



**Government of the People's Republic of Bangladesh
Ministry of Local Government, Rural Development & Cooperatives
Local Government Division**

**NARIA PAURASHAVA
MASTER PLAN: 2011-2031**

January 2015



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Ministry of Local Government, Rural Development & Cooperatives
Local Government Division

NARIA PAURASHAVA MASTER PLAN: 2011-2031

STRUCTURE PLAN

URBAN AREA PLAN:

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

WARD ACTION PLAN

January 2015

NARIA PAURASHAVA
NARIA, SHARIATPUR

NARIA PAURASHAVA MASTER PLAN: 2011-2031

Published by:

Naria Paurashava

Supported by Upazila Towns Infrastructure Development Project (UTIDP) of

Local Government Engineering Department (LGED) under

Local Government Division

Consultant:

Joint Venture of Development Design Consultants Limited & Divine Associates Limited

DDC Centre, 47, Mohakhali C/A, Dhaka-1212

Printed By:

Joint Venture of Development Design Consultants Limited & Divine Associates Limited

DDC Centre, 47, Mohakhali C/A, Dhaka-1212

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Local Government Division (LGD),

Ministry of Local Government, Rural Development and Cooperatives

First Edition: January 2015

**Price: BDT 1500.00
USD 20.00**

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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, Naria Paurashava 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 Naria Paurashava.

Master Plan of Naria Paurashva has been prepared following the pre-requisite of the Local Government (Paurashva) Act, 2009. To prepare the Master Plan, LGED engaged consulting firm named Development Design Consultant 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. Pourashava 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 Naria Pourashava together with land use control and effective management of service facilities.

The Paurashva 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 Naria Paurashava will be necessary to implement this Master Plan successfully and make this Paurashava developed and livable. I hope Naria Paurashava will be a model Paurashava in Bangladesh through building itself green and sustainable by successful implementation of this Master Plan.

(Md. Haider Ali)
Mayor,
Naria Paurahsava

EXECUTIVE SUMMARY

The term “Master Plan” is a guideline for future development. This guideline is being resulted on specific issues. The Government of Bangladesh has committed to prepare the Paurasava master Plan for ensuring the Paurasava environment livable. At present, development scenery of the Paurasava shows a very grave situation. Primary and secondary drains and natural streams are not functioning as an integrated drainage system due partly to silting up and unplanned and deficient construction and lack of maintenance. Encroachment on drainage reservations causes inundation to many areas, including houses and roads, during heavy storms. There is hardly any roadside drain and if any, the roadside drains are inadequate due to insufficient capacities and incorrect gradients.

Equally, traffic and transportation problems in the Paurasavas in Bangladesh are continuously increasing as the development and management of road network has not been commensurate with the increasing demand for its usage. Traffic congestion, delay, accidents, pedestrian and parking difficulties, air and noise pollution are among the problems. Traffic congestion is one of the most important and critical problems now being identified in the Paurasavas. The situation has been steadily deteriorating over time, over large areas and for longer periods of the day. If this unplanned construction goes on unabated it will make the environment of the Paurasava unsuitable and inhabitable. At present, there is no proper Master Plan for development of Paurasava to overcome those problems. In the absence of proper Master Plan construction of all types of infrastructure like houses, roads, drains, markets are going on unabated in an unplanned manner. This situation is creating an adverse milieu in the original landscape thereby creating environmental hazards.

It appears that planned development of Paurasava is very important. In view of this grave situation it has, therefore, been contemplated that preparation of Master Plan is being made with projection for a period of 20 years. Further, in support of the Master Plan there are separate plans named Landuse Plan, Drainage and Environmental Plan, Traffic Management Plan, Community Services Plan and Ward Action Plan to ensure operation and maintenance of the existing infrastructure along with those facilities proposed to be built up under the future investment program and above all, to suggest improvement of the management ability of the Paurasava Authority so that their revenue earning capability will be enhanced with a view to building up the Paurasava Authority as self-sustaining local government institution. The Master Plan will also suggest construction of roads and bridges / culverts, drainage facilities, streetlights, markets, bus stands, solid waste management, sanitation, water supply and other such infrastructure facilities.

This is the primary effort of planned development for the Naria Paurasava, guided by the LGED under Package-10 of the Upazila Towns Infrastructure Development Project (UTIDP). It is

expected that the implementation of the plan will induce higher level of development, ensure planned life, good community and better future of the Paurasava inhabitants.

The Naria Paurasava is located in the Naria Upazila under Shariatpur Zila, between 2301' and 23027' north latitudes and between 90014' and 90036' east longitudes. The Paurasava is consisted with 9 Wards and 9 mouzas. The Paurasava is located at southwestern part of Bangladesh and about 120 km. (through Maowa) away from the Dhaka City. The Naria Paurasava (established through a Gazette Notification dated 13th May 2004) is under the jurisdiction of Naria Upazila in Shariatpur Zila. Total area of the Paurasava is 9.84 sq. km. according to the Gazette Notification. At the sametime, category of the Paurasava is being changed in to "B". With the active participation of the Paurasava authority, the Consultant has identified the Paurasava's existing jurisdiction area is 9.84 sq. km. (2431.21 acres). An area of 2431.21 acres has been considered both Structure Plan and Planning Area.

According to the Census Year 2011, 22773 populations are living in the planning area with gross density 9 persons per acre and it will be 29355 in 2031 with gross density 12 persons per acre.

In the Paurasava, agriculture occupies 1178.85 acres and residential and circulation network occupy 849.80 acres and 48.73 acres of land respectively. An area of 303.96 acres is covered with water bodies.

The Paurasava is a naturally developed area. Planning effort yet not been taken by the public authority. Therefore, a mixed landuse scenario is viewed all over the Paurasava. About 4 to 6 meter earth filling will be needed for every development activities in the Paurasava. So, bulk development should not be encouraged due to the huge cost involvement.

Almost all the Wards have no sewerage system and toilets are mostly consists of sock pits. Overall garbage disposal system is poor. Garbage Dumping Ground is not available and mostly disposes on open streets. Wastes collect by the NGOs but not well organized all over the planning area.

Naria Paurasava bears rural influences and agriculture is the major source of income. Average monthly income per household is Tk.10500. No substantial saving of the income is found.

The Upazila Towns Infrastructure Development Project (UTIDP) of LGED requires that one of its outputs is a comprehensive set of plans for Naria Paurasava. The proposed set of plans consists of Structure Plan, Urban Area Plan and Ward Action Plan.

The Structure Plan sets out a long-term strategy – covering the twenty years from 2011 to 2031 for urban development and the use of land in the Paurasava Town as a whole. It extends to the entire area demarcated by the Consultant. The document sets out a series of policies to be pursued, if the broad objectives set for development of the Paurasava to be achieved. In

Structure Plan around 187 acre core area, 896 acre fringe area, 127 acre new urban area and 44 acre periferial area have been proposed to ensure future policy guideline.

The Urban Area Plan elaborates policies of the Structure Plan as far as they affect the area where urban development activity will be concentrated. The plan, therefore, is limited to the existing urban area and its immediate surroundings. It is for a period of twenty years, covering the period from 2011 to 2031. In providing more detailed guidance available in the Structure Plan, it gives greater precision to the spatial dimension of the Structure Plan policies. The Urban Area Plan includes landuse Plan (urban residential area 901 acre, circulation network 167 acre , educationa and research 37 acre, community facility 12 acre etc), Traffic and Transportation Plan (around 39.1 km proposed road , one bus and one truck terminal), Drainage and Environmental Management Plan (around 39 km proposed drain) and Plan for urban Services.

The Ward Action Plan provides guidance for areas where major change or action is expected in the short-term (5 years). According to the individual Ward of the Paurasava, this plan provide further the policies and proposals of both the Structure Plan and Urban Area Plan in more detailed and guidance for the control, promotion and coordination of development.

MASTER PLAN REPORT FOR NARIA PAURASHAVA

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LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---------|--|
| BBS | : Bangladesh Bureau of Statistics |
| BDT | : Bangladeshi Taka (Currency) |
| BM | : Bench Mark |
| BTCL | : Bangladesh Telecommunication Company Limited |
| BWDB | : Bangladesh Water Development Board |
| CBO | : Community Based organization |
| CS | : Cadastral Survey |
| DGPS | : Differential Global Positioning System |
| EMP | : Environmental Management Plan |
| EPA | : Environment Protection Authority |
| GCP | : Ground Control Points |
| GIS | : Geographic information System |
| Govt. | : Government |
| GPS | : Global Positioning System |
| H.Q. | : Head Quarter |
| H/hold | : Household |
| JICA | : Japan International Cooperative Agency |
| KM/ km | : Kilometer |
| LAN | : Local Area Network |
| LCC | : Lambert Conformal Conic |
| LGED | : Local Government Engineering Department |
| LPG | : Liquid Petroleum Gas |
| MV | : Motorized Vehicle |
| NGO | : Non-Government Organizations |
| NMV | : Non Motorized Vehicle |
| O-D | : Origin – Destination |
| Orgs. | : Organizations |
| PCU | : Passenger Car Unit |
| PD | : Project Director |
| PMO | : Project Management Office |
| R.F. | : Representative Fraction |
| RHD | : Roads and Highways Department |
| RoW | : Right of Way |
| RS | : Revenue Survey |
| RTK-GPS | : Real Time Kinematics Global Positioning System |
| SoB | : Survey of Bangladesh |
| SPSS | : Statistical Package for Social Science |
| TCP | : Temporary Control Point |
| TIN | : Triangulated Irregular Network |
| ToR | : Terms of Reference |

CHAPTER 1

INTRODUCTION

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 Naria Paurashava Master Plan (Structure Plan, Urban Area Plan and Ward Action Plan)”. Part A of this report describes the Structure Plan of Naria Paurashava and conceptual issues related to the preparation of Structure Plan for Naria Paurashava.

1.1 Background of the Paurashava

As per the Local Government (Paurashava) Act 2009, the Paurashavas of Bangladesh categorize as A, B and C classes based on annual income of the Paurashava. There is also a separate category called “Special Class”, for industrial and commercial hubs of Narayanganj and Tongi within the Dhaka Metropolitan Development Area (DMDA). Naria is a B category Paurashava with an area 9.84 sq.km.

The Naria Paurashava is located in the Naria Upazila under Shariatpur Zila, between 2301’ and 23027’ north latitudes and between 90014’ and 90036’ east longitudes. The Paurashava is located at southwestern part of Bangladesh and about 120 km. (through Maowa) away from the Dhaka City. The Naria Paurashava (established through a Gazette Notification dated 13th May 2004) is under the jurisdiction of Naria Upazila in Shariatpur Zila. Total area of the Paurashava is 9.84 sq. km. according to the Gazette Notification. With the active participation of the Paurashava authority, the Consultant has identified the Paurashava’s existing jurisdiction area is 9.84sq. km. (2431.2 acres). An area of 2431.2 acres (9.84 sq. km.) has been considered as Planning Area.

Table 1.1: Basic Information of the Structure Plan and Planning Area

| Jurisdiction | Area (a cre) | Area (sq.km.) | 2011 | | 2031 | |
|---------------|-----------------|------------------|------------|----------------------|------------|----------------------|
| | | | Population | Gross density / acre | Population | Gross density / acre |
| Planning Area | 2431.21 | 9.84 | 22773 | 9 | 29355 | 13 |

Source: Bangladesh Population Census, 2011 and Estimated by the Consultant.

Naria, the second largest Upazila of Shariatpur Zila, in respect of area and population came in to existence as a Thana in 1930. Nothing is definitely known about the origin of the Upazila name. It is generally believed that the Upazila might have originated its name from the mouza name Naria where its headquarters is located.

Physiographically, Naria Paurashava is same as other Paurashavas (who are on floodplain land) in Bangladesh. It’s southern, central and eastern parts are covered by agriculture land. A branch of Palong River named Palong River flows through the western part from north to south of the Paurashava. In the Paurashava, Ward No. 1, 2, 5 and 9 are developed than other Wards.

During demarcation of planning area for Structure Plan, the urban development along both the sides of regional road network and around the market places was given importance. Development along the Naria-Madaripur via Shariatpur Road is considered. Due to the growth and potentiality of this road accommodation of urban development activities along the Regional Highway has been emphasized in the Structure Plan.

Nature of the plan means that its contents should remain valid for the duration of the plan. However, in the rapidly changing circumstances of urban development in Bangladesh, it is prudent that the plan is reviewed at regular intervals, of say 5 years.

1.2 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 Naria Paurasava Structure Plan are:

- Description of the Paurasava's administrative, economic, social, physical environmental growth, functional linkage and hierarchy in the national and regional context; catchment 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 Naria Paurasava.
- 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 Naria Paurasava.
- 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 Paurasava, resource mobilization etc.

1.3 Concepts, Content and Format of the Structure Plan

Conceptualization

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 plot by plot 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 Paurasava Shahar (Town), Naria.

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 Paurasava for possible extension of the Paurasava. But no development proposals are suggested for the extended part as existing Paurasava area is enough to accommodate population and services during Structure Plan period, that is, up to the year 2031.

Contents

The Master Plan is prepared based on the survey data. Most of the information provided in the Survey Report is the outcome of the surveys namely Topographical Survey, Physical feature survey, Landuse survey, Socio-economic survey, Transport survey and Drainage and Environment survey.

Landuse survey: Landuse survey basically records the use of land by its functional activity such as residential, industrial, commercial, health, cultural, etc. During the TS and DGPS based physical feature survey each feature was recorded with individual ID or code representing their use. At the same time, uses of lands without structures were coded on mouza plots. Later on landuse features were identified and classified using the recorded code and separated in different layers during data processing stage, from where the category-wise landuse map has been prepared using the identification layers of each landuse features. The landuse map has been prepared indicating the broad categories of landuse described in the ToR. The landuse map has been prepared on RS Mouza map at scale 1"=165' (RF 1:1980).

Physical feature survey: Physical Features were surveyed using both Total Station (TS) and Differential Global Positioning System (DGPS) survey technique. All structures and installations were surveyed by TS and alignment and closed boundaries like Road, River, Khal, Marshland, Homestead, Large Water bodies etc. have been surveyed by DGPS. Where DGPS survey was not possible for weak satellite signal due to obstruction, TS survey technique was applied for those particular areas.

Location and dimension of the physical feature has been surveyed and stored using Real Time Kinematic Global Positioning System (RTK-GPS) supported TS and DGPS survey technique.

Data was recorded in the TS and DGPS memory with separate ID or code number for each feature (as Line, Point and Polygon). Later on the TS and DGPS data was transferred directly to the Geographic Information System (GIS) database where the feature was kept in separate layer wise as per specified code or ID. Names of settlements, village, rivers, khals, lakes, roads, markets, etc. were recorded during physical feature survey. For supporting the TS Survey, huge numbers of Temporary Control Points (TCP) have established using RTK fast static survey technique and GEOID Model of the project. These TCPs were used by the TS groups as reference points (Station and Back Points) for physical feature, topographic and land use survey.

Topographic survey: Topographic survey has performed using TS and DGPS. The TS survey groups / teams were responsible for measurement of spot levels (Northing, Easting, Elevation or RL) for contour generation. In general the spot levels on the land have taken at an interval that represents the topography of the land surface. The utility poles and alignment of utility lines have surveyed using DGPS. The established TCPs with RTK-GPS were used by the TS groups as reference (Station and Back Point). Contour map has prepared at scale suggested by LGED incorporating all physical features and infrastructures.

The Total Station (TS) survey groups were responsible for conducting topographic survey where Total Station (TS) is used for measurement of Land levels/spot levels (Northing, Easting, and Elevation in respect to mPWD datum) for contour generation at 0.3m intervals. In general the spot levels on the land were taken at not exceeding 50m intervals, closer spots were taken in case of rapid undulation. In addition to the Primary Bench Marks (BMs) established by RTK-GPS Static survey, 120 nos. of Secondary Bench Marks/Control, Point (BMs/SCP) were established using RTK fast static and 1st order BM carry survey for supporting the TS survey. These SCPs as well as the primary BMs were used for Total Station survey as reference points (Station and Back Points) both for topographic and physical feature surveys. The spot levels/land levels were transferred to GIS database and later by processing Digital Elevation Model (DEM) as well as contour map at 0.3m interval contours were generated using TIN (Triangular Irregular Network) Method of GIS.

Transport survey: To perform transport survey, the team was mobilized on 8th August, 2010. An introduction meeting on 9th August, 2010 was held in Naria Paurasava in presence of the Mayor, Councilors, Engineers and other professional to set the date and time of survey as well as to identify the survey stations.

The Paurasava authority recommended 10.8.2010 as local hat day and 11.8.2010 as regular day to conduct transport survey. With reference to their observations, survey time was set from 7:30 AM to 8:30 PM for those two days when traffic movements were frequent.

In order to get an accurate scenario about the study roads / links, detailed frequency of traffic movement was analyzed. This work was considered overall traffic volumes and the proportion of different traffic. Frequency analysis of traffic was performed using the collected data from traffic volume survey. This survey was included mode-wise travel frequency on that road. So, that information helps to explain the variation in using of different vehicles for different time and day of that road.

Drainage survey: Drainage channels were surveyed by Optical Level machine from the head of the channels to the outfall. A zero datum was chosen at the head of each channel. This zero height was then used to level the channel from the head to the toe or outfall. In areas where blockage or refuse was observed to accumulate in the bottom of the channel, the reason of such blockage was identified.

Environmental survey: Environmental survey was conducted following the standard methods and procedures to determine environmental pollutions. Elements of pollutions of environment are air, water, land and noise for the development of urban areas. The Consultants have taken necessary assistance and information from the Paurasava Mayor, Councilors, Engineers and other concerned officials as well as the general inhabitants to determine pollution in air, water, land and noise. Based on the information and data collected from the field, detailed report has been prepared. Data collection format and questionnaire was approved by the PD of UTIDP, LGED.

Socio-economic survey: The Socio-economic survey has been conducted with the proposed methodology beginning from January '10 and ending in March '10. The Survey Team was composed with 6 field investigators assisted by Field Supervisor. The Supervisor has been seconded from Consultant's office. The survey took approximately two weeks to complete with a pre-determined set of questionnaire.

The Paurasava is consisted with 9 Wards. The Socio-economic survey covers all the Wards. Those Wards are identified and distributed as the Core and Potential Core areas. In total, 5% sample households are considered from above each category of area and then again distributed into Pucca, Semi-Pucca, Katcha / Thatched (Jhupri) households according to the respective Wards.

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.

