drain	1.00	0.80	98.304	River
Tertiary Drain	TD-76	Existing Drain	1.00	0.80	78.334	River
Tertiary Drain	TD-77	Existing Drain	1.00	0.80	29.197	River
Tertiary Drain	TD-78	Existing Drain	1.00	0.80	28.505	River
Tertiary Drain	TD-79	Existing Drain	1.00	0.80	51.469	River
Tertiary Drain	TD-80	Existing Drain	1.00	0.80	98.858	River
Tertiary Drain	TD-81	Existing Drain	1.00	0.80	24.732	River
Tertiary Drain	TD-82	Existing Drain	1.00	0.80	21.342	River
Tertiary Drain	TD-83	Existing Drain	1.00	0.80	56.357	River
Tertiary Drain	TD-84	Existing Drain	1.00	0.80	32.125	River

Type of Drain	Proposed Id	Proposal Status	Proposed Width (m)	Proposed Depth (m)	Length (m)	Outfall
Tertiary Drain	TD-85	Existing Drain	1.00	0.80	73.848	River
Tertiary Drain	TD-86	Existing Drain	1.00	0.80	16.171	River
Tertiary Drain	TD-87	Existing Drain	1.00	0.80	30.784	River
Tertiary Drain	TD-88	Existing Drain	1.00	0.80	50.840	River
Tertiary Drain	TD-89	Existing Drain	1.00	0.80	57.323	River
Tertiary Drain	TD-90	Existing Drain	1.00	0.80	57.808	River
Tertiary Drain	TD-91	Existing Drain	1.00	0.80	41.245	River
Tertiary Drain	TD-92	Existing Drain	1.00	0.80	67.603	River
Tertiary Drain	TD-93	Existing Drain	1.00	0.80	64.535	River
Tertiary Drain	TD-94	Existing Drain	1.00	0.80	106.098	River
Tertiary Drain	TD-95	Existing Drain	1.00	0.80	45.665	River
Tertiary Drain	TD-96	Existing Drain	1.00	0.80	23.073	River
Tertiary Drain	TD-97	Existing Drain	1.00	0.80	122.127	River
Tertiary Drain	TD-98	Existing Drain	1.00	0.80	17.885	River
Tertiary Drain	TD-99	Existing Drain	1.00	0.80	112.668	River
Tertiary Drain	TD-100	Existing Drain	1.00	0.80	30.034	River
Tertiary Drain	TD-101	Existing Drain	1.00	0.80	373.277	River
Tertiary Drain	TD-102	Existing Drain	1.00	0.80	200.000	River
Tertiary Drain	TD-103	Existing Drain	1.00	0.80	39.513	River
Tertiary Drain	TD-104	Existing Drain	1.00	0.80	75.535	River
Tertiary Drain	TD-105	Existing Drain	1.00	0.80	27.750	River
Tertiary Drain	TD-106	Existing Drain	1.00	0.80	58.115	River
Tertiary Drain	TD-107	Existing Drain	1.00	0.80	134.432	River
Tertiary Drain	TD-108	Existing Drain	1.00	0.80	227.851	River
Tertiary Drain	TD-109	Existing Drain	1.00	0.80	41.419	River
Tertiary Drain	TD-110	Existing Drain	1.00	0.80	48.687	River
Tertiary Drain	TD-111	Existing Drain	1.00	0.80	125.222	River
Tertiary Drain	TD-112	Existing Drain	1.00	0.80	63.403	River
Tertiary Drain	TD-113	Existing Drain	1.00	0.80	65.948	River