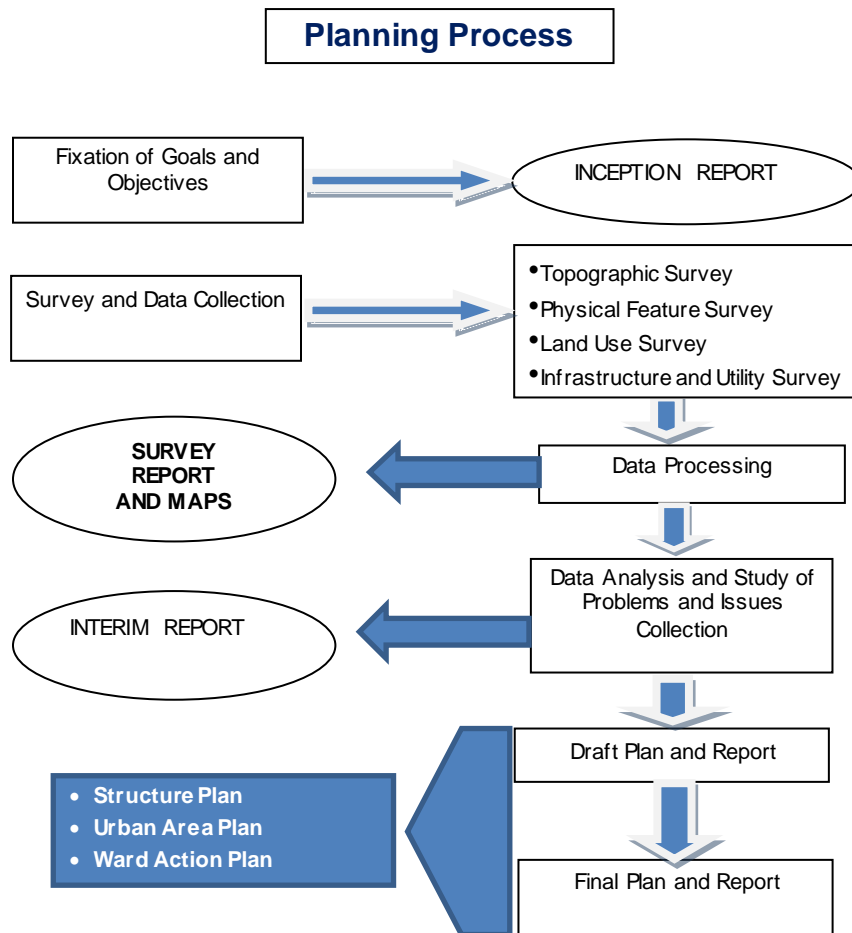
1.4 Approach and Methodology

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

The current project is preparing a Master plan of the Paurasava, 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 Paurasava 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.

Figure 1.1: Flow Chart of Planning Process



After doing all these jobs thoroughly the Master Plan had been done based on a prepared planning standard for Paurasava 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 Paurasava. In order to prepare these plans, the activities contain but not limited to the following:

Visits have been made to the Paurasava at different stages of work of the preparation of Master Plan of Naria Paurasava.

Feasibility for preparation of Master Plan has been submitted to the office of the PD, UTIDP.

An Inception Seminar has been organized at the Paurasava level to inform the Paurasava 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 Paurasava to develop a 20 year development vision for it linking the ideas and views of the Paurasava people.

Determination of the structure plan area and planning area has been done based on existing condition, demand of the Paurasava 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 Paurasava 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 Paurasava (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:

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 Paurasava.

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.

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 Paurasava.

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 Paurasava have been made.

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.

Map 1.1: Location of Naria Paurasava in context of Bangladesh

Map 1.2: Jurisdiction of Structure Plan Area

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.

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.

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.

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.

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.

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

At the first level, policies and strategies have been worked out for the preparation of a Structure Plan for each Paurasava 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.

A total list of primary and secondary roads, drains and other social infrastructures for each Paurasava 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.

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.

With the help of concerned Paurasava, at least 2 public consultation meetings or seminars have been organized, one for discussion on Interim Report and the other on

draft Final Report on the proposed Master Plan. Beneficiary's point of view has been integrated in the plan with utmost careful consideration.

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

Table 1.2: Planning area according to the Ward

| Ward No. | Area (acre) |
|----------|-------------|
| Ward 01 | 312.91 |
| Ward 02 | 170.51 |
| Ward 03 | 138.28 |
| Ward 04 | 204.05 |
| Ward 05 | 177.39 |
| Ward 06 | 280.21 |
| Ward 07 | 469.29 |
| Ward 08 | 336.09 |
| Ward 09 | 342.48 |
| Total | 2431.21 |

Source: Physical feature survey, 2010.

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 Naria Paurasava 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 Paurasava 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.

CHAPTER 2

PAURASAVA'S EXISTING TREND OF GROWTH

2.1 Social Development

Age-sex structure: Age and sex distribution indicates that population mostly increases naturally. The age-sex distribution implies that somewhere female population is higher than male population in the Paurasava. From the male-female ratio, it is seen that in all the Wards number of males are greater than the number of females.

In the Paurasava, population aged 26 to 57 year is highest in all the Wards rather than population aged 16 to 25 years. Again, population aged 16 to 25 years found nearer to the age-group 6 to 15 years. Average sex ratio is 53:47 in the Naria Paurasava. Male – Female ratio is quite same (51:49) in the Ward No. 1, 5 and 7. Highest difference of male-female ratio is 58:42 and found in the Ward No. 6. In the Ward No. 9, female population is higher than male population and the male-female ratio is 46:54.

Household size: Household size ranges from 1-3, 4-6, 7-9, 10-12 and 12+ members, but most prevalent size is 4-6 members in the Paurasava and also in Bangladesh. There are both single and joint family systems in the study area. Ward No. 3 has major percentage of 4-6 member family and Ward No. 8 is more joint-family system (48%) compared to other Wards. Most of the family in the Paurasava is single family (72.3%).

Lowest number of average family size in the Paurasava is 12%. Those families are living in the Ward No. 1, 2, 3, 5, 8 and 9. A good number of 10-12 family members in a family prevail in the Wards except Ward No. 2 and 3 and highest percentage is found in the Ward No. 4 and 6 (35% each). Single or nuclear family is the prominent family size in the Paurasava, confirming the urban character. Nuclear family is highest in all the Wards than joint family. Highest percentage of nuclear family is found in the Ward No. 1 (34%) and lowest in the Ward No. 9 (2%).

Marital status: In the Paurasava, 10 years and over population for the purpose of marriage is 15039, among them male is 7645 and female 7394. Number of male married is lower than female married. Again, number of female divorce is higher than male divorce. The scenario proves family conflict generates due to the financial insolvency of the household head. The unmarried or never married data on male and female also proves that the male population is not encouraged to marry due to their minimum income ability. (This is a copy. prepare this from secondary materials)

Migration: The Paurasava is almost formed with permanent settlers (72%). All the people of the Wards are living in Paurasava for more than 14 years. But interestingly, there are few Wards where people are living less than 2 years (10.71% in Ward No.1 and 5.55% in

Ward No. 2). This is ascribed to that population who are employees with government, semi-government and on private organization.

There are various reasons for migration like inadequacy of employment opportunity, economic backwardness, social persecution, politico-religious disturbances in the area where they migrated from and ambition like better business opportunity. But mostly, as survey finds out, migration in the study area occurred due to work prospects i.e. for job purpose or transfer of the service (50% of the total migration).

All migration has occurred after the year 2000. Basically, it was in migration in Ward No. 4, 5 and 7. It is very clear that better earning opportunity influences the people to live in urban area from other parts of the district or country. But, in this Paurasava all the opportunities is not sufficient and for this reason a little migration is occurred. Out migration has occurred in the urban area at household level but there is some students and service holders who migrate Dhaka or other large cities. Among the migrated resident of the Paurasava, 50% come from the other Upazilas of the district and rest 50% come from other districts of the country.

Educational status: There are large numbers of household heads who are illiterate (50% in Ward No. 8, 48% in Ward No. 9, 30% in both of Ward No. 4, 5 and 6). Reading between Classes-I to V is the highest educational achievement in the Paurasava (34%). SSC level (9.5%) of population is larger than HSC (3.5%), Graduate (7%) and Master Degree holder (0.50%) population in the Paurasava. A substantial percent of population in the Paurasava is holding secondary level (20.0%) of educational qualification.

Religion: In the Paurasava, Muslims are major religious group (92%) followed by Hindus (8%). No other religion group is in the Paurasava.

Land Value

Land value is an important determinant for any project related to the physical development because; the development depends on project cost and the cost on land value. In recent time, a rapid change of land value is found in the Paurasava premises. Wealthy people of the community are investing on land and became landlord because they consider it as a safe investment. As a result, land value curve is on upward. Value of land depends on location, accessibility, height and free of natural hazards. Following paragraphs discuss on land value of the planning area.

Official Value: The official land value uses for calculation and collection of land revenue. In the physical planning aspects, study of land value is necessary for land acquisition. For the preparation of physical development project including cost involvement, an idea on land value is necessary. The value may be changed when development initiative will be undertaken. In this study, the official land value is being quoted from the actual value considers by the Sub-registry Office of the Naria Paurasava.

In this study, eight types of land in 7 mouzas are being considered. In the natural land market, land for homestead / housing construction is higher than other type of land and this scenario is prevailing in the Paurasava also. In another scenario, homestead land value is higher than viti type of land value and it is found highest in Naria mouza and lowest in Dhalipara mouza. Land value is low (Tk.1500 to Tk. 12000 per decimal) for Doba, Pond and Chhon Khola type of land. Those three types of land are under the jurisdiction of agriculture land. For development activities, in case of land cost, those lands should be emphasized, though land development cost is higher than other type of lands.

Table 2.1: Mouza-wise land value in the Paurasava, 2010

| Mouza name | Type of land (Tk. / decimal) | | | | | | | |
|------------|------------------------------|-------|-------|--------|------|------|-------------|----------|
| | Nal | Home | Viti | Fallow | Doba | Pond | Chhon khola | Chandina |
| Naria | 30082 | 40395 | 40263 | 12500 | 3000 | 6000 | 12000 | 22000 |
| Mulpara | 20500 | 27500 | 26100 | 4000 | 2000 | 5000 | 3600 | 8000 |
| Nabagram | 15898 | 20000 | 26000 | 12000 | 3000 | 7000 | 1500 | 10000 |
| Dhalipara | 14060 | 20920 | 23330 | 5000 | 3000 | 6000 | 2800 | 8000 |
| Dewankandi | 22700 | 31758 | 30500 | 2400 | 1500 | 4400 | 3800 | 20000 |
| Kalukati | 24510 | 30588 | 25500 | 6100 | 1500 | 3000 | 2800 | 7000 |
| Lonsingha | 28500 | 37500 | 36200 | 5000 | 1500 | 3000 | 1600 | 8000 |

Source: Sub-Registry Office, Naria, 01.01.2010.

Existing Practice / Unofficial Value: It is clearly observed that land value increases with the height of the land. It increases from low to medium high land but the maximum mean value is found for the habitable land (Tk.52688 per decimal) and lowest for the low land (Tk.10734 per decimal). Average land value in the Paurasava is Tk.43025 per decimal. Land value is highest in Ward No. 4 (Tk.90946 per decimal) and Ward No. 6 (Tk.89130 per decimal) which implies the significance of core area. On the other hand land value is lowest in Ward No. 8 (Tk.19969 per decimal) which implies that this Ward has abundant agricultural low land.

Habitable land in Ward No. 4 bears highest land vale (Tk.102500 per decimal) and low land in Ward No. 8 bears the lowest land value (Tk.3857 per decimal). Medium high land is found only in Ward No. 5 and the average value is Tk.50000 per decimal.

Land Ownership Types and Patterns: Status of residence or ownership of dwelling units / land is a key socio-economic indicator. Residential status varies in the study area. The land ownership pattern often determines social power and position.

The low land ownership indicates most of the household's landed property. Households almost all the Wards own low land (73%) followed by habitable land (26%) and very small quantity medium high land (almost 0%) including other land area (1%). In Ward No. 6 all lands are habitable owned by the households. In Ward No. 1, 3, 4, 7, 8 and 9 only habitable land and low land ownership exists. Ward No. 2 and 5 have a combination of habitable, low and other land ownership and habitable, low and medium high land ownership respectively. Since, the area is business based with considerable number of

agricultural activities, presence of considerable ownership of low-land and habitable land supports small business as main activity.

Living house types that exist in the Wards are highest in katcha (86%) and almost every house owned by the household owner. For example, in Ward No. 1 there are 93% katcha houses and all are owned by them. It is notable that semi-pucca and katcha or thatched houses are 100% owned by dweller itself.

2.2 Economic Development

Two basic elements of economic development i.e. employment generation and increase of productivity are found in the cities and urban areas than the rural areas. This is a common phenomenon for the developed and developing countries. Employment opportunities act as a strong pull factor for influx of job seekers in the cities and urban areas, the centers of productivity. Special features of the Naria Paurasava are that it covers a vast rural area, besides a small urban center. This indicates general feature of the Paurasava as a mixture of rural and semi-urban nature. On the other hand, a considerable number of populations (at least one member from every family of the Paurasava) are in the Italy. Those families are enjoying remittance facilities for maintaining their daily life. These special socio-economic features have been taken into consideration in conducting the study of the prevailing economic situation.

Industry: It has found that 12 industries with two categories are prevalent in the Paurasava. Among those establishments, agro-based industries account for about 90% and wood based industries 10% share of the total running industries. It reflects the general agrarian character of the planning area. All of those enterprises are proprietorship units meaning that private sector dominates the industrial sector of the Paurasava.

Most of the industries (except saw mills) depend on raw materials available within the Paurasava. The industrial output produces in the local market. It is also found that those establishments have problems and potentialities. Careful consideration will help to resolve those problems and adoption of necessary policy initiatives to flourish the existing units and draw more investors and entrepreneurs to set up new manufacturing industries, which will be based mainly on local raw materials.

Commerce: Commerce includes purchase and sale of various consumer and durable items performed by the business person. In the Paurasava, such activities are wholesale and retail trade, hotel and restaurant business, transport, storage services, hat/bazar, etc. Major part of trade and commerce of the Paurasava is conducted through hat/bazar where agriculture produces, consumer items, merchandise for household and other farm and non-farm items are transacted. The market/bazar performs significant role on the Paurasava economy. It is observed that market/bazar provide good number of employment and act as an economic centre for the area of influence of the

market/bazar. These markets/bazars remain open everyday from morning to evening. Along with the daily business transactions, two market places are also used as hat which sits twice in a week. On the hat day farmers, traders, businessmen and many other informal professionals gather in the hats and run trades and business till evening. Actually, the market/bazar is the key supplying centres of all sorts of agro-products to the urban areas and other non-producing areas of the country and similarly this market / bazar is the major distribution centres of industrial products to the vast majority of the rural people throughout the country at consumer levels. Importance of the market / bazar can not be ignored, rather needs to be facilitated with provision of infrastructure facilities.

There are two locations with agglomeration of commercial activities at hat/bazar area in the Paurasava. Those hats/bazars are taking place in the core part of the Paurasava along with the road; tin-shed semi-pucca structures with parcels of open lands. Saturday and Tuesday of a week are the local Hat days. Those hats/bazars are prominent due to its availability of agro-product, poultry and fish. People from different Upazilas, Zilas and Capital City accumulate in those hat/bazars as a buyer.

The Paurasava is composed with 400 numbers of commercial structures. The scenario proves that the area is identified as a rural-based commercial centre and dominating the surrounding Upazilas and Zilas with its economic commodities. Daily gross economic turnover may be taka 4 lakhs (approx. one thousand taka per shop in average).

Services: The service sector consists of the hotel and restaurant business; transport and communication, storage/godown, financial intermediaries, real estate, rental activities, public administration, education, health, community service and social work including social and personal services. The service sector significantly contributes to the local economy. Most of the service structures are housed in permanent structures. There are some makeshift type structures also.

There is one banking establishment and 10 NGOs working throughout the Paurasava. Major investment by the bank is in the system of cash credit in the form of running capital and capital loan for setting up of business establishments, besides general banking facility. Some NGOs have also disbursed agricultural loan. The NGOs are rendering services in the fields of poverty alleviation programs, awareness building, health care, education, sanitation, micro-credit and training on income generating activities including skill development. NGOs provide services in the field of micro-credit; encourage social services, advance loan for poultry, fisheries, livestock, agriculture, house building, land purchase and capital loan for running business. NGOs also take part in various social activities like awareness building on environment, natural calamities, health and many other fields. A good number of people specially women and poverty-stricken has been getting various types of services from the NGOs for quite a long period.

Primary occupation: About 37% of the respondents are engaged in business activities. The scenario reveals that there are significant numbers of respondents who are engaged as shopkeepers and traders, while 16.82% as office workers both government and semi-government including employees in private offices. There are workers involving large trade (1.82%). The transportation workers comprising rickshaw and van pullers accounts for 5% of the total occupation group in the study area. Agriculture with allied business seems to be the major occupation, followed by petty trading and small business. Paurasava has numerous occupational groups who are helping the economic base to sustain. Being predominantly in an agricultural region, the Paurasava area has major occupational involvement in agriculture sector producing rice, spices and horticultures.

Secondary occupation: A number of households are engaged with secondary occupation seasonally to raise their family income. Mostly the low income groups are with secondary occupations during off-season when they do not have any regular jobs. Secondary jobs include, day labouring, hawkery, van / rickshaw pulling and similar other occupations. Such involvement is 5%. A substantial number of populations of all the Wards except Ward No. 8 are involved with the secondary occupation.

Table 2.2: Primary occupation by Ward (in %)

| Main Occupation | Ward No. | | | | | | | | | Paurasava As a whole |
|--------------------|----------|------|------|------|-----|------|------|------|------|-------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| Govt. Officer | 7.14 | 8.7 | | | | | | | 3.7 | |
| Other employee | 10.7 | | 4.76 | 9.68 | 8 | 8.33 | 13.0 | 11.1 | 22.2 | |
| Teaching | 10.7 | 8.7 | | 6.45 | 4 | | | | 7.41 | |
| Agriculture | 7.14 | 8.7 | 33.3 | 9.68 | 4 | | | 38.8 | 29.6 | 13.64 |
| Housewife | 3.57 | 4.35 | 9.52 | | | | | | | |
| Large Business | | | | 6.45 | | | 8.7 | | | 1.82 |
| Small Business | 17.8 | 39.1 | 38.1 | 35.4 | 44 | 58.3 | 21.7 | 50.0 | 22.2 | 35.45 |
| Private Service | | | 4.76 | 3.23 | 12 | 8.33 | 4.35 | | 7.41 | |
| Skilled Labor | 14.2 | 8.7 | | 9.68 | 4 | 4.17 | 4.35 | | | |
| Unemployed/Retired | 21.4 | 17.3 | 4.76 | 6.45 | 4 | 12.5 | | | 3.7 | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

Source: Socio-economic Survey, 2010.

Employment Pattern: In the Paurasava, population below 10 years of age is 14942. Among population of age 10 years and above, those recorded idle are 6124, looking for work 355, doing household work 4524, performing agricultural activities 1403, related with industries 89, business 1108 and services 98. The employment opportunity will be increased through the preparation of Master Plan.

Table 2.3: Population 10 years and over by main activity

| Ward | Total | NW | LW | HW | Agr. | Ind. | WEG | Con. | Tran. | H&R | Bus. | Ser. | Others |
|-------|-------|------|-----|------|------|------|-----|------|-------|-----|------|------|--------|
| 1 | 2021 | 793 | 27 | 548 | 141 | 11 | 1 | 15 | 7 | 0 | 143 | 5 | 330 |
| 2 | 1382 | 527 | 22 | 405 | 65 | 2 | 0 | 18 | 37 | 6 | 171 | 43 | 86 |
| 3 | 1692 | 531 | 35 | 641 | 166 | 14 | 0 | 16 | 32 | 5 | 186 | 4 | 62 |
| 4 | 1786 | 718 | 22 | 593 | 77 | 38 | 5 | 40 | 54 | 0 | 174 | 8 | 57 |
| 5 | 1358 | 576 | 44 | 485 | 85 | 3 | 0 | 3 | 10 | 0 | 85 | 2 | 65 |
| 6 | 1660 | 843 | 44 | 378 | 180 | 0 | 1 | 11 | 8 | 2 | 141 | 8 | 44 |
| 7 | 1892 | 926 | 52 | 508 | 257 | 3 | 0 | 29 | 15 | 1 | 53 | 16 | 32 |
| 8 | 1457 | 564 | 46 | 468 | 223 | 2 | 1 | 33 | 18 | 1 | 56 | 10 | 35 |
| 9 | 1694 | 646 | 63 | 498 | 209 | 16 | 0 | 2 | 25 | 0 | 99 | 2 | 134 |
| Total | 14942 | 6124 | 355 | 4524 | 1403 | 89 | 8 | 167 | 206 | 15 | 1108 | 98 | 845 |

Source: Population Census 2001, Community Series, Shariatpur Zila, Bangladesh Bureau of Statistics, October 2005, p.148-149.

Note: NW = Not Working, LW= Looking for Work, HW= Household Work, Agr.= Agriculture, Ind.= Industry, WEG= Water, electricity and gas; Con.= Construction, Tran.= Transport, H&R= Hotel and Restaurant, Bus= Business, Ser.= Service, Others.

Income level: Small business (35.45%) is the dominant occupation of the household heads in the Paurasava. Farming or agriculture (13.64%) is the second dominant occupation. Agriculture or farming includes crops, livestock and poultry and fish cultivation. Apart from this there are other occupations like public or private service, informal sector work, rickshaw/van puller, teaching, skilled and unskilled labour, handicrafts, etc.

Present population distribution and growth including migration shows that the area is developing significantly in terms of trade and large business and trying to get out of agriculture based activity. Income ranges basically support this concept which is evident by the ranges of income earned by households. In Ward No. 9, 33.33% household earns Tk.9001-Tk.12000 compared to 37.04% within Tk.4001-Tk.6000 per month. There are good numbers of households who earn Tk.12000+ per month. Tk.4001-Tk. 6000 income group is dominant income group in the Paurasava (32.42%). On the other hand, average monthly income per household is highest (Tk.14242) in Ward No. 4 and lowest (Tk.5741) in the Ward No. 1.

Expenditure level: Expenditure pattern of the Paurasava as a whole conforms to the general pattern of household expenditure. There are several headings like Food, House rent, Basic utility charge, Education, Health, Transportation/vehicle charge, Recreation and Other charges, etc.

Since Naria Paurasava still has rural influences and agriculture is the major source of income and average monthly income remain small; food relatively stands higher in expenditure list; Tk.7199 in Ward No. 3 and Tk.4618 in Paurasava as a whole. Important finding is that, there is no expenditure for water in any Ward of the Paurasava. The residents of the Paurasava save a little money. People of the Ward No. 4 save highest amount of money (Tk.5918) but the surprising thing is that, the average monthly household income is less than expenditure in Ward No. 3, 7, 8 and 9 among which the

scenario of Ward No. 3 is really alarming (this may happen due to the people in general do not want to talk about his / her income rather than expenditure).

Agro-based: In total, 12 industrial establishments are found in the Paurasava and among them 10 are agro-based industries and 2 wood-based industries. The industrial activities cover 0.73 acres and 0.03% land of the Paurasava. Local woods are being processed in the saw mills and locally produced paddy are using in the rice mills. Those industries are located in some selected Wards. Location of those industries will be rearranged and grouped in some selected areas. After construction of Padma Bridge at Maowa point, number of agro-based industries will be increased.

Agriculture: Agriculture dominates the economy of this Paurasava. Among agricultural produces, important items besides paddy are vegetables, local fruits, sugarcane, onion, jute and mustards. Among the agriculture products, paddy, local fruits, onions, mustards and vegetables are consumed locally and a considerable percent (about 55%) are using by the inhabitants of adjacent Upazilas and Dhaka City and rest 45% are using by the inhabitants of the Paurasava.

Informal Economic Sectors: Informal sector covers a lot of activities which may be classified as Trading and Services. Various type of mobile or fixed salable items like food, fish, nuts, coconut, vegetables, daily household items, old cloth / garment, repairing of household gadgets, electronic items repairing, hair cutting, shoe polishing, etc. are considered as informal economic activities.

In the Paurasava, informal entrepreneurs mainly perform their business in the market / bazars and males are dominating this sector. Mostly 18-34 age-groups run the informal activities followed by 35-59 age-group. In total, 12 types of occupation grouped under two major categories of Trade and Services, adopted by the informal entrepreneurs in the Paurasava. Of the various occupations, trade includes sale of various food items, clothes, vegetables, meat, seed, medicines, etc. and service includes hair cutting, shoe repairing, umbrella repairing, mobile phone service, tailoring, etc. It is revealed that, major occupation is business adopted by 37%; service is composed 17% and 14% for agriculture of total informal entrepreneurs. Sources of the capital of the informal entrepreneurs are inheritance (2%), self-earned (95%), borrowing from friends/family members (1%) and loan from NGOs (2%).

It has been found that, 6% (including loan from NGO) of total entrepreneurs had to borrow money to form capital for their business. Rest of the respondents did not receive any loan to start their business. Recipients of loan of the informal sector have received varied amount of loans. Of the total loan recipients, 50% took loan ranging between Tk. 10000.00 to Tk. 6000.00, followed by 40% received between Tk. 10001.00 to Tk. 15000.00 and 10% between Tk. 15001.00 to Tk. 20000.00.

About 30% respondents monthly earning is in the range of Tk. 7000 to Tk. 10000 and 10% is Tk. 5000 to Tk. 7000. Only 2% respondents are in the very low income range of less than Tk. 7000 monthly. A considerable (58%) entrepreneurs has monthly income is above Tk. 14000.

Informal entrepreneurs encounter many problems like dull business, unfavourable weather, fear of eviction, extortion, lack of permanent business location, exorbitant rate of interest, lack of credit facilities and unhygienic residential areas.

2.3 Physical Infrastructure Development

Naria Paurasava is comparatively a medium sized Paurasava (11.00 sq. km.) than the other Paurasava of the Madaripur Zila. There is a unique opportunity of growth of the Naria Paurasava. Dhaka is only 120 km. (through Maowa) and Madaripur Town is 70 km. away from this Paurasava. Obviously the physical growth will be occurred towards the Dhaka and Madaripur. As it is agriculture based Paurasava, its development mainly depend on the future road pattern and urban services.

The Paurasava is mostly oval shaped. Settlements are formed linearly around the internal roads. Pattern of compact settlement is viewed in the Ward No. 1 (part), 2, 7, 8 and 9 (part). Ward No. 1 and 9 are mostly formed with char lands. Those Wards are adjacent to the regional highway and boat ghats. Ward No. 3, 4, 6 and 8 is mostly agriculture dominated areas. Most of the commercial activities are formed in the Ward No. 2 because it is nearer to the Naria Bus stand and Paurasava office.

Functional linkages include national highway, regional highway, primary, secondary, tertiary roads, local road, access road, feeder road, walk way, etc. This landuse includes establishments to accommodate all transport and communication facilities such as bus terminal/stoppage, railway station, toll station, ferry ghat, launch ghat, boat ghat, etc. This category covers an area of 43.73 acres of land or 2.0% of the Planning Area. The highest amount of road coverage is found in the Ward No. 1(7.70 acres), next in Ward No. 7 (7.13 acres) and Ward No. 8 (6.26 acres). Ward No. 3 (2.69 acres) is the lowest position of this category. All types of transport related facilities are available in Ward No. 1 and 7.

Road: In the Paurasava, about 57% roads are pucca (bituminous carpeted) and their total length is above 43.30 km encompassing an area of 31.24 acres. Total length of semi-pucca road is 13.84 km and this accounts for 18.23% of the total roads in the Paurasava. In total, 7.15 acres of land are being used under semi-pucca road. The katcha road is called earthen road. About 25% road is katcha accounting for 18.78 km. coursing 10.34 acres of land. In total, there are 447 no. of roads under three category coursing 75.92 km in length and 48.73 acres of land.

No transport terminal facility exists in the Paurasava. Buses and trucks as well as other vehicles generally park on adjacent roads. One bus stand is found in the Paurasava,

known as Naria Bus Stand. One Regional road passes through the Naria Bus Stand towards Shariatpur. This regional road produces a hub at Naria Bus Stand. All type of vehicles stand and park on this Bus Stand. Besides this, all major intersections in the Paurasava are the places where all local passengers carrying vehicles await on roads with some stoppage time and those are mostly non-motorized vehicles.

Waterway: No waterway is available in the Paurasava. There are altogether 22 bridges (RCC) and 75 culverts (RCC) in the Paurasava. Those bridges and culverts are located on the major canals and drainage channels. The study area is flood prone area. Water logging is common, dyke is an important issue for this Paurasava, but there is no dyke or embankment in the Paurasava.

- **Railway:** No railway facility is in the Paurasava.
- **Airway:** No airway facility is in the Paurasava.

2.4 Environmental Growth

The plan has documented Naria Paurasava area's environmental conditions, determines potentiality for present and past site contamination (e.g. hazardous substances, petroleum products and derivatives) and identifies potential vulnerabilities (to include occupational and environmental health risks). Details are in drainage and environmental plan.

2.5 Population

According to the Census Year of 2011, total population of the Paurasava Town is 22773.

Population density: In the Paurasava, average population density is 2114 persons per sq. km. according to the Population Census 2011. Ward No. 1 seems highly population concentrated area and density of population in that Ward is 4373 persons per sq. km. Medium concentration of population are found in the Ward No. 3, 4 and 6. Population density is below than 3700 persons per sq. km. in those Wards. Ward No. 8 is lowest in the group i.e. 1081 persons per sq. km.

Table 2.4: Household, population and density according to the Ward, 2011

| Ward No. | Household | Population | Density per sq. km. |
|----------|-----------|------------|---------------------|
| 01 | 550 | 3448 | 4373 |
| 02 | 335 | 3675 | 2851 |
| 03 | 495 | 2223 | 3641 |
| 04 | 421 | 2463 | 3627 |
| 05 | 394 | 1935 | 2529 |
| 06 | 415 | 2033 | 3337 |
| 07 | 490 | 2540 | 1424 |
| 08 | 410 | 1949 | 1081 |
| 09 | 488 | 2507 | 1266 |
| Total | 3998 | 22773 | 2114 |

Source: Population Census, 2011

2.6 Institutional Capacity

The Paurasava is responsible for Paurasava administration and also responsible for providing services, slum upgrading, infrastructure development and licensing of non-motorized transport within its jurisdiction. To perform the responsibilities efficiently as prescribed in the Local Government (Paurasava) Act, 2009 existing capacity of the Naria Paurasava administration is not sufficient. The responsibility may be categorized as two broad heads named Revenue Collection including Budget Preparation and Delivery of Services. Three types of management system are involved with those two responsibilities and they are Top Management, Middle Management and Supervisory Management. A general scenario is found in those three category management system of the Paurasava i.e. lack of efficient manpower. Shortage of technical manpower in the Paurasava is also an administrative problem.

Allocated Manpower: Strength of the Paurasava can be assessed from its employment structure and budget. The employment structure indicate the weakness as some of the important positions are lying vacant and development control function is unattended which is demonstrated in the absence of Town Planning Division. The manpower allocated for the Naria Paurasava by the Government except the Mayor and nine Counselors are as follows:

Table 2.5: Allocated manpower for Naria Paurasava

| Positions under Divisions | Number of employees | Positions under Divisions | Number of employees |
|-------------------------------------|---------------------|-----------------------------|---------------------|
| Administration | 05 | Health Division | 07 |
| Secretary | 01 | Health Assistant | 02 |
| Head Assistant | 01 | Conservancy Inspector | 01 |
| Store Keeper | 01 | Vaccination Supervisor | 01 |
| Upper Division Clerk | 01 | Vaccinator | 02 |
| Lower Division Clerk | 01 | MLSS | 01 |
| Accounts | 05 | Engineering Division | 11 |
| Accountant | 01 | Asstt. Engineer | 01 |
| Cashier | 01 | Sub Asstt. Engineer (Civil) | 02 |
| MLSS | 03 | Sub Asstt. Engineer (Power) | 01 |
| Tax Assessment | 02 | Lower Division Asstt. | 01 |
| Tax Assessor | 01 | Work Asstt. | 01 |
| Asstt. Tax Assessor | 01 | Street Light Inspector | 01 |
| Tax Collection and License Division | 06 | Line Man | 01 |
| Tax Collector | 01 | Driver | 01 |
| Asstt. Tax Collector | 03 | Night Guard | 01 |
| License Inspector | 01 | Power Asstt. | 01 |
| Asstt. License Inspector | 01 | Total | 33 |

Source: Local Government Ministry of Bangladesh, 2009.

Existing Manpower: Existing manpower except the Mayor and nine Counselors in the Naria Paurasava is presented in the Table-2.7. In total 12 employees as a permanent staffs are in the Naria Paurasava.

Table 2.6: Existing manpower of the Naria Paurasava

| Name of the post | No. of employee | Name of the post | No. of employee |
|-----------------------------|-----------------|-----------------------|-----------------|
| Secretary | 1 | License Inspector | 1 |
| Sub-Asstt. Engineer (civil) | 1 | Asstt. Health Officer | 1 |
| Accountant | 1 | Garbage Truck Driver | 1 |
| Asstt. Tax Collector | 1 | MLSS | 1 |
| Asstt. Tax Fixation Officer | 1 | Night Guard | 1 |
| Assistant | 1 | Total | 12 |
| UD cum Typist | 1 | | |

Source: Naria Paurasava, 2010.

Among the allocated manpower (7 employees) for general administrative division, 3 employees designated as office assistant. Accordingly, 3 persons are allocated for accounts division, 5 persons for tax section, 9 persons for engineering section and 4 employees for health division. Existing scenario deserves more involvement of employees; otherwise implementation of master plan will be difficult with the help of present manpower of the Paurasava authority.

Logistic Support: Logistic support and necessary equipment is limited for Naria Paurasava which should be a really big concern. Only a Garbage Truck and a road roller are available.

Paurasava Office: The Paurasava office is a two-storied building with proto-type design, is using as administrative building of the Paurasava. About 1.0 acre land has been acquired for this purpose. The building is known as Paurasava Office and located at the inner part of the Paurasava. Surrounding lands are using for commercial purposes. Further provision for extension of the Paurasava office boundary will not possible and other administrative buildings should not be constructed along with the Paurasava office.

2.7 Urban Growth Area

Physical growth of Naria Paurasava town generally depends on the market and availability of highland. Naria Paurasava was connected with all over Bangladesh through water ways. So, a concentrated development around the market has been formed. All development activities including bazar and police station, at present, produce a centre of the Paurasava around the market place. After construction of regional highway, development has been spread all over the Paurasava considering the link roads.

An intersection named Chourasta (in Bengali) with the help of regional road penetrates the Naria Paurasava. Vehicular movement about 4 Upazilas passes through this intersection. Once development trend of the Naria was followed the water ways and as a result, a concentrated development is found in the Ward No. 2.

A trend of urban growth is found around the intersection and near the launch ghats. A tremendous development trend will be generated around the Naria bazar after construction of Padma Bridge at Maowa point. A development wave from Naria to Naria will be found after construction of that bridge.

Once the area developed as a trade centre based on the launch ghat. The traders who bring their commodities through the water ways of the Palong River, the Paurasava acted as a growth centre after loading and unloading of commodities from the boats and launches. From then, development activities started around the markets including boat ghats. After that, when regional highway constructed, the trend of development has been changed and followed the regional highway. This trend is being continued up to the recent years.

After the year of 1980, when Upazila system imposes considering the decentralization of administration, some internal roads have been developed and trend of development followed those roads.

After the year of 1995, development activities started sparsely due to the presence of vast low lands. But, this type of development also followed the proximity of Upazila Headquarters and market areas.

2.8 Catchment area

Catchment area of the Naria Paurasava is calculated according to the agriculture commodities and movement of dwellers for rendering services. From Naria Paurasava, agriculture commodities marketed to the Dhaka, Narayangaj and Madaripur. Rice, jute, onion, mustard and sugarcane are the major agriculture products marketed in those areas. Except agriculture production, fish and poultry productions also distributes in those areas. The Paurasava dwellers for rendering their services go to the Dhaka, Narayanganj and Madaripur.

2.9 Landuse and Urban Services

Landuse

Existing landuses are categorized on the basis of functional activities perform in the Naria Paurasava. In this Paurasava, agriculture occupies 1178.85 acres of total land. Residential and circulation network occupy 849.80 and 48.73 acres of land respectively. An area of 303.96 acres is covered with water bodies.

In this Paurasava, agriculture occupies 48.49% of total land. Residential and water body occupied 2nd and 3rd position respectively. Except agriculture, residential, circulation network and water bodies all other activities are less than 1%.

According to the landuse, agricultural domination is found in the Paurasava. Except Ward No. 2, 3 and 5 large amount of agriculture land lying in other Wards. Those Wards are conceived agriculture land below than 80 acres. Highest amount (255.50 acres) of agriculture land is available in the Wards No. 7 and lowest (32.57 acres) in the Ward No. 2.

Residential: Residential landuse includes urban housing, rural homestead, flats or apartments, mess/boarding houses and informal housing (comprising thatch, katcha and

semi-pucca structures) areas. In the Paurasava, most of the residential areas are informal type means that they are not developed in a planned manner.

Residential land occupied 849.80 acres or about 35% of the Planning Area. It is revealed that residential category is the second major dominated landuse. As per Ward-wise statistics, Ward No. 9 occupied highest amount of land (137.40 acres) and Ward No. 3 is minimum (48.55 acres).