Tertiary Drain	TD-114	Existing Drain	1.00	0.80	41.799	River
Tertiary Drain	TD-115	Existing Drain	1.00	0.80	189.753	River
Tertiary Drain	TD-116	Existing Drain	1.00	0.80	14.338	River
Tertiary Drain	TD-117	Existing Drain	1.00	0.80	33.497	River
Tertiary Drain	TD-118	Existing Drain	1.00	0.80	139.056	River
Tertiary Drain	TD-119	Existing Drain	1.00	0.80	81.037	River
Tertiary Drain	TD-120	Existing Drain	1.00	0.80	49.285	River
Tertiary Drain	TD-121	Existing Drain	1.00	0.80	24.199	River
Tertiary Drain	TD-122	Existing Drain	1.00	0.80	53.437	River
Tertiary Drain	TD-123	Existing Drain	1.00	0.80	56.224	River
Tertiary Drain	TD-124	Existing Drain	1.00	0.80	35.303	River
Tertiary Drain	TD-125	Existing Drain	1.00	0.80	18.060	River
Tertiary Drain	TD-126	Existing Drain	1.00	0.80	104.227	River
Tertiary Drain	TD-127	Existing Drain	1.00	0.80	44.672	River
Tertiary Drain	TD-128	Existing Drain	1.00	0.80	71.944	River
Tertiary Drain	TD-129	Existing Drain	1.00	0.80	64.568	River
Tertiary Drain	TD-130	Existing Drain	1.00	0.80	42.882	River
Tertiary Drain	TD-131	Existing Drain	1.00	0.80	65.239	River
Tertiary Drain	TD-132	Existing Drain	1.00	0.80	59.427	River
Tertiary Drain	TD-133	Existing Drain	1.00	0.80	100.260	River
Tertiary Drain	TD-134	Existing Drain	1.00	0.80	67.177	River
Tertiary Drain	TD-135	Existing Drain	1.00	0.80	50.947	River
Tertiary Drain	TD-136	Existing Drain	1.00	0.80	38.150	River
Tertiary Drain	TD-137	Existing Drain	1.00	0.80	63.041	River
Tertiary Drain	TD-138	Existing Drain	1.00	0.80	33.407	River
Tertiary Drain	TD-139	Existing Drain	1.00	0.80	49.063	River
Tertiary Drain	TD-140	Existing Drain	1.00	0.80	108.191	River
Tertiary Drain	TD-141	Existing Drain	1.00	0.80	23.118	River
Tertiary Drain	TD-142	Existing Drain	1.00	0.80	78.896	River
Tertiary Drain	TD-143	Existing Drain	1.00	0.80	37.136	River
Tertiary Drain	TD-144	Existing Drain	1.00	0.80	178.328	River
Tertiary Drain	TD-145	Existing Drain	1.00	0.80	56.143	River
Tertiary Drain	TD-146	Existing Drain	1.00	0.80	29.498	River
Tertiary Drain	TD-147	Existing Drain	1.00	0.80	18.809	River
Tertiary Drain	TD-148	Existing Drain	1.00	0.80	31.751	River
Tertiary Drain	TD-149	Existing Drain	1.00	0.80	33.417	River
Tertiary Drain	TD-150	Existing Drain	1.00	0.80	340.524	River
Tertiary Drain	TD-151	Existing Drain	1.00	0.80	54.513	River
Tertiary Drain	TD-152	Existing Drain	1.00	0.80	22.583	River
Tertiary Drain	TD-153	Existing Drain	1.00	0.80	16.987	River