Commercial: One hat/bazar in the Paurasava premises is in unorganized nature. The bazar is developed naturally through generations. The bazar is prominent due to its availability of agro-product and fish. People from different Upazilas and Zilas accumulate in that bazar as a buyer.

Landuses under this category are retail and wholesale shopping areas and all categories of ribbon commercial developments formed along the major roads. In the Paurasava, there are large numbers of retail shops, kitchen market and weekly hat. The extent of commercial landuse depends on the size of consumers. Most of the commercial activities are agglomerated in Ward No. 2, 4 and 9 with the covered area 6.63, 2.41 and 2.07 acres of land. All of those Wards are the core areas of Naria Paurasava. In total 17.33 acres or 0.71% of land is using for commercial purposes.

Table 2.7: Ward-wise landuse of the Naria Paurasava

| Landuse category | Area according to the Wards (in acre) | | | | | | | | | Total | |
|--|---------------------------------------|--------|--------|--------|--------|--------|---------|--------|--------|---------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Area | (%) |
| Residential | 133.74 | 95.11 | 48.55 | 69.23 | 71.92 | 80.11 | 122.88 | 90.86 | 137.40 | 849.8 | 34.95 |
| Commercial | 1.35 | 6.63 | 1.14 | 2.41 | 0.45 | 1.73 | 0.65 | 0.90 | 2.07 | 17.33 | 0.71 |
| Industrial/ Processing and Manufacturing | 0.01 | 0.02 | | | | 0.45 | 0.15 | | 0.10 | 0.73 | 0.03 |
| Educational Facility | 5.86 | 1.47 | 0.20 | 0.23 | 0.23 | 0.72 | 2.09 | 0.55 | 1.15 | 12.5 | 0.51 |
| Governmental Services | 5.67 | 1.13 | | | | | 0.083 | | 0.05 | 6.933 | 0.29 |
| NGO Services | 1.05 | 0.11 | | | | 0.19 | | | | 1.35 | 0.06 |
| Mixed-Use | 0 | 0.24 | | | | | | | | 0.24 | 0.01 |
| Community Services | 1.28 | 0.39 | 0.26 | 0.79 | 0.18 | 1.69 | 2.49 | 0.40 | 0.43 | 7.91 | 0.33 |
| Circulation Network | 7.70 | 5.13 | 2.68 | 4.2 | 4.17 | 5.33 | 7.13 | 6.26 | 6.14 | 48.73 | 2.00 |
| Recreational Facility | | 0.05 | | | | | | | | 0.05 | 0.00 |
| Open Space | | | | | | | | | | | |
| Transport & Communication | 0.03 | 0.09 | 0.27 | | | | | | 0.04 | 0.43 | 0.02 |
| Service Activity | 0.46 | 0.11 | 0.22 | 0.13 | 0.38 | 0.01 | 0.79 | 0.21 | 0.08 | 2.39 | 0.10 |
| Agricultural | 119.29 | 32.57 | 69.79 | 107.38 | 78.51 | 143.20 | 255.50 | 202.17 | 170.44 | 1178.85 | 48.49 |
| Water body | 36.47 | 27.46 | 15.17 | 19.68 | 21.55 | 46.78 | 77.53 | 34.74 | 24.58 | 303.96 | 12.50 |
| Total | 312.91 | 170.51 | 138.28 | 204.05 | 177.39 | 280.21 | 469.293 | 336.09 | 342.48 | 2431.20 | 100 |

Source: Landuse Survey, 2010.

Industrial: Industries are one kind of dominating landuse but not applicable for Naria. Little amount of land (0.73 acres or 0.03%) of the Planning Area is covered by this category of landuse. This category includes husking mill, oil mill and saw mill. About 0.45

acres and 0.15 acres of land under industrial use are occupied by the Ward No. 6 and Ward No. 7 respectively. The industrial land use is not prominent in other Wards as well as the Paurasava. No industrial land use is found in the Ward No. 3, 4, 5 and 8.

Agricultural: Agricultural land use includes paddy field, cropland, grazing land, horticulture, orchard, etc. A total of 1178.85 acre of land is under this category in Naria Paurasava. It constitutes 48.49% of total land of the Paurasava. The rural agricultural land uses are spread over the entire Planning Area.

Every Ward is more or less occupied by the agricultural land. In the Ward No. 7 agricultural land use occupied 255.50 acres out of the total land under this category. At the same time, Ward No. 8 and 9 are occupied 202.17 acres and 170.44 acres respectively. Lowest amount of agriculture land is found in the Ward No. 2 (32.57 acres).

Education: The Paurasava is not well developed with number of educational institutions like college, high school and primary school for improvement of educational activities. The students who like to develop him with higher education shifts to the Dhaka or Zila Headquarters, but for general educational services three high schools and nine primary schools are found in the Paurasava premises. Total area under this use is 12.5 acres or 0.51% of the Planning Area whereas Ward No. 1 and 7 accounts 5.86 acres and 2.09 acres respectively. Ward No. 3 conceived minimum land use under educational facilities (0.20 acres).

Public Land: This category includes all types of government offices like DC office, Zila Parishad, Upazila Parishad, LGED, DPHE, Fisheries, Social Welfare, Statistical Bureau, Health office, etc. Total land under this category is found 6.93 acres (0.29%). The services are found in the Ward No. 1, 2, 7 and 9. Among those Wards, Ward No. 1 conceived highest (5.67 acres) land and lowest (0.05 acres) in Ward No. 9.

Land under other Govt. Institutions: Such type of land dedicated for activities of public gathering which are mostly closed spaces. This category of use includes auditorium, town hall, all kinds of assembly hall, community centre, etc. Such type of use is not in the Paurasava.

This category includes all types of financial institutions like bank, insurance company, mercantile and cooperative society, health, fire station, police station, electric sub-station, telephone office, etc. In total, 2.39 acres (0.10%) of land is found under this category. Highest concentration of those services is found in the Ward No. 1 (0.46 acres) and lowest in the Ward No. 2 (0.11 acres).

Khas land: The Paurasava is not maintaining the khas land record. Upazila Nirbahi Officer is the custodian to maintain the khas land record and he has denied to supply any information on khas land of Naria Paurasava.

Other (Abandoned, etc.): In the Paurasava, 10 NGOs are with multi-disciplinary social development activities. Most of those offices are located in the residential areas and same compound in a residential building. Total areas under non-government services are 1.35 acres and those establishments are found in the Ward No. 1, 2 and 6.

Recreational: Recreational facilities like cinema hall, auditorium, amusement park, picnic spot, etc. are included in this category. In the Paurasava, 1 cinema hall is delivering recreational services. Only 0.05 acre of land is used for this purpose and located in the Ward No. 2.

Water Bodies: These land use is spread all over the Planning Area. Water bodies like river, pond and ditch encompass 303.96 acres or 12.50% area where 77.53 acres is in Ward No. 7 and 46.73 acres each in Ward No. 6.

Mixed-Use: Mixed-use areas are those where, either commerce is mixed up with residence or residence with commerce or residence with office or admixture of all the three. Sometimes small industrial enterprises are also found to co-exist with any one or all the above land uses. However, other admixture of diverse land uses is also found. Mixed land use is a common character of all unplanned urban centers in Bangladesh. The degree of such admixture depends on the specific location of the area. If the area is closer to the urban centre than the more profitable land use takes over the less profitable ones and co-existence of diverse land uses prevail for long till one fully takes over the other. In such areas usually commerce gradually takes over residential use.

In the Paurasava, mixed-use is not prominent, only Paurasava town centre is being formed. Only 0.24 acres (0.01%) of land is identified as mixed-use areas. Mixed-use areas are found in the Ward No. 2. This type of land use is found along the main road where the ground floor is using for commercial purposes and other floors are using for residential purposes.

Urban services: The Paurasava is formed with the urban services like Post Office, Bank, Police Station, Monument and Mobile Tower. Highest number of those services is found in the Ward No. 2 and 7. No urban service is in the Ward No. 3, 4, 5, 6 and 8. The schedule bank is found in the Ward No. 2. Five monuments are located in the Paurasava, 2 in the Ward No. 1 and 3 in the Ward No. 7. In total, 12 numbers of urban services have identified in the Paurasava, post office and police station is located in the Ward No. 1 and 7 respectively.

2.10 Paurasava Functional Linkage with Regional and National network

National: Present urban growth is found in the northern part of the Paurasava along the Palong River. In recent the trend of development follows the road towards Shariatpur, Bhedarganj and Alphadanga Upazilas. At north of the Paurasava, Laukhola Bazar is the important inter-district urban centre and development trend of the Naria Paurasava will be expanded soon up to the Laukhola. Undulating land elevation towards Alphadanga

Upazila will not encourage the development of Naria Paurasava faster than Shariatpur and Bhedarganj Upazilas. The development trend of the Naria Paurasava may be controlled with the connection of approach road of 1st Padma Bridge at Maowa point.

Soil of the Zila is mainly formed by the young Ganges flood plain but in some places the older Ganges flood plain. The northern and eastern parts of the Paurasava are covered by grey silty clay soil of the active and young Ganges flood plain. Central and southern parts of the Paurasava are mainly formed of brown silty clay of the mixed young and the older Ganges flood plain. Northern part of the Paurasava is less productive and is mainly used paddy cultivation. Main rivers flowing through the Zila are the Padma, the Jamuna, the Garai and the Kumar. The Padma and the Jamuna are navigable throughout the year. Those rivers are non-tidal.

Poor sanitation facilities with pit latrine and open drain, katcha latrine are the general picture of sanitation facilities. The adjacent Kirtinasha River including low-lands are using as dumping ground of solid wastes. Market areas and the canals are congested with commodities and garbages.

For a better living environment above environmental phenomenon should be considered with the systematic planning principles and regulatory measures. With these views, people's awareness should be increased about the fair living environment through different public activities. Arrangement of landuses should be provisioned for all the public and private organizations as their necessities.

Naria is a new Paurasava established with the help of a Regional Highway. Negligible urban facilities like water supply, cleaning of road, road lighting, dustbin facilities and road maintenance (constructed by the Paurasava, LGED and RHD) are the facilities provided by the Paurasava Authority. All urban facilities as a township development are necessary. Most of the urban services were developed when the Paurasava was formed as a growth centre.

East, west, north and southern parts of the Paurasava are under the low-lands. In every year the Kirtinasha River submerges and eroded those lands. Urban facilities are not possible to provide on those lands except agriculture.

Most of the areas in the Paurasava are low land needs sufficient earth filling to provide urban services. As a result, heavy construction cost should be considered to provide those facilities.

Regional: The Paurasava is located at southwestern part of Bangladesh and about 80 km. (through Maowa) away from the Dhaka City. River Palong is on the northeastern side of the Paurasava, Alphadanga Upazila of Faridpur Zila on the east, Bhedarganj Upazila on the south and Shariatpur Zila on the western part of the Naria Upazila. Regional importance of the Naria Paurasava as well as Naria Upazila is governed with its

agriculture production and fish farming. Rice, jute and sugarcane are the major agriculture production. Most of those productions distributes among the Upazilas and Zila lying at the boundary line of the Naria Upazila, also brings it to the markets of the Capital City.

2.11 Role of Agencies for Different Sectoral Activities

Agencies responsible for utility facilities and municipal services are an important component for an area. Utility services include water supply, gas supply, electric supply, sewerage and drainage system, telecommunication system, fire services, solid waste management, etc. The concerned departments / organizations responsible for planning and development of utility services are shown in the following table.

Table 2.8: Agencies responsible for sectoral activities

| Sl. No. | Sectors | Responsible agencies |
|---------|-------------------------|-----------------------------------|
| 1. | Electricity Supply | Rural Electrification Board (REB) |
| 2. | Water Supply | DPHE / Paurasava/Private |
| 3. | Telecommunication | BTCL / Mobile Phone Companies |
| 4. | Sewerage and Sanitation | DPHE / Paurasava/Private |
| 5. | Solid Waste Disposal | Paurasava / Private |
| 6. | Fire Service | Fire Services and Civil Defense |
| 7. | Post office | Postal Department |

Source: Physical Feature Survey, 2010.

The authorities (as presented in the Table-2.9) should perform other roles need to be carried out with the assistance and support of other relevant government agencies. Those roles are:

- Provide existing and future service areas with full complement of related services to ensure that they can function efficiently.
- Identify depressed areas in each of the Ward where no improvement is being made and provide services with ensuring benefits for the dwellers.
- Ensure that within specific time (may be project period or private sector involvement process and a guideline frame for them) services will be provided according to the demand of the Paurasava inhabitants.
- Identify the existing procedural and institutional constraints and resolve them with full cooperation of other responsible agencies.

Map 2.1: National/ Regional Road Network

CHAPTER 3

PROJECTION OF FUTURE GROWTH BY 2031

3.1 Introduction

The Chapter presents future growth of the Paurasava according to the population, economy and landuse. The projected period for those components has been considered for the year 2011 to 2031. In case of population and landuse, projection has been presented but in case of economy, opportunities have been considered. For the Naria Paurasava, government policy is the prime focus as economic opportunity but that is not considered here. Existing local economic strength considers as the basis of economic opportunity. Agriculture, fish, livestock and poultry, local fruits and availability of labour force considers as a basic components of the economic opportunities.

3.2 Projection of Population

According to the BBS, 2011, urban population growth rate of Naria Upazila is 1.28 and Paurashava also 1.28. Therefore, the population growth rate of 2011 for the Paurashava is considered for population projection of an agro-based township which is 1.28% per annum. The formula quoted in calculation of the population projection is -

$$P_n = P_o (1 + r)^t$$

Where

P_o =base year population

P_n =projected year population

t =time period

r =annual growth rate

Basis of population projection: The data collected from several sources is not reliable to be accepted because, as like different sources data is also different. When it is calculated for the projection then the output shows separate result. It is the main deficiencies of data obtained from diverse sources.

Table 3.1: Growth Trend Analysis

| Area | Population 2001 | Population 2011 | Growth Rate 2011 (%) |
|------------------|-----------------|-----------------|----------------------|
| Shariatpur Zila | 100,685 | 115970 | 1.42 |
| Naria Upazila | 20,058 | 22,773 | 1.28 |
| Naria Paurashava | 20,058 | 22,773 | 1.28 |

Migration information is not available in the BBS Census, only considers natural growth rate. Actual population projection requires both natural growth rate and migration rate. For this unavailability of migration data, calculation of population projection becomes very difficult. To avoid this problem, population estimation presents as alternate of population projection.

The growth rate presented and calculated in the Table-3.1 is considered for the preparation of population projection. The projection shows that the population of the planning area and Structure Plan area will be 24265 in 2016, 25855 in 2021, 27550 in 2026 and 29355 in 2031. The scenario proves, in next 20 years the Paurasava population will be increased and it may be more than double. The projection is showing normal increase of population. In special case, for construction of Padma Bridge at Mawa Point, government policy on relocation of industries from Dhaka City and community facilities provided by the Paurasava according to the Master Plan, the growth rate will be increased rather than the normal rate at present. The growth is calculated by considering the BBS population data of 2001 and 2011 by using the formula. The present growth rate is 1.28 % per year.

Table 3.2: Population projection (according to the 1.28% growth rate)

| Ward No. | Area in acre | Population 2001 | Population 2011 | Projected population | | | |
|----------|--------------|-----------------|-----------------|----------------------|-------|-------|-------|
| | | | | 2016 | 2021 | 2026 | 2031 |
| 1 | 312.91 | 2624 | 3448 | 3674 | 3915 | 4171 | 4445 |
| 2 | 170.52 | 1853 | 3675 | 3916 | 4172 | 4446 | 4737 |
| 3 | 138.28 | 2294 | 2223 | 2369 | 2524 | 2689 | 2866 |
| 4 | 204.04 | 2321 | 2463 | 2624 | 2796 | 2980 | 3175 |
| 5 | 177.39 | 1770 | 1935 | 2062 | 2197 | 2341 | 2494 |
| 6 | 280.19 | 2102 | 2033 | 2166 | 2308 | 2459 | 2621 |
| 7 | 469.31 | 2677 | 2540 | 2706 | 2884 | 3073 | 3274 |
| 8 | 336.51 | 2011 | 1949 | 2077 | 2213 | 2358 | 2512 |
| 9 | 342.48 | 2406 | 2507 | 2671 | 2846 | 3033 | 3232 |
| Total | 2431.21 | 20058 | 22773 | 24265 | 25855 | 27550 | 29355 |

Source: BBS, 2011 and calculated by the Consultant.

3.3 Identification of Future Economic Opportunities

Most of the entrepreneurs expressed their desire of implementing future development plan. A major portion mentioned that their development plan is the expansion of their enterprises (95%) and others intend to increase their production (5%). Expansion of existing industries and establishment of new industries will create more jobs and thus have multiplier effect in the overall economy leading to create more consumption capacity, investment opportunities in diversified economic fields and thus push the economy upward.

Some small-scale pisciculture is located in the Naria Paurasava. About 48 households are involved with such pisciculture. The production mostly uses in the Dhaka City, Narayanganj and Madaripur Zila. Investment in this field will bring huge prospects of the Paurasava. Other economic prospect summarizes in the following discussions:

- Availability of unskilled and cheap manpower.
- Availability of agriculture land. The land may be used for different agricultural production and those productions may be used for the input of agro-based industries.

- Due to the nearness of Dhaka City, the Paurasava may be developed as the fringe area of Dhaka City. This fringe area with its agriculture production will support to the Dhaka City where marketing for those productions are available.
- The Paurasava has been developed as growth centre concept. Some cluster development is found around this growth centre. Planned development through this master plan will initiate to arrange the growth component in a systematic manner. At the sametime, economic development parallel to the physical and social development will be encouraged.

3.4 Projection of Landuse

Landuse requirement: In Naria Paurasava, major landuse is agricultural (38.49%). Residential landuse occupies second position (34.95%) of the category. A negligible percent (2.0%) land is using for circulation network. Though, residential landuse dominates the Paurasava but, after the preparation of Master Plan, more residential development will be preceded. In consideration of such concept, the Master Plan will be delighted in favour to save the agriculture land.

The determining factors of landuse change is the income of the people, government policy, new establishment like industry, higher leveled educational institute, construction of road and embankment and availability of services. The Paurasava was developed as a growth centre long before, than a police station. In the year 2004, it is notified as Paurasava. Radical change of landuse in the Paurasava is not found. Before it known as Paurasava, agricultural domination was the key landuse. During last ten years, the landuse scenarios remain same. A stagnant character of landuse change still stand due to the existence of river named Palong. Rapid change of landuse will be viewed after the construction of Padma Bridge at Maowa point.

The Paurasava is not an ideal township due to the agriculture domination. Agriculture based township should be encouraged in the preparation of Master Plan. Growth of population is the natural trend and at the sametime, expansion of non-agricultural use on agriculture land is also natural tendency of the people. This will be controlled through the Compact Township concept with the encouragement of vertical development. In case of government services, specific building may accommodate different type of offices.