Type of Drain	Proposed Id	Proposal Status	Proposed Width (m)	Proposed Depth (m)	Length (m)	Outfall
Tertiary Drain	TD-154	Existing Drain	1.00	0.80	82.231	River
Tertiary Drain	TD-155	Existing Drain	1.00	0.80	22.877	River
Tertiary Drain	TD-156	Existing Drain	1.00	0.80	28.776	River
Tertiary Drain	TD-157	Existing Drain	1.00	0.80	29.674	River
Tertiary Drain	TD-158	Existing Drain	1.00	0.80	83.395	River
Tertiary Drain	TD-159	Existing Drain	1.00	0.80	30.663	River
Tertiary Drain	TD-160	Existing Drain	1.00	0.80	66.809	River
Tertiary Drain	TD-161	Existing Drain	1.00	0.80	74.317	River
Tertiary Drain	TD-162	Existing Drain	1.00	0.80	20.434	River
Tertiary Drain	TD-163	Existing Drain	1.00	0.80	18.126	River
Tertiary Drain	TD-164	Existing Drain	1.00	0.80	15.079	River
Tertiary Drain	TD-1	New Drain	1.00	0.80	269.365	SD-19
Tertiary Drain	TD-4	New Drain	1.00	0.80	106.753	River
Tertiary Drain	TD-5	New Drain	1.00	0.80	159.910	River
Tertiary Drain	TD-6	New Drain	1.00	0.80	43.982	River
Tertiary Drain	TD-7	New Drain	1.00	0.80	52.279	River
Tertiary Drain	TD-8	New Drain	1.00	0.80	52.268	River
Tertiary Drain	TD-9	New Drain	1.00	0.80	54.226	River
Tertiary Drain	TD-10	New Drain	1.00	0.80	21.824	River
Tertiary Drain	TD-11	New Drain	1.00	0.80	125.528	River
Tertiary Drain	TD-12	New Drain	1.00	0.80	62.944	River
Tertiary Drain	TD-14	New Drain	1.00	0.80	136.433	River
Tertiary Drain	TD-15	New Drain	1.00	0.80	318.571	SD-2
Tertiary Drain	TD-16	New Drain	1.00	0.80	220.742	SD-2
Tertiary Drain	TD-17	New Drain	1.00	0.80	132.030	SD-3
Tertiary Drain	TD-18	New Drain	1.00	0.80	141.683	SD-3
Tertiary Drain	TD-19	New Drain	1.00	0.80	382.191	River
Tertiary Drain	TD-20	New Drain	1.00	0.80	208.044	SD-4
Tertiary Drain	TD-21	New Drain	1.00	0.80	53.062	River
Tertiary Drain	TD-22	New Drain	1.00	0.80	254.634	River
Tertiary Drain	TD-24	New Drain	1.00	0.80	78.696	River
Tertiary Drain	TD-25	New Drain	1.00	0.80	28.712	River
Tertiary Drain	TD-26	New Drain	1.00	0.80	277.791	SD-8
Tertiary Drain	TD-27	New Drain	1.00	0.80	352.167	SD-18
Tertiary Drain	TD-28	New Drain	1.00	0.80	345.900	SD-19
Tertiary Drain	TD-29	New Drain	1.00	0.80	318.956	River
Tertiary Drain	TD-30	New Drain	1.00	0.80	442.494	River
Tertiary Drain	TD-31	New Drain	1.00	0.80	134.560	River
Tertiary Drain	TD-32	New Drain	1.00	0.80	129.650	River
Tertiary Drain	TD-33	New Drain	1.00	0.80	0.000	River
Tertiary Drain	TD-3	New Drain	1.00	0.80	51.345	River
Tertiary Drain	TD-178	Existing Drain	1.00	0.80	74.163	River
Tertiary Drain	TD-179	Existing Drain	1.00	0.80	23.838	River
Tertiary Drain	TD-181	New Drain	1.00	0.80	198.982	River
Tertiary Drain	TD-182	New Drain	1.00	0.80	717.428	River
Tertiary Drain	TD-183	New Drain	1.00	0.80	855.255	River
Tertiary Drain	TD-184	New Drain	1.00	0.80	669.796	River
Tertiary Drain	TD-185	New Drain	1.00	0.80	752.361	River
Tertiary Drain	TD-186	New Drain	1.00	0.80	498.491	River

Source: Drainage Network Plan ofAkkelpur Paurashava

Annexure-D: Mouza Schedule of Waterbody and Development Proposals

Table D1: Waterbody Mouza Schedule

Landuse Type	Mouza	Plot No.	Area
Waterbody	**Akkelpur (016_00)**	1,2,11,24,25,41,42,43,46,47,62,63,65,75,86,87,88,89,90,91,96,103,105,106,108,109,110,111,120,122,124,128,141,142,144,146,148,153,156,157,158,159,161,163,164,171,172,174,186,191,192,193,194,195,196,197,198,199,207,208,251,252,253,254,266,267,268,269,272,273,278,298,312,314,315,316,317,318,319,320,321,326,344,345,347,348,349,350,352,353,354,356,359,366,367,368,373,374,390,392,398,399,400,405,406,412,419,420,421,422,423,429,434,436,437,439,440,441,442,448,459,501,511,518,524,525,531,535,536,537,541,542,543,545,546,547,548,550,551,562,565,566,567,576,578,582,599,600,604,650,651,652,653,654,655,657,659,661,662,663,664,683,686,687,691,692,693,695,696,702,706,707,709,710,711,715,716,718,719,720,746,747,750,761,791,808,809,810,811,814,851,874,875,876,877,879,909,910,911,9999.	23.06
	Amtraw (015_01)	575,576,588,589,590,594,600,602,603,604,606,607,608,611,612,657,658,661,664,665,666,670,671,672,673,674,675,676,680,681,682,684,685,686,689,690,691,695,696,745,746,755,756,757,758,759,765,766,767,768,769,770,771,773,774,778,780,781,782,809,812,813,814,817,818,822,823,824,825,826,849,850,851,852,853,854,855,859,860,861,862,864,866,867,869,906,908,909,910,913,920,921,979,985,986,987,989,990,991,992,993,996,1002,1003,1004,1005,1006,1011,1012,1023,1026,1027,1028,1030,1031,1046,1047,1048,1049,1051,1061,1062,1063.	11.77
	Amtraw (015_02)	1203,1339,1357,1387,1421,1422,1425,1426,1427,1444,1445,1446,1447,1448,1450,1453,1459,1494,1500,1501,1502,1503,1519,1552,1556,1566,1567,1569,1570,1571,1572,1575,1579,1587,1589,1590,1592,1593,1594,1595,1596,1597,1603,1604,1608,1611,1614,1615,1618,1622,1625,1626,1627,1630,1631,1632,1633,1635,1636,1637,1638,1639,1640,1641,1654,1658,1659,1660,1661,1662,1663,1664,1665,1666,1673,1683,1686,1690,1691,1692,1693,1697,1698,1699,1700,1701,1714.	4.52
	Biharpur (030_00)	17,18,19,20,21,28,33,34,35,42,44,56,57,58,59,90,100,114,117,118,119,128,130,131,132,133,135,136,137,139,144,152,153,154,155,157,159,166,169,185,200,205,226,231,232,239,240,242,243,272,287,288,294,295,310,319,329,330,331,334,335,347,352,353,354,355,356,357,371,372,373,387,427,428,429,430,431,432,433,434,435,437,438,440,443,444,449,455,456,468,471,503,504,507,545,549,552,554,570,572,577,578,579,580,581,582,583,584,585,586,588,589,590,592,595,601,602,606,607,608,610,616.	19.09
	Chokropara (028_01)	6,18,19,20,21,25,26,28,29,30,47,54,55,57,59,60,61,62,63,67,89,90,91,92,97,98,101,102,103,111,135,136,137,141,143,144,145,146,152,153,155,156,157,161,164,165,211,228,229,277,314,315,318,321,322,323,324,325,327,328,337,338,339,340,342,343,363,364,418,419,423,424,425,426,427,430,432,438,439,440,441,442,445,473,477,479.	8.88
	Chokropara (028_02)	541,542,547,548,551,552,553,557,558,559,560,561,562,567,568,576,577,578,579,586,587,588,624,625,626,628,644,704,707,709,710,731,732,806,813,814,820,821,822,823,824,828,829,830,852,853,856,857,858,859,860,861,866,867,876,877,878,879,880,927,928,929,933,934,935,937,938,989,990,991,993,995,998,1000,1006,1010,1011,1013,1038,1039,1040,1043,1045,1046,1047,1048,1049,1050,1053,1136,1138,1141,1144.	9.38
	Gurki (024_00)	1,6,7,12,13,15,16,17,18,20,21,27,28,29,30,31,32,33,35,58,59,60,64,67,68,69,70,71,72,73,78,79,80,83,124,125,128,129,130,131,132,133,138,142,144,145,146,147,205,231,251,266,304,379,380,597,600,608,610,9999.	4.73
	Hastab Santapor (017_01)	8,9,33,34,35,36,37,38,39,44,45,46,47,48,49,51,52,56,78,79,80,81,85,269,273,274,280,282,283,734.	
	Hastab Santapor (017_02)	811,812,821,826,828,831,853,865,866,867,881,882,883,885,886,892,893,906,907,909,912,913,919,924,925,926,929,930,931,932,940,943,957,958,959,963,965,975,984,986,1003,1004,1005,1010,1011,1012,1014,1020,1022,1023,1025,1029,1032,1033,1034,1035,1037,1049,1050,1051,1053,1077,1081,1082,1086,1090,1091,1092,1094,1095,1113,1141,1142,1144,1164,1165,1166,1167,1187,1210,1211,1212,1279,1280,1297,1298,1300,1301,1302,1562,1568.	1.68
	Kesobpur (026_00)	1,32,33,34,35,36,37,46,64,65,66,68,69,70,71,74,77,78,79,80,87,88,108,109,111,112,113,115,118,144,150,152,153,154,155,156,157,158,159,160,163,164,193,210,211,213,296,298,376,377,438,445,446,447,448,449,450,459,460,461,464,465,466,467,469,472,473,475,477,478,479,480,481,483,484,485,486,487,488,549,552,553,563,564,661,766,780,783,784,785,786,791,792,793,794,803,811,812,814,846,854,855,860,861,862,864,865,866,867,868,869,870,871,876,877,890,941,949,950,998,1001,1002,1005,1006,1007,1009,1012,1013,1014,1015,1016,1017,1018,1019,1022,1023,1024,1026,1027,1030,1031,1034,1035,1042,1043,1058,1078,1088,1089,1090,1091,1092,1093,1094,1095,1097,1098,1099,1129,1130,1131,1136,1138,1139,1140,1162,1184,1185,1214,1215,1216,1217,1227,1228,1229,1230,1235,1237,1238,1239,1240,1241,1242,1253,1254,1255,1256,1257,1259,1260,1261,1262,1264,1284,1286,1287,1294,1295,1296,1297,1300,1308,1313,1314,1316.	12.41