Future landuse is calculated according to the development control for the masses. In case of public land, existing use and khas land will be emphasized. Willingness and participation of the people in development activities will be the key factor for future landuse demarcation. Slow change of landuse will be emphasized rather than rapid change. Let the people do whatever he likes on own land – such concept should not be considered for future projection of landuses. Three parts of the projection are landuse change, landuse control and landuse restriction will be included in the Master Plan. In any case, river front areas should be restricted for human habitation. As a result, river water will safe from contamination.

Basis of Projection: In case of landuse change, the standard given by the LGED according to the projected population and area for the specific service has been calculated. But, the agriculture land should be preserved from any type of physical development. It should not be decreased. Vertical expansion will be emphasized rather than horizontal. In case of road network planning, missing links is prescribed rather than new roads. For the development of pisciculture, all ponds and ditches may be preserved, in some exceptional cases; small number of ditches may be used for physical development activities. Landuse control and landuse restriction should be imposed by the Paurasava according to the prescribed plan.

People's willingness has considered as important base for the projection because the Master Plan is for the inhabitants of the Paurasava. They are the beneficiary group of the Master Plan. Their willingness in case of use and land allocation, location, expansion provision is the important consideration. On the basis of fulfillment of their demand, they will like to involve them willingly in the implementation procedure of the Master Plan.

Demand Analysis: Different methods have been followed for the calculation of landuse demand (such as 1 acre land for 20000 populations in case of a primary school). Demand for utility services, is calculated according to the growth of people and the standard follows in the country. In case of special allocation, emergency services and restricted use of land, any method should not be considered. An amount of land may be allocated or preserved for that service. Population considered according to the standard for calculating the future need of the land in various uses are:

3.5 Housing

Housing areas in the Paurasava is the composition of an admixer of housing types. Mixed residential, poor dominated rural houses and semi-urban homesteads are found. Most housing areas have developed in a spontaneous fashion. In the rural part of the Paurasava, with its rural-agricultural character, has a different housing type. The dwellings, comprising homesteads, encompass larger areas having low density. Highest gross population density in the Paurasava is only 8 persons per acre. Buildings in the Paurasava are dominated by katcha structure (84%). No building is found approved from Paurasava. However, owners of the buildings have been found violated the setback rule by the construction. Except labour charge there is very little variation in building construction cost between Dhaka and Naria Paurasava.

Problems relating to the housing are mostly concerned with the poor community. Due to their low level of income a vast number of poor are squatting in public land. They are not only deprived of minimum housing but also from the personal security that endanger their health and working efficiency. Regular income can solve most of their housing problems. Apart from dwelling, pure water and transportation are real problems for the inhabitants. Municipal services are highly inadequate. Drainage is major problem in rural

part of the Paurasava. The Paurasava can not solve the problems due to scarcity of fund. In the Paurasava, above 99 percent housing structures are one-storied that includes semi-pucca, katcha and Jhupri type houses.

Basis of housing projection: Existing landuse is not the only basis for housing projection. Residential use has considered for the year 2010 as base year and projected housing area is calculated considering 30 persons per acre (at present 9 persons per acre).

Demand analysis: It is estimated that housing demand will stand at 294 acres at the end of project period 2031. The estimate is based on the assumption that the standard supplied by the LGED for housing estimation where density is declared around 100 or 150 persons per acre. The figure is around half of existing housing area (849.8 acre). So it will be more practical if density is consider 30 persons per acre and it will be around 979 acre. Projected demand is shown in the Table-3.3 and 3.4.

Table 3.3: Ward-wise demand of housing areas (100 person/acre)

| Ward No. | Existing Housing Area (acre), 2010 | Estimated housing demand (acre) | | | |
|----------|------------------------------------|---------------------------------|------|------|------|
| | | 2016 | 2021 | 2026 | 2031 |
| 1 | 133.74 | 37 | 39 | 42 | 44 |
| 2 | 95.11 | 39 | 42 | 44 | 47 |
| 3 | 48.55 | 24 | 25 | 27 | 29 |
| 4 | 69.23 | 26 | 28 | 30 | 32 |
| 5 | 71.92 | 21 | 22 | 23 | 25 |
| 6 | 80.11 | 22 | 23 | 25 | 26 |
| 7 | 122.88 | 27 | 29 | 31 | 33 |
| 8 | 90.86 | 21 | 22 | 24 | 25 |
| 9 | 137.4 | 27 | 28 | 30 | 32 |
| Total | 849.8 | 243 | 259 | 276 | 294 |

Source: Landuse Survey, 2010 and calculated by the Consultant.

Table 3.4: Ward-wise demand of housing areas (30 person/acre)

| Ward No. | Existing Housing Area (acre), 2010 | Estimated housing demand (acre) | | | |
|----------|------------------------------------|---------------------------------|------|------|------|
| | | 2016 | 2021 | 2026 | 2031 |
| 1 | 133.74 | 122 | 131 | 139 | 148 |
| 2 | 95.11 | 131 | 139 | 148 | 158 |
| 3 | 48.55 | 79 | 84 | 90 | 96 |
| 4 | 69.23 | 87 | 93 | 99 | 106 |
| 5 | 71.92 | 69 | 73 | 78 | 83 |
| 6 | 80.11 | 72 | 77 | 82 | 87 |
| 7 | 122.88 | 90 | 96 | 102 | 109 |
| 8 | 90.86 | 69 | 74 | 79 | 84 |
| 9 | 137.4 | 89 | 95 | 101 | 108 |
| Total | 849.8 | 809 | 862 | 918 | 979 |

Source: Landuse Survey, 2010 and calculated by the Consultant.

CHAPTER 4

DEVELOPMENT PROBLEMS OF THE PAURASAVA

4.1 Physical Infrastructure

- Most of the lands in the Paurasava are acting an important role on the supply of agriculture commodities in different Paurasavas and Zilas. All of those lands submerge in rainy season. On the other hand, development activities are reducing agriculture land rapidly. This trend should be controlled through the imposition of development control, but the contemporary regulations and their management is not enough to control such development activities.
- About 2 to 8 meter earth filling will be needed for every development activities in the Paurasava. So, bulk development should not be encouraged due to the huge cost involvement. Poor soil condition is another problem of bulk development. Lowlands are also providing natural drainage facilities in the area.
- The Paurasava is a naturally developed area. Planning effort yet not been taken by the public authority. Therefore, a mixed landuse scenario is viewed all over the Paurasava. These unorganized landuses should be framed within a planning manner with the physical and financial involvement of public authority.
- All roads in the Paurasava town are narrow and irregular. Some of the roads submerge in rainy season. Widths of all semi-pucca and katcha roads are between 3 to 6 meters and somewhere they are using as footway. Those narrow and irregular roads may be widen and in regular shaped but not in all cases. Because some of the roads are in densely populated areas, pucca buildings and commercial establishments will be needed to demolish. Some roads did not preserve any scope for further improvement. Infrastructural facilities such as water and sanitation will not be possible to construct in those narrow roads.
- Southern and western parts of the Paurasava are under the char lands. In every year the Palong River submerges and eroded those lands. Urban facilities are not possible to provide on those lands except agriculture.
- Most of the areas in the Paurasava are low land needs sufficient earth filling activities (at least 5 to 8 meter) to provide urban services. As a result, heavy construction cost should be considered to provide those facilities.
- Problems will be prevailed to provide central water supply and drainage system due to the presence of ditches and char lands (sandy soil, eroded every year), only the land along with the Regional Highway (Dhaka-Shariatpur) appropriate for those services.

4.2 Socio-economic

The Paurasava is quite poor in respect of basic utility services. Information collected through Socio-economic survey reveals basic utility facilities like piped water supply is

very negligible. Gas, drainage and sewerage and solid waste are also in same condition. People use various types of fuel sources like cylinder gas, kerosene, wood, electric heater, cow dung, etc. For drinking water supply, deep tubewell, community tubewell uses, electricity supply for household lighting and for other purposes exists but with frequent load shedding.

Almost all the Wards have no sewerage system and toilets are mostly consists of sock pits. Overall garbage disposal system is poor. Garbage Dumping Ground is not available and mostly disposes on open streets. Wastes collect by the NGOs but not well organized all over the study area.

Naria Paurasava bears rural influences and agriculture is the major source of income. Average monthly income per household is Tk.14242. Food relatively stands higher in expenditure list (Tk.4618 in Paurasava as a whole). The residents of the Paurasava can save a considerable amount of money per month from their income (highest amount is Tk.5918).

Drainage Facility: Nearly non-existence, very shallow katcha in type is the major characteristics of drainage facilities in the Paurasava. There are katcha drains constructed along the access roads, but this is found rare. Those drains are not continuous and open and not facilitated all the Wards.

In total, 1.65 km. roadside pucca drain is found in the Naria Paurasava constructed by personal initiative. Those drains are uncovered and located in the Ward No. 1, 2, 4 and 6. Average width of those drains is 1.0 m. The drainage system in the study area is to be improved in future by proper drainage network plan.

Sewerage Facility: The sewerage system so far has not introduced in the Paurasava. There are 1.65 km. open roadside drains and channels provided by the inhabitants of the Paurasava, which cannot serve the requirement of wastewater discharge.

Toilet Facility: Toilet system of the study area is mostly categorized as pucca and katcha. In spite of this, Paurasava has a modest development of pucca toilets in government zones. Sewerage system has not been introduced on a trial basis as to their popularity and acceptance. Ownership of toilets varies widely in most of the study areas. Most of the households have their own toilets and at the same time there is joint toilets found in slum areas. Sanitary toilets or pucca toilets are comparatively good (70%) in all the Wards. About 25% katcha toilet is found in the Paurasava and owner of those toilets are poor people. Again, 5% people have no toilet, use open ground for the purposes.

Maximum households build individual septic tanks for disposal of night soil and built on own initiatives. Most of the holdings have sanitary latrines in the Paurasava. There is no latrine connected to drain.

Water supply: Good water supply network is found in the Naria Paurasava. Almost all households are using supply water as main source of drinking water and cooking purposes. At least 70% households are using tubewell water to maintain their daily needs. About 30% of the residents are using hand tubewell, supply water, pond and other source water for washing and bathing purposes. Two water supply pumps are in the Paurasava for supply drinking water to the government areas. Ground water level during dry and wet seasons are 20ft and 15ft respectively.

4.3 Environmental

In Naria Paurasava, noise pollution occurred by three wheelers and sound generates from saw mills and rice husking mills. Water contamination is observed as “Arsenic” threat. Air pollution is caused by dust emitted from saw mill, rice husking mills and furniture shops. Flood water and water-logging creates health hazards. Dysentery and diarrhea diseases occur due to flood and water-logging. Habitual inundations, especially in monsoon, due to external floods from canals are another threat to environment. Pragmatic planning / solution and Drainage Master Plan are very pertinent issues which is utmost importance in planning the Naria Paurasava.

However, implementation of activities like roads, drainage, bridge / culverts, housing and industrial establishments and bazars will radically change the natural topography and landuse pattern. The agricultural land will be converted into urban and semi-urban nature. Existing scenic beauty will disappear; water bodies will lost and general slope will be diminished for earth filling due to urbanization. Therefore, in the process of preparation Structure Plan, Urban Area Plan and Ward Action Plan, consideration of those factors will be made for keeping the natural environment livable.

To create a better living environment, environmental phenomenon (as discussed earlier) has been considered with the systematic planning principles and regulatory measures. With these views, people’s awareness needed to be increased through different public activities about the fair living environment. Arrangement of landuses should be provisioned for all the public and private organizations as their necessities.

CHAPTER 5

PAURASAVA DEVELOPMENT RELATED POLICIES, LAWS AND REGULATIONS

5.1 Indicative Prescription of Policy for Paurasava in the light of the Different Urban Policies, Laws, Regulations and Guidelines

The preparation of Structure Plan, Urban Area Plan and Ward Action Plan for the Naria Paurasava is highly depended on the policies and relevant contemporary rules and regulations prescribed by the government. In preparation of the above Plans, guidelines and strategies prescribed through the policies are considered carefully. Contemporary rules and regulations help to formulate the process and procedure for development control.

Urban Land Management Policy

It is necessary to impose control on the use and development of urban land. A range of urban planning tools including landuse planning, transportation planning and management, site planning, subdivision regulations and building regulations can be applied to minimize environmental impacts of urban development activities.

Policies

- Protect sensitive land resources by minimizing activities threatening environmentally sensitive areas.
- Manage hazard-prone lands through improvement of environmental management practices throughout the Paurasava.
- Conserve open space, as identified through a participatory planning process that will effectively preserve drainage system, provide greater opportunities for recreation and meet the minimum needs of aquifer recharge.
- Protect heritage structures and archaeological and cultural sites through appropriate schemes, projects and regulations.
- Control excessive urban sprawl and manage prime agricultural land through the implementation of regulatory reforms.
- Formulation of land information system, land market assessment regulations, efficient and transparent land record and registration system, etc.
- Increase the supply of land for the poor through reforming land transfer laws to counter trends towards land accumulation.
- Adoption of taxation policies that discourage speculative investments in land that is left undeveloped for extended periods of time.
- Implementation of land-banking and land-pooling programs that allow the government to increase its pool of land which can be exchanged for low-cost housing sites in the Paurasava;

- Undertaking land readjustment projects that include low-cost land and housing sites.
- Undertaking land-sharing schemes and tenancy reforms for establishing clear rights of tenants.
- Allocating khas land/acquired land for housing the poor.
- Allocating reasonable proportion of land in urban places for housing the poor.

Strategies

The strategies necessary to implement the policies of the urban land management is the use of planning tools in land management. Those planning tools may be structure planning, local planning and action planning. Second strategy is the land use zoning. This tool may be used to:

- Protect productive agricultural lands by limiting the intrusion of non-agricultural uses;
- Manage floodplains by controlling uses of land within hydrologically defined areas subject to floods of a designated frequency;
- Preserve wetlands by limiting permissible uses to those that do not entail significant surface disturbance or runoff and substantially restricting land-disturbing uses within the areas identified as wetland areas;
- Restore and conserves natural canals and ponds.
- Facilitate planned unit development by allowing flexible design and clustering of residential development with higher densities on one portion of a land parcel so as to allow agricultural development or to provide increased open space or natural cover elsewhere on the parcel;
- Preserve open space by designating land areas for a variety of purposes such as recreation, future use, green belt, etc.

Strategies of land development for the Paurashava according to the Urban Land Management Policy may be followed through some techniques such as land pooling / readjustment, guided land development, land sharing, sites and services schemes, etc.

Landuse Policy

Bangladesh Landuse Policy was prepared and notified in the year 2001. Major aim of the policy is to prevent indiscriminate conversion of agricultural land into non-agricultural use, because such conversion may be threatened for food security of the country. The expansion of residential, commercial, industrial and socio-economic uses will encourage the diminishing trend of agriculture land. Through the policy, government has encouraged Compact Township and vertical expansion of the different type of building rather than horizontal expansion.

Objectives

The objectives of the Landuse Policy are to:

- Prohibit the recent practice on conversion of agriculture land into non-agricultural use to ensure food security for the people.
- Impose zoning provision to control the better use of land according to the nature of land located in different regions.
- Rehabilitation of landless people on the alluvion lands alluviated from river, Haor or sea.
- Preserve khas land for future physical development activities.
- Confirm landuses in relation with the existing natural environment.
- Use of land in favour of job creation, landlessness and poverty alleviation.
- Control land pollution.
- Construction of multi-storied building with accommodation of various purposes in public and private sector for ensuring minimum land coverage.

About 49% land of the Naria Paurasava under agricultural practices. According to the Landuse Policy, those lands should be preserved as agriculture land. For such preservation, some guidelines prescribed in the Landuse Policy will be considered they are – in case of rehabilitation of the landless people, Khas land will be emphasized for distribution by the government.

Housing Policy

Housing, in the context of overall improvement of human settlements, is considered by the Government of Bangladesh as an integral part of culture and planning for economic development. The Global Strategy for Shelter by the year 2000 adopted by the United Nations in November, 1988 calls upon governments to take steps for formulating a National Housing Policy, 2004 in the light of "the enabling approach" for achieving the goals of the strategy.

The housing problem in the country is of serious magnitude. In addition to the large number of homeless households; the rapid growth of slums and unauthorized squatter settlement; the increasing cost of land and construction materials; rampant speculation and the phenomenal increase in house rent, the problem is compounded by non-availability of basic civic services, including water and sanitation to the bulk of the population and acute shortage of affordable and adequate shelter for the poor and vulnerable groups. The housing shortage was estimated in 1991 to be about 3.10 million units, composed of 2.15 million units in rural areas and 0.95 million units in urban areas; with the bulk of the backlog consisting of katcha un-serviced units. The housing shortage is likely to exceed 5 million units by the year 2000 A.D. The current housing stock is deteriorating fast due to aging, general neglect, poverty and civic apathy on the part of the dwellers.

Objectives

The objectives of the National Housing Policy are to:

- Make housing accessible to all strata of society and to accelerate housing production in urban and rural areas with major emphasis on needs of the low and middle-income groups, the high priority target groups will be the disadvantaged, the destitute and the shelterless poor.
- Make available suitably located land at affordable price for various target groups, especially the low and middle-income group.
- Develop effective strategies for reducing the need to seek shelter through formation of slums, unauthorized constructions, encroachments and shanty dwelling units and to improve the existing ones environmentally and, where possible, to relocate them in suitable places.
- Rehabilitate disaster affected households and houses affected by fire accidents.
- Mobilize resources for housing through personal savings and other financial input's and by developing suitable financial institutions.
- Make effective implementation of the housing programs, promote use of locally developed materials and construction techniques and increase production of forest-based building materials such as timber, bamboo or grass. Attempts will be made to develop alternative and durable materials based on locally available raw material.
- Develop institutional and legal framework to facilitate housing.
- Improve and enhance the character, quality and environment of the existing residential areas.
- Develop new strategies and undertake revision of the policy from time to time to cope with the emerging housing needs and problems in the country.
- Undertake action-oriented research in all aspects related to housing and foster minimization of cost and rent.

Rural Homestead

Clause 5.9 of the Housing Policy describes about the rural housing. The Naria Paurasava is rural based urban area. Rural character is the dominating issue in the housing sector. In the Housing Policy, following measures are suggested to improve rural housing:

- Avoiding unnecessary displacement of rural settlements due to development projects and where unavoidable, makes proper rehabilitation of the households, with full community involvement.
- Encroachment on agricultural land by proliferation of homestead should be discouraged. Efforts should be made for planned densification of rural homesteads. Subject to availability of khas lands, programmes similar to 'Adarsha Gram' programme of the Ministry of land will be undertaken in rural areas.
- The coordinated provision of water supply, sanitation, electricity, roads and other basic infrastructure services to existing and new habitations.