	Manikpara (029_00)	1,4,8,11,12,13,14,17,31,33,36,37,38,40,41,42,43,44,45,46,54,55,62,78,81,131,132,157,185,186,187,188,189,190,193,194,198,247,248,249,268,269,270,271,272,315,322,323,324,325,328,329,330,331,332,336,351,352,354,382,383,384,385,387,389,390,391,392,396,398,399,400,405,406,407,408,409,410,415,416,465,469,470,473,475,476,477,482,485,487,488,489,497,498,499,526,601.	10.74
	Mokimpur (034_00)	1,2,5,9,14,15,20,21,22,23,24,25,26,27,29,30,32,33,36,37,39,41,54,60,61,63,64,66,97,98,113,119,297,304,305,306,307,309,324,325,328,332,333,335,336,400,402,412,414,416,419,422,423,424,425,432,434,437,439,474,476,477,481,485,486,487,493,510,521,522,523,524,525,538,541,542,543,548,571,572,573,574,575,578,579,581,582,587,591,592,594,595,596,597,598,599,602,604,605,615,619,624,626,630,634,635,636,640,654,655,657,659,660,661,662,677,678,679,683,698,707,708,709,711,713,717,727,731,732.	17.29
	Raj Kanda (031_00)	160,161,175,176,185,187,188,189,196,198,199,200,205,206,207,208,209,217,220,225,227,228,229,232,234,235,236,239,240,241,245,246,247,250,252,255,256,257,258,318,319,333,340,341,342,359,9999.	4.13
	Santa (027_02)	702,739,740,741,742,743,744,745,746,748,749,750,751,767,768,769,770,773,774,775,776,798,799,800,816,829,831,832,834,1332,1333,1334,1336,1340,1341,1349,1378,1383,1384,1385,1390,1393,1700,1713.	9.22
	Santa (027_01)	28,31,32,34,37,38,41,45,46,47,50,51,65,66,67,68,79,80,82,83,84,89,92,93,94,98,100,111,112,113,114,115,116,120,121,125,130,131,135,136,137,138,143,144,146,147,148,150,152,155,157,158,160,161,162,163,164,171,172,174,175,176,177,178,179,180,187,188,189,190,197,198,203,204,205,247,248,250,251,254,256,257,258,259,260,261,270,271,391,421,425,426,427,428,429,431,438,444,452,458,460,462,463,464,465,466,467,468,471,472,478,479,485,486,487,488,489,490,495,496,497,506,510,512,516,518,519,529,530,531,535,536,545,556,557,559,560,561,562,578,579,580,587,588,589,590,600,601,602,605,606,1356,9999.	
	Sri Krisnopur (018_00)	170,171,172,183,184,185,213,214,216,217,218,219,220,221,222,223,224,227,229,232,251,252,253,254,255,257,258,265,268,274,277,278,288,289,304,305,308,309,310,318,419,421,422,426,428,429,430,528,529,530,531,537,538,541,543,545,554,555,558,596,607.	10.27
	Thangapur (032_00)	22,24,30,35,67,68,73,75,76,77,87,88,89,90,91,97,102,103,105,106,107,108,109,110,111,112,113,114,115,116,117,118,120,126,127,136,139,144,147,174,175,309,310,319,320,323,324,328,330,331,333,337,338,339,340,360,361,362,363,364,459,460,465,468,475,476,564,565,582,583,584,585,587,591,592,596,598,599,600,601,602,603,605,606,609,611,616,626,680,681,692,703,712,713,715,716,719.	22.36

Table D2: Development Proposals Mouza Schedule

Type of Facilities	Area in Acre	Ward No.	Mouza Name	Plot No.
Low Income Housing	10.13	1	Amtraw (15_01)	979,988,989,990,991,992,993,994,995,996,1011,1012, 1013,1014,1015,1016,1017,1018,1019,1020,1021,1022, 1023,1126,1127
		5	Hastab Santapor (17_01)	1,2,3,4,5,6,66,

Type of Facilities	Area in Acre	Ward No.	Mouza Name	Plot No.
General Industrial Area	31.74	9	Mokimpur (034_00)	105,106,107,108,109,110,146,147,148,162,211,212,213,316, 317,318,319,320,326,336,337,339,340,341,342,343,344,345, 346,348,349,350,353,355,356,357,358,359,360,361,362,363, 365,366,367,368,370,373,375,376,387,596,598,599,720,728.

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre(Proposed)
Neighbourhood Market	07	Kesobpur (026_00))	Partial 830-834,836-839,842	0.39
	02	Thangapur (032_00)	129-131	0.13
	06	Hastab Santapor (017_02)	943, 966-969	0.48
Super Market	01	Amtraw (015_02)	1480,1481,1482,1483,1495,1496,1497,1498,1499,1500,1505,1506,1507,1508,1509,1510,1511,1512,1514,1515,1516	4.73
Cattle Hat	08	Manikpara (029_00)	Partial 157,158, 160	0.72

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre (Proposed)
Ward Center	1	Amtraw (015_02)	1507,1508,1511,1512,1513,1514,1515,1516,1517,1538,1539	1.88
Ward Center	2	Raj Kanda (031_00)	191,192,193,194,195,196,197	0.73
Ward Center	3	Akkelpur (016_00)	41,45,261,262,263,264	0.45
Ward Center	4	Akkelpur (016_00)	650,651,652	0.41
Ward Center	5	Hastab Santapor (017_02)	838,839,841,842,843,844,846	0.67
Ward Center	6	Hastab Santapor (017_02)	1048,1210,1212,1213,1214,1216,1217,1218,1219,1272	1.17
Ward Center	7	Kesobpur (026_00)	1,3,4,5,6,10,11,12	1.35
Ward Center	8	Manikpara (029_00)	340,341,342,343,344,360,361,362,363,364	1.0
Ward Center	9	Chokropara (028_01,02)	23,24,61,479,543,544	0.75