- Providing assistance by way of providing credit, dissemination of appropriate technology and delivery system for promoting housing.
- Initiating schemes for increased employment opportunities and income generation by extending appropriate credits and advice, so that housing affordability is enhanced.
- Establishing suitable institutional structure including strengthening of existing organizations at district and local level, with the responsibility for planning, financing, implementation, supervision and monitoring of rural housing schemes, and with the full involvement of beneficiaries, NGOs and CBOs, giving special attention to the needs of the poorest segments, specially women and disadvantaged persons.
- Linking the development of housing sites and the upgradation of rural housing with the activities under the Bangladesh Rural Development Board (BRDB) and other programmes for the creation of rural assets and employment.

Slums and Squatter Settlements

Clause 5.10 of the Housing Policy describes about the slums and squatter settlements.

The poor environmental condition in slums and squatter settlements create health problems for their residents and those in the adjoining areas. Those areas may be Paurasava Town. Keeping in view the policies of planned growth of urbanization, income support and poverty alleviation and together with steps to arrest the growth of new slums in urban areas, the Government would take steps to:

- Encourage in-situ upgradation, slum renovation and progressive housing development with conferment of occupancy rights, wherever feasible, and to undertake relocation of the squatter settlements from the sites that need to be cleared in public interest.
- Expand provision of water supply, sanitation and other basic services in slum and other settlements occupied by the poor.
- Ensure proper maintenance of amenities in slums and squatter settlements through community involvement and decentralized institutional arrangements.
- Integrate the provision of physical amenities slums and squatter settlements with basic services including maternal and child welfare services and health care, structured on community participation and involvement of voluntary agencies and management by local bodies.
- Provide night shelters and pay and use public toilet for the footpath dwellers and the homeless.

Infrastructure

Clause 5.2 of the Housing Policy describes about the infrastructures related with the housing. Most of those infrastructures are needful for housing construction and preparation of master plan. Following measures are recommended for development and improvement of infrastructure for housing:

- Increase investment by national and local government agencies in order to meet the rapidly growing needs of serviced land and to improve the availability of services in different settlements.
- Promote a balanced pattern of urbanization through a policy of decentralization of investments and incentives for the growth of secondary, intermediate and small towns so as to reduce pressure on metropolitan cities and to control unregulated conversion of agricultural and forest land for the purpose of housing.
- Develop economically buoyant and socially attractive secondary and intermediate towns by strengthening their linkages with contiguous rural areas and market centres as part of the integrated and planned development of the region and to reduce migration to the larger cities.
- Make necessary investments to increase within a reasonable time, the coverage of entire rural and urban population for potable water supply and basic sanitation.
- Increase investments in public transport and traffic network to improve mobility of people, particularly that of the poor.
- Encourage the use of infrastructure construction technologies, which are cost effective, incrementally upgradable and environmentally appropriate.
- Provide government support for extension of infrastructure based on the participation of the people and private developers, NGOs, CBOs or on innovative systems of infrastructure leasing.
- Provide Government assistance to the local bodies for adequate cost recovery of investment on infrastructure, proper maintenance of services and upgradation of the capability of the personnel in local bodies and functional agencies.
- Provide opportunity for community participation and recognize people's initiative in the design, installation and the upkeep of services within the framework of the development programmes.

Strategies

The salient features of the housing strategy are:

- Housing will be given due priority in the national development plans treating it as a separate sector by itself.
- The role of the Government in housing will primarily be that of a facilitator or enabler in order to increase access to land, infrastructure, services and credit and to ensure availability of building materials at a reasonable price, specially for the low and middle-income groups and to create and promote housing finance institutions; whereas actual construction of housing will generally be left to the private sector developers, the people themselves, and the NGOs.
- Greater emphasis will be laid on affordability, personal savings, self-help and cost recovery. Efforts would be made to enhance affordability of the disadvantaged and low-income groups, through provision of credit for income generation and income

enhancement, housing loans at especially low interest, access to space for running workshops or business and such other facilities.

- Improvements and rehabilitation of the existing housing stock will be given priority by the Government alongside new housing.
- Encroachments on public land and formation of unauthorized constructions will be discouraged.
- Austerity will be maintained in building houses and efforts will be made to economize housing costs, discourage extravagant construction, facilitate incremental house building and ensure wider application of low cost technology and optimum use of resources at the individual and national levels both in public and private sectors.
- Regeneration of forest-based building materials would be planned and environmental conservation given due consideration.
- Due attention would be given to construction, protection, replacement and rehabilitation of shelter in disaster affected and fire prone areas.
- Special care would be taken for the preservation of cultural heritage and promotion of vernacular architecture in new housing projects.
- Universities, research institutes and centres will be encouraged to conduct research on housing issues.
- The National Housing Policy will be co-ordinated with other development policies e.g. land, environment, population, employment, social welfare, fiscal and monetary policies at national and local levels.

Population Policy, 2004

Realizing the importance of population and development, the government prepared a Population Policy in the year 1976 and identified population problem as a national problem. Objectives of the Population Policy are to improve the status of family planning, maternal and child health including reproductive health services and to improve the living standard of the people making a desirable balance between population and development in the context of Millennium Development Goals (MDGs) and Interim Poverty Reduction Strategy (IPRS). Economic growth, poverty reduction and social development has identified as national strategy through the Population Policy of 1976. In the Policy, urgent attention should be given on the gender equity and empowerment, welfare services for elderly and poor, control on rural to urban migration, human resource development through skilled workforce and participation on NGOs and private sector in the process to control the population growth.

Aims

Aims of the Population Policy as presented are:

- Aware females about family planning to reduce Total Fertility Rate (TFR) and increase to use family planning devices among the fertile groups.

- Towards stable population within the year 2060 and the net growth rate not higher than 1% within the year 2010.
- Provide importance on mother's health to reduce maternal dead.
- To aware people about HIV / AIDS and to reduce it's chronological expansion.
- To help for providing gender equity and women empowerment in the society.
- To increase personal quality of the planners, administrators and service delivery agencies and to develop the information collection system, research and presentation.
- To control immigration from rural to urban and considers effective steps.
- Provisioning environmental sustainability including safe drinking water supply.

Agriculture Policy

Primary goal of the Agriculture Policy is to modernize and diversify the crop sector (including agricultural system) through initiation and implementation of a well-organized and well-coordinated Agriculture Development Plan. Overall objective of the Agriculture Policy is to make the nation self-sufficient in food increasing crop production (cereals also) and ensure a dependable food security system for all.

Aims

Clause 2 of the Agriculture Policy presents aims to increase crop production and maintain food security in the country. Some of those aims are:

- To increase income of the farmers and their buying capacity through stable and benefited agricultural development.
- To develop and preservation of productivity of the land.
- Removal of dependency on specific crop as a stable food.
- Introduces biological technologies, their use and expansion among the farmers.
- To encourage farmers for introducing irrigation from secondary sources during draught and introduces stable irrigation facilities for improving cropping intensity and crop production.
- Introduction of farming as an income generating sector through farming system and agro-forestry activities.
- To produce necessary agro-product for industrial use.
- To find out new opportunities for more export and minimum import of agriculture commodities.

Transportation Policy

For the country's economic and social development and for poverty alleviation, development of the road network is essential. For this reason the transport sector has been accepted as a priority sector. With the development of the economy the volume of vehicles, passengers and goods has been increasing. In the meantime a notification

regarding classification, definition and responsible organizations for all roads was issued. In this context standardization and cost rationalization of the roads in the country, especially the Zila, Upazila, Union and village roads, have become very essential. For the development of Multimodal Transportation System (Road-Rail-River) such a standardization / cost rationalization of roads and bridges / culverts is a need of the hour. Standardization including cost rationalization will provide the basis of appraisal of road / bridge projects leading to optimal development of the transport system as a whole. At present there is no standard design and national unit cost for construction and maintenance of various roads and bridges and culverts. As a result substantial cost difference has been proposed by the agencies for same type of roads / bridges for the same area.

Summary of Issues Covered

Following tasks of a road projects will be adopted:

- The Committee reviewed the design standards for the Union, Upazila, Zila Roads, and concluded that the key design criteria for all roads should be traffic and axle loads, and not the classification of the roads.
- The six design standards agreed by the Committee to form a logical progression in terms of road width and pavement thickness, all based on traffic considerations. They are not directly related to road classification.
- The agreed design standards are to be used by all road agencies. Road agencies will be required to use appropriate standards for roads according to traffic criteria.
- Reconstruction- full pavement reconstruction on an existing embankment
- New road Construction - completely new embankment and road pavement, including bridges, culverts and any necessary slope protection. This is likely to prove a rare category of road project in Bangladesh
- Widening- road widening and upgrading, including full re-construction of the existing pavement
- Strengthening- removing existing road surfacing and providing a new base layer of Base Type-1 and surfacing.

A passenger car is 1.0 pcu. Larger vehicles have higher values. Conversion factors for vehicles to pcu's are shown in the following table.

Table 5.1: Passenger Car Unit (pcu) Conversion factors for non-urban roads

| Vehicle Type | PCU factor | Vehicle Type | PCU factor |
|--------------|------------|--------------|------------|
| Car | 1.0 | Bicycle | 0.3 |
| Bus | 3.0 | Rickshaw | 1.0 |
| Truck | 3.0 | Motor Cycle | 0.3 |
| Autorickshaw | 0.5 | Tempo | 1.0 |
| | | Bullock Cart | 4.0 |

Source: Transport Research Laboratory (UK) Overseas Road Note 13.

Road design will henceforth be based on traffic criteria, as opposed to road classification, then in theory a road could take any of considerations mean that the typical applications of the designs will be as listed in the following table.

Table 5.2: Design applications

| Roads class | Typical design applications |
|-------------|-----------------------------|
| Zila | Types 5,4,3* |
| Upazila | Types 6,5,4* |
| Union | Types 8,7 |

* Special type to be used under special circumstances.

Table 5.3: Existing and Recommended design lives

| Road Class | Existing Design | | | Recommended Design | | |
|--------------------------------|--------------------------|--------------------------------------|-----------|--------------------|-----------------------------|------------------------------|
| | Cumulative Million ESA's | Typical Expected Design Life (Years) | New Class | Design Type | Design Life (Million ESA's) | Expected Design Life (years) |
| Rural Road/ union Road | 0.5 | 10 | Union | 8 | 1.0 | 10 |
| | | | | 7 | 1.0 | 10 |
| Feeder Road B/ Upazila Road | 1.0 | 10 | Upazila | 6 | 1.0 | 10 |
| | | | | 5 | 1.6 | 10 |
| Feeder Road A/ Zila Road | 1.0 | 10 | Zila | 4* | 2.0 | 10 |
| | | | | 5 | 1.6 | 10 |
| | | | | 4 | 5.0 | 20 |
| | | | | 3 | 6.5 | 20 |

** Overlaying of 25-40mm BC will be required after every 7-8 yrs. * Special type to used under special circumstances.

The design lives, based on the pavement thicknesses for each existing design and each recommended design are set out in Table-5.3 in terms of the cumulative number of equivalent standard axles (ESA's). Given typical traffic levels and a growth rate of 5% per year the expected design life for each type of existing road is provided. For each of the recommended designs the forecast ESA's have been calculated from the traffic capacity in the design year, to allow the design life to be estimated. Again, traffic growth of 5% on all roads is assumed.

Environment Policy

Bangladesh National Environment Policy was approved and published in 1992. Key elements of the Policy are –

- Maintain ecological balance and overall physical development progress of the country through protection and development of different sectors. Protection from natural disaster is one of them.
- Identification and regulation all type of activities which pollutes and degrade the environment.
- Ensuring proper Environment Impact Assessment prior to undertaking of industrial and other development projects.
- Ensuring sustainable use of natural resources.

Proposed Sectors

For the fulfillment of every component of Environment Policy, it has divided in to 15 sectors. Those sectors are – Agriculture, Industry, Health, Energy, Water Development, Flood Control and Irrigation, Land, Forest including flora and fauna, Fish and Livestock, Food, Seashore and Maritime, Transport and Communication, Housing and Urbanization, Population, Literacy and awareness, Science, Technology and Research, Legal framework and Institutional framework.

Strategies

For the implementation of policies, a large number of strategies have been framed according to the sector. Some of those strategies are:

Agriculture: Conduct field survey for imposing sustainable farming system and increase soil fertility. Necessary steps should be taken based on that survey. Control on the use of chemical insecticides and pesticides and encourage farmers using bio-chemical fertilizer. Such strategy may be implemented by the Agriculture Ministry, Bangladesh Agriculture Research Council, Directorate of Agriculture Extension, Bangladesh Rice Research Institute, Jute Research Institute, Bangladesh Agriculture Research Institute, Bangladesh Sugar and Food Industries Corporation.

Industry: The industries identified by the Directorate of Environment in the group of polluting industries, measures should be taken against them as early as possible. The strategy should be imposed by the Agriculture Ministry, Directorate of Forest, Commerce Ministry, Controller of Export Import, Plant Protection Wing, Directorate of Agriculture Extension, Bangladesh Sugar and Food Industries Corporation.

Health: Pure drinking water supply and sanitary latrine in urban and rural areas should be introduced. Industrial and agricultural wastes which are harmful for the health should not be dumped in the river, pond, canal and ditches. This should be controlled through the imposition of appropriate regulations. Those strategies will be maintained by the Local Government Division, Directorate of Public Health Engineering, Paurasava Authority and Directorate of Environment.

Water Development, Flood Control and Irrigation: For the expansion of the project on Water Development, Flood Control and Irrigation, environmental audit is necessary. Based on that audit, environmental degradation areas will be identified and appropriate measures will be undertaken. Roads and Highways Department, Bangladesh Road Transport Authority, Directorate of Environment, Water Development, Flood Control and Irrigation Ministry and Bangladesh Water Development Board will responsible for implementation of those strategies.

Land: Land use regulations should be prepared and their effective use will be confirmed for planned use of land. Land Ministry, Agriculture Ministry, Industrial and other relevant

Ministries, Local Government Division, Works Ministry, Directorate of Forest and Zila Parishad will responsible for such strategies.

Industrial Policy

At first, in the year 1999, government of Bangladesh has approved and notified the Industrial Policy. Again, in the year 2005, Industrial Policy of Bangladesh was published by the government. Both the Policies are synonyms and foremost objective is to setup planned industries considering the domestic demand, prospect of exporting goods and discouraging unplanned industrial growth in the light of past experience.

Objectives

Objective of Industrial Policy is –

- To expand the production base of the economy by accelerating the level of industrial investment.
- To promote the private sector to lead the growth of industrial production and investment.
- To focus the role of the government as a facilitator in creating an enabling environment for expanding private investment.
- To permit public undertaking only in those industrial activities where public sector involvement is essential to facilitate the growth of the private sector and / or where there are overriding social concerns to be accommodated.
- To attract foreign direct investment in both export and domestic market-oriented industries to make up for the deficient domestic investment resources and to acquire evolving technology and gain access to export markets.
- To ensure rapid growth of industrial employment by encouraging investment in labour intensive manufacturing industries including investment in efficient small and cottage industries.
- To generate female employment in higher skill categories through special emphasis on skill development.
- To raise industrial productivity and to move progressively to higher value added products through skill and technology up gradation.
- To enhance operational efficiency in all remaining public manufacturing enterprises through appropriate management restructuring and pursuit of market-oriented policies.
- To diversify and rapidly increase export of manufactures.

Strategies

All regulatory barriers will be removed within the quickest possible time to facilitate easy and rapid flow of domestic private and foreign direct investment. Appropriate legal framework will be put in place to protect both investor and consumer rights to ensure proper market operation and consequently, for lowering cost of doing business.

- There will be no discrimination between domestic and foreign investment. Due emphasis will be given to promotion of regional and sub-regional cooperation.
- Existing public sector enterprises will be progressively privatized and public industrial investment will be limited to only those cases where there is special need to complement private investment or where there is an overriding social and national objective to be achieved.
- The capital market will be developed and strengthened to mobilize domestic savings and to attract foreign investment.
- Development of the infrastructure including port facilities, energy, transport and communication and human resource development will receive high priority. Private investment including "Build, Operate and Own" (BOO) and "Build Operate and Transfer" (BOT) methods will be particularly encouraged in these sectors.
- Intensive industrial zones development will be undertaken together with balanced geographical dispersal of the zones in areas with growing potential to the utilization of local resources as more infrastructural and other facilities are put in place.
- Consistent with the charter of World Trade Organization (WTO), protection to domestic industries from external competition will be rationalized.
- To retain the competitive edge of domestic products, wage increases will be linked to productivity trends, and appropriate labour laws will be put in place to ensure congenial industrial relations.
- The industrial investment will be encouraged through tariff rationalization and (appropriate fiscal measures. The import and export policies will also be made supportive of and consistent with the Industrial Policy.

The Naria Paurashava is agro-based urban area. To reduce poverty and generate employment opportunities, more efforts are needed to establish agro-based industries in the light of Industrial Policy, 2005. This effort will ensure protection and fair price of agro-products and employment opportunities for unemployed people. In order to create further employment opportunities beyond the agricultural sector, initiatives should be taken to setup small, medium and large industries across the country. A well organized linking among those industries in case of raw materials and supply of labour will be needed. If these types of industries setup in a planned way, unemployment rate will decline and poverty alleviation will be accelerated.

Health Policy

National Health Policy was approved and published by the government in the year 2000.

Aim of the Health Policy is –

- To develop a system to ensure easy and availability of health services for the people living in urban and rural areas.
- To ensure optimum quality, acceptance and availability of primary health care including government medical services at the Upazila and Union level.

- To adopt satisfactory measures for ensuring improved maternal and child health at the Union level and install facilities for safe child delivery in each village.
- To improve overall reproductive health resources and services.
- To ensure the presence of full-time doctors, nurses and other officers / staffs, provide and maintain necessary equipment and supplies at each of the Upazila Health Complexes and Union Health and Family Welfare Centres.
- To formulate specific policies for medical colleges and private clinics, and to introduce appropriate laws and regulations for the control and management of such institutions including maintenance of service quality.
- To explore ways to make the family planning program more acceptable, easily available and effective among the extremely poor and low-income communities.
- To arrange special health services for mentally retarded, physical disabled and for elderly population.

Strategies

Some of the strategies of health policy are:

- The aim “health for all” will be implemented through awareness building strategies. Cost-effective procedures to deliver health services will be the prime consideration.
- A specific organization will perform responsibility for Epidemiological Surveillance to control the spread of epidemic diseases. Such concept will be included with different programs.
- The services delivering by the health centers to the patient should be standard and a printed guideline on standard, monitoring and evaluation will be given to those health centers.
- A Health Services Reforms Body will be formed based on the Health and Population Sector Strategy. This Body will be responsible for infrastructural reformation, employment, development planning and implementation of human resources relevant with the health activities and development of carrier of workforces.