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre (Proposed)
Primary School	5	Hastab Santapor (017_01)	110,111,114,115,116,117, 118,119,120,122,143	2.8
Vocational Trainning Inst.	8	Manikpara (029_00)	204,209,210,211,212,213,214,215,216 ,217,218,220,221,231,232,233,234,235, 236,237,238,239,240,241,242,243,244, 245,247,248,249,250,251,252,253,254, 255,256,257,258,259,260,261,262, 263,264,265,266,273,274,275,276, 277,278,279,280,281,282,283, 286,287,288,289,290,291,292,293,294, 296,298,299,	10.96

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre
Stadium	1	Amtraw (015_01)	594,603,604,605,606,607,612,613,614,615,616,617,618,619,620,621, 622,623,624,625,626,627,628,629,631,632,638,640,642,643,644,645, 646,647,648,649,1121	9.75
		Amtraw (015_02)	1421,1423,1459,1476,1477,1707	
Playground	7	Kesobpur (026_00)	3,4,53,54,55,56,57,62	1.24
	2	Raj Kanda (031_00)	141,142,149,153,154,155,156,157,165,166,360	2.28
	5	Hastab Santapor (017_02)	842,844,846,847,848,849,882,1568	1.75
Central Park	2	Biharpur (030_00)	578,584	4.83
	8	Manikpara (029_00)	39,155,156,461,462,463,464,467,603,604	
Neighborhood Park	7	Kesobpur (026_00)	1,6,7,8	2.76
	6	Sri Krisnopur (018_00)	214,215,216,217,218,219,220,222,223,224,231,264,265,543,544,545, 546,547,548,554,555,561,596	4.76
	2	Biharpur (030_00)	229,230,231,232,233,239,440,578	0.94
Total Proposal				**28.31**

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre
Bus Terminal	1	Amtraw (015_01)	594,653,654,655,656,657,665, 666,667,668,669,670,671,672	3.47
	3	Akkelpur (016_00)	1,2,3,4,5,6,15,16,209	
Tempo /Nasimon Stand	4	Akkelpur (016_00)	Partial- 641	0.07
	1	Amtraw (015_01,02)	598,607,609,610,1420, 1421,1427	1.03
Rickshaw/ Van Stand	8	Manikpara (029_00)	39,157,465	0.23

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre
Waste Transfer Station	4	Akkelpur (016_00)	Partial-787,788,791	0.19
	4	Akkelpur (016_00)	Partial-392,9999	0.17
Waste Dumping Area	9	Mokimpur (034_00)	240,241,242,243,261,277,278,279, 280,282,283,284,285,288,289 ,290,291,292,293,294,295,296,298	6.82

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre
Clinic	3	Akkelpur (016_00)	Partial-261-264	0.56
Mother & Child Care Hospital	6	Hastab Santapor (017_02)	1219,1225,1226,1227, 1228,1229,1230,1231,1232,1233,1234,1238,1264,1268,1270,1271,1272	4.32

Type of Facilities	Ward No.	Mouza Name	Plot No.	Area in Acre
Community Centre	9	Chokropara (028_01)	63,64,65,479	0.97
Fire Service	8	Manikpara (029_00)	Partial-159-162	1.00
Public Toilet	4	Akkelpur (016_00)	717,723,724	0.11

Annexure-E: Minutes and Attaendance list of Final Consultation meeting

Annexure-F: Paurashava Gazette

স্থানীয় সরকার পল্লী উন্নয়ন ও সমবায় মন্ত্রণালয়
স্থানীয় সরকার বিভাগ
(পৌর-৩ শাখা)
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" প্রজ্ঞাপন "

তারিখ ২৮/২/১৯৯৯ ইং
১৬/১১/১৪০৫ বাং

এস,আর,ও নং ৩৭-আইন/৯৯ যেহেতু নিম্নে বর্ণিত এলাকাসমূহ আক্কেলপুর থানাধীন নিম্ন তফসিলে উল্লিখিত শহর এলাকা সমূহকে মিউনিসিপ্যালিটি ঘোষণা করার প্রস্তাব করিয়াছিল ,