National Urban Policy

National urban policy aims to strengthen the aspects of urbanization and at the same time effectively deal with its negative consequences in order to achieve sustainable urbanization. Diffusion of urbanization and rural-urban linkages is an important issue in this regard. There is need for decentralization of power from central to local government. The major objectives of national urban policy will aim to:

- Ensure regionally balanced urbanization through diffused development and hierarchically structured urban system.
- Facilitate economic development, employment generation, reduction of inequality and poverty eradication through appropriate regulatory frameworks and infrastructure provisions.

- Ensure optimum utilization of land resources and meet increased demand for housing and urban services through public-private partnerships.
- Protect, preserve and enhance urban environment, especially water bodies.
- Devolve authority at the local urban level and strengthen local governments through appropriate powers, resources and capabilities so that these can take effective responsibility for a wide range of planning, infrastructure provision, service delivery and regulatory functions.
- Involve all sectors of the community, in participatory decision-making and implementation processes.
- Ensure social justice and inclusion by measures designed to increase the security of poor people through their access to varied livelihood opportunities, secure tenure and basic affordable services.
- Take in to account, particular needs of women, men, children, youth, elderly and the disabled in developing policy responses and implementation.
- Assure health, safety and security of all citizens through multifaceted initiatives to reduce crime and violence.
- Protect, preserve and enhance the historical and cultural heritage of cities and enhance their aesthetic beauty.
- Develop and implement urban management strategies and governance arrangements for enhancing complementary roles of urban and rural areas in sustainable development.
- Ensure good governance by enhancing transparency and establishing accountability.

Rural Development Policy

From the year 1987 to 2011, government has framed and implemented different projects and programs for the betterment of rural people. Those projects and programs as mentioned in the Rural Development Policy of Bangladesh are:

- Food for Works Program (Lj-Sl øhøej-u MjcÉ LjÑp\$Q£)
- G.R Program (Gratuitous Relief Program)
- T.R Program (Test Relief Program)
- V.G.D Program (Vulnerable Group Development Program)
- V.G.F Program (Vulnerable Group Feeding Program)
- Single-House Single-Farm Program (HLøV hjs£ HLøV Mijjl LjÑp\$Q£)
- Back to home Program (O-l @glj LjÑp\$Q£)
- Food for Education Program (Mj-cÉl øhøej-u ønrj LjÑp\$Q£)
- Rural Occupational Project (fð£ S£øhLjue fÈLÒf)
- Poverty Reduction Project (cjølå øh-jjQe fÈLÒf)
- Self-employment Program for Women (jøqmj-cl BaÈ-LjÑpwøqje fÈLÒf)

- Women Empowerment Program (jçqm i-cl pijjçSL rja iue fËLÒf)
- Coordinated Women Development Program (pjçeÄa jçqm i Eæue fËLÒf)
- Peace Home Program (niçç¹ çehip LjÑp\$Q£)
- Shelter Support Program (BnËue LjÑp\$Q£)
- Educational Allowance Program (çnr i Efhªçš LjkÑH²j)
- Aged-allowance Program (huØLi a j LjkÑH²j)
- Micro-credit Program (rªâGZ LjÑp\$Q£)
- Allowances for Widowed, Poor and Husband-renouncement Women Program (çhdh i, çxØq J üjj£ fçlaÉJ²j jçqm i-cl SeÉ i a j fËçje LjÑp\$Q£)

Aims and objectives

Some of the aims and objectives of the Rural Development Policy is presented here.

- To increase the income and provision of jobs for the Villagers, especially for women and people under low-living standard in the rural areas.
- To confirm sustainable economic and social development through poverty reduction.
- To encourage self-employment opportunities in the rural areas.
- To emphasize for the development of rural wealth according to the equal distribution of economy and national development as prescribed in the Constitution of Bangladesh.
- To give confirmation to the rural people about infrastructural development, equal distribution of wealth and marketing of the agricultural production.
- To produce technologically efficient people about education, technical education and trainings in rural areas.
- Identification of demand and their fulfillment for socio-economic development of rural poor, persons involved with the production, especially small farmers and landless people.
- To reduce distances between towns and villages about services prevail through collective efforts and develop gradually.

Programs

Programs for the rural development may be framed on Involvement of people with the decision-making and development activities, Poverty reduction, Rural infrastructural development, Agro-based rural economy, Rural educational system, Village health service and development of foodstuffs, Village population control, Development of village settlement, Landuse and development, Village industrial expansion, Increase of capital and financing, Women empowerment, Development of village child and youth, Development of village backward population, Area-based special development program, Self-employment for self-dependent, Cooperative system for rural development and Conservation of rural environment.

5.2 Laws and Regulations Related to -

5.2.1 Urban Development Control

The President of Bangladesh is empowered through the Constitution (called constitutional Wright) to establish, control and removal of any government office. This is a part of national administration. The President of Pakistan, in the year 1960 was enacted the Municipal Administration Ordinance, 1960. In the year 1977, some of the Municipalities were upgraded and re-named as Paurasava and administered through the Paurasava Ordinance, 1977. Again, in the year 2009, Paurasava Ordinance, 1977 is re-named as Local Government (Paurasava) Act, 2009 but the name remains same.

The Local Government (Paurasava) Act, 2009 (Ordinance No. XLXVIII of 2009) was enacted in 6th October 2009 and this is the only regulation executes by the Paurasava authority. The Paurasava authority may provide the functions as prescribed in the Ordinance, no provision is being outlined to control and manage those functions. The jurisdiction of this Ordinance on other regulations includes following Acts and Ordinances. The Paurasava may enforce those regulations according to their capacity.

- A;çbÑL fËçaùje A;Ce, 1993 (1993 p-el 27 ew A;Ce)
- AbÑ GZ A;ç;ma A;Ce, 2003 (2003 p-el 8ew A;Ce)
- ÙÛje£u pL;l Lçjne AdÉj-cn, 2008
- h;wmj-cn nËj A;Ce, 2006 (2006 p-el 42 ew A;Ce)
- Cantonments Act, 1924 (Act No. II of 1924)
- District Act, 1836 (Act No. I of 1836)
- The Penal Code, 1890 (Act No. XLV of 1890);
- Prevention of Corruption Act, 1947 (Act No. II of 1947)
- hÉjwL @L;Çfje£ A;Ce, 1991 (1991 p-el 14 ew A;Ce)
- The Bangladesh Shilpa Rin Sangstha Order, 1972 (P.O. No. 128 of 1972)
- The Bangladesh Shilpa Bank Order, 1972 (P.O. No. 129 of 1972)
- The Bangladesh House Building Finance Corporation Order, 1973 (P.O. No. 17 of 1973)
- The Bangladesh Krishi Bank Order, 1973 (P.O. No. 27 of 1973)
- The Investment Corporation of Bangladesh Ordinance, 1976 (Ordinance No. XL of 1976)
- The Rajshahi Krishi Unnayan Bank Ordinance, 1986 (Ordinance No. LV III of 1986)
- @L;Çfje£ A;Ce, 1994 (1994 p-el 18 ew A;Ce)
- Local Government (Paurasava) Act, 2009 (Ordinance No. XLXVIII of 2009)
- SeÈ J jªaÉ çehåe A;Ce, 2004 (2004 p-el 29 ew A;Ce) (see section 53(2)(Q))
- Evidence Act, 1872 (Act No. I of 1872) (see section 131)
- fö @l;N A;Ce, 2005

On the other hand, the Paurasava is empowered for delivery urban services, collection of taxes and tolls, preparation of budget, control development and other physical activities provide health and social services and electoral role. All of those activities are guided through this Ordinance. In case of regulatory involvement, the Ordinance is wide enough than other authorities. The Ordinance proves that the Paurasava is independent and self regulatory body, but due to the absence of necessary manpower, technological support

and government initiative in financial matter, the Paurasava is dependent on central government.

Building Construction Rules, 1996

Building Construction: The Paurasava Authority is the custodian and enforcement authority of the Building Construction Act, 1952 and Building Construction Rules, 1996 for any construction in the Paurasava premises. Section 3(1) of the Act presents control on building construction in the country. Mostly approval system of the building plan prescribed in the Rules and punishment for the breach of regulation presented in the Act. But the approval system is lengthy and volume of punishment is poor.

Density Control: Section 12(1) of Building Construction Rules, 1996 sets a formula for building height determination based on the width of the front road. This rule imposes a limit on the building height as long as the front road is less than 75 ft. (22.87 meter). Indirectly this limits the number of family or the size of population in a building. Setback rule of the building and approval system of the building plan also prescribed in the Building Construction Rules.

Excavation of Tank: Section 3(2) of the Act presents control on the excavation of Tank in the urban area. Approval for such excavation will be needed from the concerned authority. The regulation mostly enforces by the Development Authority and the Deputy Commissioner enforces on the areas other than the jurisdiction of Development Authority.

Raging of Hill: Section 3(3) of the Act presents regulation on the raging of hill. In the Act it is prescribed that anybody is not authorized for raging of hill without approval from the concerned authority. Development Authority and Deputy Commissioner is the concerned authority.

National Reservoir Protection Act, 2000

Playfield, Open space, Garden and Natural Tank in Urban Areas Preservation Act, 2000 (Act No. XXXVI of 2000), enacted in 18th September 2000. In short, this Act may be called as National Reservoir Protection Act. The jurisdiction of this Act is covered Metropolitan City, Divisional and District level Cities and all urban areas including Paurasava area. Aim of the Act is to preserve play field, open space, park / garden and natural water reservoir. For the Paurasava premises, Paurasava Authority is empowered for enforcement of the said Act.

According to the section 5 of this Act, any area demarcated as Playfield, Open space, Garden and Natural Tank should not be changed with other use or it is prohibited for rent, leasing or any other procedure followed by, or handover to anybody for such changes. Again, according to the section 6, approval from concerned authority through application within stipulated time will be needed for any change of the area identified as play field, open space and natural tank. Punishment for such changes without approval

from concerned authority is presented in the section 8. For such unlawful activities, punishment may be 5 years imprisonment or Tk 50,000 as a penalty or both. For preservation of natural water bodies in the Paurasava, this Act will be the important tool of the Paurasava authority.

Acquisition and Requisition of Immovable Property Ordinance, 1982

For any physical development activities, acquisition of land is needed primarily. In the Paurasava premises, for acquisition of land, the Paurasava Authority will request to the Deputy Commissioner to acquire the land needed. It is said in the section 3 of the Acquisition and Requisition of Immovable Property Ordinance, 1982, whenever it appears to the Deputy Commissioner that any property in any locality is needed or is likely to be needed for any public purpose or in the public interest, he shall cause a notice to be published at convenient places on or near the property in the prescribed form and manner stating that the property is proposed to be acquired.

Conservation of Environment Act, 1995

Directorate of Environment is the enforcement authority of the Conservation of Environment Act, 1995. According to the Act, government can declare ecologically critical area through Gazette Notification (section 5(1). Such critical environment may be created through human activities or climatic disturbances. Control on motorized vehicles who exhausts smoke dangerous for human health has prescribed in the section 6. Punishment for violation of any order presented in the Act may be 5 years imprisonment or fine with Tk. 1, 00, 000 or with both.

Rural Electrification Board Ordinance, 1977

Government of Bangladesh has enacted the Rural Electrification Board Ordinance on 29th October 1977. Section 8 of the Ordinance has presented functions of the Board and among them two functions are -

- (a) To establish electricity generation transmission, transformation and distribution systems in the rural areas of Bangladesh.
- (b) To take measures for effective use of electricity to foster rural development with special emphasis on increase of use of electric power for economic pursuits such as development of agriculture and establishment of rural industries and assisting the advantaged sections of the community for augmenting their income and standard of living.

Public Health (Emergency Provisions) Ordinance, 1944

Department of Public Health Engineering is the enforcement authority of the Public Health (Emergency Provisions) Ordinance, 1944. The Department is responsible for supply of drinking water also in the Paurasava premises. According to the section 7(1), “a local authority may supply water to any local authority or to any other authority or person within or without its local area upon such terms as may be agreed, notwithstanding any provision prohibiting or restricting such supply contained in any

other law.” Based on such regulation, the Department is performing his duty in the Paurasavas.

Brick Burning (Control) Ordinance, 1989

Chairman of the Upazila Parishad is the enforcement authority of the Brick Burning (Control) Ordinance, 1989. In this Ordinance, control imposes only on the brick burning and said that no person should use wood for such purposes (section 5). For the violation of this regulation, the accused person may be punished with 6 months imprisonment or punished with a fine Tk. 10,000 or with both.

Land Development for Private Housing Project Act, 2004

The Act was enacted on 1st March 2004 to control land under private housing and develop accordingly. The authority who has prepared master plan, the Act will be enforced on those areas. It is said in the section 1(2) of this Act that, this Act will be enforced under the jurisdiction of the master plan areas prepared under the guidance of The Town Improvement Act, 1953 (E.B.Act XIII of 1953) and The Building Construction Act, 1952 (E.B.Act II of 1952).” According to the regulation prescribed above, the private housing construction in the Paurasava area may be controlled through this Act but, an amendment will be necessary to include the name of Local Government (Paurasava) Act, 2009 under which the Master Plan (Structure Plan, Urban Area Plan and Ward Action Plan) is being prepared.

5.2.2 Paurasava Development Management

After the independence (1971), all local government systems were abolished by the Presidential Order No. 7 in the year 1972 and appointed an administrator in each of the Municipality. After this Order, name of the Local Governments were changed as Town Panchayat instead of Union Committee, Shahar Committee instead of Town Committee and Paurasava instead of Municipal Committee. Shahar Committee was renamed as Paurasava in the year 1973 with a Presidential Order No. 22 and introduced election procedure for the Chairman and Vice-chairman. Thana Parishad Ordinance, 1976 (Ordinance No. XXXII of 1976) was enacted in 21st May 1976 to provide for the constitution of Thana Parishad. Paurasava Ordinance was enacted and notified in the year 1977. Nine Commissioner and selection of female Commissioner in every Paurasava was provisioned in the Ordinance. According to the Paurasava (amendment) Ordinance, 1998, re-distribution of Paurasava Wards was introduced and the Paurasava belongs with 3 Wards proposed for 9 Wards and 12 Wards instead of 4 Wards. One Commissioner for every Ward and one-third Ward of every Paurasava was reserved for female Commissioner who was elected by the general election of the country. Local Government (Paurasava) Ordinance, 2008 (Ordinance No. XVII of 2008) was provisioned 9 Wards, one Mayor and 3 female Councilors for every Paurasava. Mayor and Councilors will be elected through general election. The provision remains in the Local Government (Paurasava) Act, 2009.

From the year 1977 to 2009, Paurasava Ordinance, 1977 enforces by the Paurasava authority and the name of the statute was Paurasava Ordinance, 1977. After promulgation of the same statute, name of the Ordinance has changed as Local Government (Paurasava) Act, 2009. Generally, people call it Local Government (Paurasava) Act, 2009.

For the management of all physical development activities, a wide range of functions have been prescribed in the Second Schedule of the Ordinance. For efficient management of development, three major activities are prescribed and they are – Town Planning, Building Construction and Development. According to the Second Schedule, functions in brief are presented in the following table.

Table 5.4: Functions in brief prescribed in the Local Government (Paurasava) Act, 2009

| Major activity | Specific functions | Functions in brief |
|-----------------------|---|--|
| Town planning | Master plan | The Paurasava shall draw up a master plan for the city which shall provide for a survey of the Paurasava including its history, statistics, public services and other prescribed particulars. Development, expansion and improvement of any area within the city; and restrictions; regulation and prohibitions to be imposed with regard to the development of sites, and the erection and re-erection of buildings within the Paurasava. |
| | Site development schemes | Where a master plan has been drawn up and approved by the government, no owner of lands exceeding such area as may be specified in this behalf in the master plan, shall develop the site or erect a building or any plot of land covered by the provisions of a site development scheme sanctioned to area in the prescribed manner. Among other matters, a site development scheme may provide for- (a) the division of the site into plots; (b) the street, drains and open spaces to be provided; (c) the land to be reserved for public purposes and to be transferred to the Paurasava; (d) the land to be acquired by the Paurasava; (e) the price of plots; (f) the works that shall be executed at the cost of the owner or owners of the site or sites; and (g) the period during which the area shall be developed. |
| | Execution of Site Development Schemes | If any area is developed or otherwise dealt with in contravention of the provisions of the sanctioned Site Development Scheme, the Paurasava may by notice require the owner of such area or the person who has contravened the provisions to make such alteration in the site may be specified in the notice as where such alteration is not made or for any reason cannot be carried out, the Paurasava may, in the prescribed manner require and enforce the demolition of the offending structure; and notwithstanding anything to the contrary contained in any law, no compensation shall be payable for such demolition. |
| Building construction | Building construction and re-construction | Without approval of the building site and plan by the Paurasava, nobody can construct, re-construct any building in the Paurasava area. The Paurasava will approve the plan within sixty days or refund it within that specified time frame; otherwise the plan will be considered as approved. |
| | Completion of | After completion of the approved building, the owner will notify to |

| Major activity | Specific functions | Functions in brief |
|----------------|----------------------------------|--|
| | construction and change, etc. | the Paurasava within 15 days. The Paurasava may inspect the building and if found any violation of the provision prescribed in the Master Plan or in the Site Development Scheme, the Paurasava may demolish the building and the demolishing cost may be incurred from the building owner. |
| | Building control | If any building or anything fixed thereon, be deemed by the Paurasava to be in a ruinous state or likely to fall or in any way dangerous to any inhabitant of such building or any neighboring building or to any occupier thereof or to passers-by, the Paurasava may by notice required the owner or occupier of such building to take such action in regard to the building as may be specified in the notice, and if there is default, the Paurasava may take the necessary steps itself and the cost incurred thereon by the Paurasava shall be deemed to be a tax levied on the owner or occupier of the building. If a building is in dangerous condition, or otherwise unfit for human habitation, the Paurasava may prohibit the occupation of such building till it has been suitably repaired to the satisfaction of the Paurasava. |
| Development | Development plans | The Paurasava shall prepare and implement development plans for specific time. Such Plans shall provide for- (a) the promotion, improvement and development of such function or functions of the Paurasava as may be specified; (b) the manner in which the plans shall be financed, executed, implemented and supervised; (c) the agency through which the plans shall be executed and implemented; and (d) such other matters as may be necessary. |
| | Community Development Projects | The Paurasava may, sponsor or promote community development projects for the Paurasava or any part thereof and may in this behalf perform such functions as may be prescribed. |
| | Commercial schemes | The Paurasava may, with the previous sanction of the Government, promote, administer, execute and implement schemes for undertaking any commercial or business enterprise. |
| Street | Public streets | The Paurasava shall provide and maintain such public street and other means of public commutation as may be necessary for the comfort and convenience of the inhabitants of the Paurasava and of the visitors thereto. |
| | Streets | No new street shall be laid out except with the previous sanction of the Paurasava. The Paurasava may by notice required that any street may be paved, metalled, drained, channeled, improved or lighted in such manner as may be specified in the notice, and in the event of default, the Paurasava may have the necessary work done through its agency, and the cost incurred thereon by the Paurasava shall be deemed to be a tax levied on the person concerned. |
| | General provisions about streets | The Paurasava may assign names to streets and paint the names or fix the nameplates on or at conspicuous places at or near the end corner or entrance of the street. No person shall destroy, deface or in any way injure any street, name or name plate, or without the previous permission of the Paurasava, remove the same. |
| | Street lighting | The Paurasava shall take such measures as may be necessary for the proper lighting of the public streets and other public places vesting in the Paurasava. |
| | Street watering | The Paurasava shall take such measures as may be necessary for the watering of public streets for the comfort and convenience of the public, and for this purpose, maintain such vehicles, staff and other apparatus necessary. |
| | Traffic control | The Paurasava shall make such arrangements for the control and |