এবং যেহেতু সরকার Declaration and Alteration of Municipelities Rules, /1978 অতঃপর উক্ত Rules বলিয়া উল্লিখিত ,এর Rule 3 এর অধীন প্রস্তাবিত মিউনিসিপ্যালিটি ঘোষণার ব্যাপারে পরামর্শ বা আপত্তি আহবান করিয়া পাবলিক নোটিশ জারী করার জন্য সংশ্লিষ্ট ডেপুটি কমিশনারকে নির্দেশ প্রদান করিয়াছিল এবং তদনুযায়ী ডেপুটি কমিশনার উক্ত বিষয়ে প্রয়োজনীয় ব্যবস্থা গ্রহণ করিয়া প্রতিবেদন দাখিল করিয়াছেন ।

এবং যেহেতু প্রস্তাবিত মিউনিসিপ্যালিটি ঘোষণার ব্যাপারে ডেপুটি কমিশনারের প্রতিবেদন বিবেচনা করিয়া সরকার উক্ত Rules এর rule 4(2) এর অধীন উল্লিখিত শহর এলাকাসমূহকে মিউনিসিপ্যালিটি ঘোষণা করার জন্য চূড়ান্ত সিদ্ধান্ত গ্রহন করিয়াছে ।

অতএব, সেহেতু উক্ত Rules এর rule 5 এ প্রদত্ত ক্ষমতাবলে সরকার এতদদ্বারা নিম্ন তফসিলভুক্ত শহর এলাকাসমূহ সমন্বয়ে আগামী ১৬ ফাল্গুন, ১৪০৫ বাংলা মোতাবেক ২৮ ফেব্রুয়ারী ১৯৯৯ ইং তারিখ হইতে আক্কেলপুর মিউনিসিপ্যালিটি গঠনের ঘোষনা করিল ।

" তফসিল "
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এলাকা নং	ইউনিয়নের নাম	মৌজার নাম	জে,এল,নং	খানা নং
১	২	৩	৪	৫
(১)	কুশলিদী পুর	আক্কেলপুর	১৬	সম্পূর্ণ
	ঐ	আমটুকী	১৫	ঐ
	ঐ	বিহারপুর	৩০	ঐ
	ঐ	রাজকান্দা	৩১	ঐ
	ঐ	ঠেংগাপুর	৩২	ঐ
(২)	সোনামুখী	হাসুবিসনুপুর	১৭	ঐ
	ঐ	শ্রীকৃষ্ণপুর	১৮	ঐ
	ঐ	মেশবপুর	২৬	ঐ
	ঐ	গুড়কী	২৩	ঐ
	ঐ	শাম্রা	২৭	ঐ
	ঐ	চরপাড়া	২৮	ঐ
	ঐ	মকিমপুর	৩৪	ঐ
	ঐ	মানিকপাড়া	২৯	ঐ

রাষ্ট্রপতির আদেশক্রমে
স্বাঃ/
(আব্দুস সাত্তার মিঞা)
উপ-সচিব(পৌর)।
তাং- ১৩/৩/৯৯ ইং

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
থানা নির্বাহী অফিসারের কার্যালয়
স্মারক নং:- ৩-২২/৯৯ ৩৯৯(৫০) আক্কেলপুর, জয়পুরহাট।
অনুলিপি ও প্রয়োজনীয় ব্যবস্থার জন্য প্রেরন করা হলো :-
১। .....অফিসার,
২। .....ইউ/পি

থানা নির্বাহী অফিসার
আক্কেলপুর, জয়পুর হাট।

Appendix

Appendix-1: Structure Plan of Akkelpur Paurashava

Appendix-2: Land Use Plan of Akkelpur Paurashava

Appendix-3: Transportation and Traffic Management Plan

Appendix-4: Drainageand and Environment Management Plan