| Major activity | Specific functions | Functions in brief |
|---------------------------|---------------------------------|--|
| | | regulation of traffic necessary to prevent danger and ensure the safety, convenience and comfort of the public. |
| | Public vehicles | No person shall keep or let for hire or drive or propel within the limits of the Paurasava any public vehicle other than a motor vehicle except under a license granted by the Paurasava, and in conformity with the conditions of such license. No horse or other animal shall be used for drawing a public vehicle within the limits of the Paurasava except under a license granted by the Paurasava. |
| | | |
| Water supply and drainage | Water supply | The Paurasava may provide supply of wholesome water sufficient for public and private purposes. Frame and execute water supply scheme for the construction and maintenance of such works for storage and distribution of water. |
| | Private sources of water supply | All private sources of water supply within the Paurasava shall be subject to control, regulation and inspection by the Paurasava. No new well, water pump or any other source of water for drinking purposes shall be dug, constructed or provided except with the sanction of the Paurasava. |
| | Drainage | The Paurasava shall provide an adequate system of public drains in the and all such drains shall be constructed, maintained, kept, cleared and emptied with due regard to the health and convenience of the public. All private drains shall be subject to control, regulation and inspection by the Paurasava. |
| | Drainage scheme | The Paurasava may prepare a drainage scheme in the prescribed manner of the construction of drains at public and private expense. The drainage scheme as approved by the government shall be executed and implemented within specified period. |
| | Bathing and washing place | The Paurasava may from time to time set a suitable place for use by the public for bathing, washing cloths, or for drying cloth. Specify the time at which and the sex of persons by whom such places may be used. No person shall establish, maintain or run a bath for public use except under a license granted by the Paurasava. |
| | Dhobi ghat and washer men | The Paurasava may provide dhobi ghats for the exercise of their calling by washer men, and may regulate the use of dhobi ghats and levy fees for their use. |
| | Public water-course | The Paurasava may declare any source of water, spring, river, tank, pond, or public stream, or any part thereof within the Paurasava, which is not private property, to be a public watercourse. |
| | Public ferries | The Paurasava may by by-laws provide for the licensing of boats and other vessels plying for hire in a public water-course to be a public ferry and may entrust the management thereof to the Paurasava, and there upon the Paurasava shall manage and operate the public ferry in such manner and levy such tolls as prescribed. |
| | Public fisheries | The Paurasava may declare any public watercourse as a public fishery, and there upon the right of fishing in such water course shall vest in the Paurasava which may exercise such right in such manner as may be prescribed. |

5.3 Strength and Weaknesses of the Existing Policies

The Consultant has identified following weaknesses in the existing policies. These are – accommodation of future thrust of growth likely to arise after construction of the 1st Padma Bridge at Maowa point, supply of safe drinking water, providing safe and easy accessibility, use of agriculture production in income generating activities and create provision for further investment.

The primary motive is to exercise control over unorganized development and promotion of planned infrastructure development to accommodate future urban growth. The Paurasava will be developed as a self-contained town in rural environs.

Impact of construction of Padma Bridge at Maowa point is extremely difficult to make a growth projection with sufficient precision. Many factors are involved with this such as landuse change, increase of commuters, increase of vehicular movement, forward linkage of commodities and social changes of the Paurasava dwellers.

To increase the agro-product and use them in income generating activities, a vast agriculture land will be used and at the sametime, the existing agriculture land should be preserved. Further residential expansion should be controlled through the imposition of development control. In this context, concept of cluster development and compact township approach should be provisioned in the plan. Vertical development will be encouraged rather than horizontal to save the agriculture land.

CHAPTER 6

CRITICAL PLANNING ISSUES

6.1 Transport

Van and rickshaw are two major transport modes in the study area. Bicycle is the main mode for private users. Movement of motorcycle is also identified as major private mode. Inadequacy of bus service found normal scenario in the study area. The peak hour traffic movement is found in morning from 9am to 10am and in the afternoon from 4pm to 6pm in general. Overall traffic congestion is low, let it should not be increased. The movements of Nosimon which is very risky need to restrict to keep the urban area risk free, clean and sound. Establishment of bus route within the study area is another prior demand of the people.

The hat / bazar in the study area serves by bituminous and brick soling roads. But the area is not served by well defined road hierarchy, nor is required now due to sparse use of roads by motorized vehicles. However, the induced activities due to the prospects of upward economic change may need to provide road network befitting with the need.

Highway traffic is comparatively low dominated by mixed type of vehicles including non-motorized. Generally, surface of the highways excepting for a larger part is excellent. The road network is not facilitated by designated parking area, bus terminal and bus bay. As a result, sometimes congestions and chaotic situation occurs for a little while. In spite of this situation, present road network is functioning well. But it has to be upgraded to accommodate the future increase of traffic volume that is expected to increase due to the construction of 1st Padma Bridge at Maowa point.

6.2 Environment

In the Paurasava, water pollution and solid wastes are the major environmental problems. Pesticides use in agriculture land, chemicals and food use in pisciculture, poultry feed use in poultry farming and bathing and washing in river water are the causes of water pollution. Household garbages, kitchen market garbages and garbages produce by the pedestrians are producing solid waste problems. Systematic approaches will be needed to remove those problems.

6.3 Landuse Control

Accommodation of future thrust of growth likely to arise after construction of the Padma Bridge, supply of safe drinking water, providing safe and easy accessibility, use of agriculture production in income generating activities and create provision for further investment.

The primary motive is to exercise control over unorganized development and promotion of planned infrastructure development to accommodate future urban growth. The Paurasava should be developed as a self-contained town in rural environs.

Impact of construction of Padma Bridge is extremely difficult to make a growth projection with sufficient precision. Many factors are involved with this. Those factors are rapid change of land use from agriculture to non-agricultural activities, rural homesteads will change their character by the urban dwellers, land value will increase and the farmers will sell their farming land and shift elsewhere where low land value exists, spotted industrial development emerges and a mixed urbanization character will be formed, low lands adjacent to the communication network will be filled and will create drainage congestion.

To increase the agro-product and use them in income generating activities, a vast agriculture land will be needed and therefore, existing agriculture land should be preserved. Further residential expansion should be controlled through the imposition of development control. In this context, concept of cluster development and compact township approach should be provisioned in the plan. Vertical development should be encouraged rather than horizontal to save the agriculture land.

Major aim of the Land Use Policy 2001 was to prevent indiscriminate conversion of agricultural land into non-agricultural use, because such conversion may be threatened for food security of the country. Such conversion should be prohibited with the multi-sectoral use of land. During implementation of Urban Area Plan and Ward Action Plan, necessary control should be imposed according to the following manner.

High value agriculture land should be preserved only for agriculture purposes. The land produces three crops in a year are under this category. Any physical development activities should be prohibited by the Paurasava authority. In the Paurasava, high value agriculture land is found in the Ward No. 1, 2 and 4.

Drainage congestion due to the indiscriminate development activities is another critical issue. With the increase of population and commercial activities, lands of the Paurasava town are being converted for habitation. Natural development of those settlements somewhere creates drainage congestions. Drainage congestion areas in the Paurasava are Dhalipara and Khalifapara in Ward No. 3, Purba Naria in Ward No. 4 and Dewan Para in Ward No. 6.

Missing links in road transportation creates accessibility problem. In the intersections, lands are used by commercial activities including daily bazar and saw mill. Most of those are government lands. Vehicular accessibility became zero in those areas.

Easy accessibility with neighbouring Upazilas and a regional linkage is needed. Those linkages will grave huge amount of agriculture land. The single crop land may be used for this purpose.

6.4 Disaster

Disaster is the tragedy of a natural or man-made hazard that negatively affects society or environment. Disaster can be classified into two categories: natural disaster and man-made disaster. Natural disaster is the effect of flood, volcanic eruption, earthquake or landslide, draught, epidemic, etc. that affects environment and leads to financial, environmental or human losses. Man-made disasters is resulting from human intent, negligence or error, or involving a failure of a man-made system.

The Paurasava area including the Naria Upazila has affected by the several major natural disasters ranging from Cyclone, Flood to Water-logging and Draughts, etc. The periods of those disasters are 1998, 2000, 2004, 2007 and 2008. Very scanty attempt has been made by the government to rehabilitate people after the natural disaster.

Urbanization is converting lands for residential use. Agricultural lands and water bodies are being chosen most frequently and the lands are being converted into urban settlement. In the Naria Paurasava, wet lands are being filled up and agricultural lands are being converted. This has been identified as the major man-made disaster accelerating the degree of conversion year to year. Use of poisonous insecticides on the agricultural land is another man-made disaster which will affect in the long-run.

6.5 Laws and Regulations

The regulations prescribed (mentioned in the Chapter-5.2.1, Sl. No. 1 to 20) in the Local Government (Paurasava) Act, 2009 are not directly related with the physical development activities and their control. The East Bengal Building Construction Act, 1952 is called the mother regulation to control all type of physical development but no instruction is being included in the Local Government (Paurasava) Act, 2009 regarding EBBC Act, 1952. The Paurasava authority approves the building plan and excavation of tank without any regulatory control.

The regulation prescribed in the Local Government (Paurasava) Act, 2009 on the preparation of master plan is called traditional regulation. In the modern world, the concept of master plan became obsolete. In this project, the so called master plan, as mentioned in the Local Government (Paurasava) Act, 2009 considered as a package and the plan included in this package named Structure Plan, Urban Area Plan and Ward Action Plan, though there is no regulation in the country on the preparation and implementation of those plans.

In the Paurasava, 48.49% (except water bodies) land is under agriculture use. Most of those lands are private. Different type of help is necessary for the farmers involved with

those agriculture lands. Section 13(1a) of the Agricultural Development Corporation Ordinance, 1961 prescribed regulation on the function of the Corporation and said that “the Corporation shall make suitable arrangements throughout East Pakistan, on a commercial basis, for the procurement, transport, storage and distribution to agriculturists of essential supplies such as seed, fertilizers, plant protection equipment, pesticides and agricultural machinery and implements.” Where the Corporation is absent, how the farmers will get benefit prescribed in the section 13(1a)? To increase the agricultural commodities such type of help is necessary.

Except the Paurasava Town (Township development areas), other areas are rural. To generate rural-based township environment, those rural areas should be preserved. Rural development components as prescribed in the section 7(1a) of the Bangladesh Rural Development Board Ordinance, 1982 should be provisioned to control those rural areas. As prescribed in the section 7(1a), functions of the Board shall be “to promote village-based primary co-operative societies and Thana Central Cooperative Association (TCCA) with a view to enabling them to be autonomous, self-managed and financially viable vehicles for increasing production, employment generation and rural development.”

6.6 Others

The Paurasava can control the Dhobi Ghat as prescribed in the Second Schedule of the Local Government (Paurasava) Act, 2009. About 6 Dhobi Ghat is found in the Naria Paurasava. Those Ghats are using for bathing and washing of the Paurasava inhabitants. Most of them are located by the side of Palong River. Number of Ghats is showing the necessity of water. The Palong River is linked with other rivers of the country. Pollution of Palong River water is polluting other river water. People awareness is necessary to use that river water.

CHAPTER 7

LAND USE ZONING POLICY AND DEVELOPMENT STRATEGIES

7.1 Strategies for Optimum Use of Urban Land Resources

Inhabitants of the Paurasava are not aware about the land level and slope direction of the Paurasava. Without knowing this information they are raising their land up to a mark and constructing permanent structure. As a result, water-logging problem during rainy season is all over the residential areas.

Due to the absence of development control, the core area of the Paurasava is already developed as mixed-use area. Commercial, residential, administrative, educational uses are admixture in the core area. Zoning provision, land use control should not be enforced in such type of the core area.

The Paurasava is a natural developed area. Rearrangement of the existing use is not possible. Land acquisition for expansion of road (to increase the width of road) will create socio-political hazards. As a result, the roads in the core area remain same as today.

For water supply network, construction of sewerage facilities and removal of fire hazards, at least 24 feet width road is necessary. In the Paurasava such type of road is absent. New road will form new township on agriculture land. These processes will washout agriculture domination from the Paurasava. Compact Township and cluster development will be effective for new formation, not for the mixed-use areas where most of the roads are 8 to 10 feet width.

Prior to planning, strategies have been developed for issues like, utilities, circulation and drainage both for core urban areas and urban fringe areas. The steps of strategies for formulation master plan are based on the policy recommendations and standards suggested by the LGED. All those aspects are very vital for creating livability in Paurasava area.

Policies and Strategies

In relation to the land uses, the expected cluster development policies are:

Review the selected clusters and prepare guidelines for their development: In carrying out this task, Paurasava will pay particular attention to the scale of growth to be accommodated in each cluster. This will be influenced by the local pressures for growth and capacity of each cluster to absorb such growth. In relation to the tentative list of clusters identified in the Chapter-3, the following comments need to be made:

First priority clusters are the market areas (Naria Bazar in Ward No. 2 and 7). Variations between the scales of growth to be accommodated in each of the markets will be found. Second priority clusters are located on the fringes of the existing Paurasava town centre.

They are areas where pressure for growth is already strong. Their inclusion in the list is therefore almost inevitability. However, the long term costs associated with large scale development in all four of these clusters - central part of the Ward No. 4, central part of the Ward No. 5, eastern part of the Ward No. 7 and southern part of the Ward No. 9 – suggest that the policy should be to provide for growth whilst containing it as much as possible.

Those clusters are in rural character, objective of the Paurasava will be to ensure that the use of land is appropriate to this character.

Limit industrial use outside the existing town centre and the proposed extensions to the town centre: Location of manufacturing activity may have benefits to the local communities in which the manufacturing activity is located – through provision of direct or indirect employment and benefits to the entrepreneur in terms of reduced costs. However, it may also have disadvantages, say, for example, if the infrastructure is not available to deal with the effluent (whether it be air borne, water borne or in the form of solid waste) of the manufacturing processes being undertaken in these relatively remote locations.

Encourage the development of non-urban uses such as agriculture and forestry on land on the periphery of the Town centre which is unsuitable for urban development.

Optimization of the Existing Urban Land Resources

Structure Plan area of the Naria Paurasava is 2717.82 acres (11.00 sq. km.); population is 22337 with gross density 8 persons per acre. In the year 2031, the population will be 29355 with gross density 11 persons per acre.

At present, agriculture and water body includes 48.49% and 12.50% land respectively. Some important landuse determining factors like government policy, industrial establishment, construction of road including embankment and availability of services may change the agriculture domination in next 20 years. Question raises that how much this change will affect the present land resources?

During last ten years, the landuse scenarios remain same. A stagnant character of landuse change still stand due to the existence of river named Palong. Rapid change of landuse will be viewed after the construction of Padma Bridge at Maowa point. Except this, present population distribution and growth including migration shows that the area is developing significantly in terms of trade and large business and trying to get out of agriculture based activity.

After preparation and implementation of master plan / urban area plan changes in the physical character of the Paurasava will be viewed. These changes will be provided by the infrastructural and community services development. According to the master plan / urban area plan and Ward Action Plan this change should not exceed 5% to 10% from the

total land of the Paurasava for next 20 years. Conversion of agriculture land in to infrastructural development may be considerable only for construction of embankment and road.

Zoning Policies and Strategies

Zoning is an effective guideline for the preparation of landuse plan. According to this guideline, specific use should be in specific area; height of the building will be controlled for easy access of sunlight and wind flow and ensuring availability of open spaces in every lot with the controlling of building density. For the sake of zoning provision in the Paurasava, core area, fringe area, peripheral area and new urban area is being demarcated accordingly.

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 Land use Plan (2011-2031) period.

Policies: Existing town centre will be defined as core area. Mostly mixed-use areas are the important characteristics of the core area. Size of the core area is 166.5 acres. With the increasing of density, this area will lost living environment. Further expansion of the core area will be discouraged in the plan.

Strategies: Let the core area remain up to the plan period. No physical development provision will be initiated by the Paurasava. Vertical and horizontal expansion of the structure or establishment may be approved by the Paurasava with high rate.

Table 7.1: Proposed zoning areas

| Type of zone | Area (acre) | % |
|-------------------|-------------|--------|
| Agriculture | 686.87 | 28.25 |
| Core Area | 166.55 | 6.85 |
| Fringe Area | 886.17 | 36.44 |
| Major Circulation | 168.02 | 6.91 |
| New Urban Area | 70.21 | 2.89 |
| Peripheral Area | 240.87 | 9.91 |
| Waterbody | 212.92 | 8.76 |
| Total | 2431.45 | 100.00 |

Source: Based on Landuse survey, 2010.

Fringe area

This zone is identified as 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 resources.

Policies: The area, adjacent with the core area, ideal for rapid urbanization is considered as fringe area. Total area is 886.17 acres. Important community facilities, utility services and residential development will be the basic components of the fringe area. Improved transportation and communication linkages, better water supply and drainage facilities including rain water reservoirs will be the planning components.

Strategies: The guidelines set in the policy may be implemented by the different public authorities. A close coordination among those authorities should be maintained during implementation of the planning component. Any change of the planning should instantly be resolved with the involvement of the Paurasava authority.

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 a planned way.

Policies: Agriculture domination will be the prime characteristic of the peripheral area. Rural homesteads, spotted important development like park, dumping ground, stadium and agro-industries are the important planning components of this area. Total area is 240.8 acres. Any contrast regarding the implementation of those planning components should not be encouraged.

Strategies: Phase-wise development will be encouraged. Individual authority may implement individual component. Coordination among the authorities is not mandatory. Locational change of the proposed components should be discouraged.

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 being proposed to be developed within the year 2031.

Policies: Planned development will be the prime characteristic of the new urban area. Housing with greeneries, important development like park, commercial centre, educational institute, improved health facilities, community centre, road with footpath including drainage facilities, water supply and fire service are the important planning components of this area. Total area is 70.21 acres. Any contrast regarding the implementation of those planning components should not be encouraged.

Strategies: Phase-wise development will be encouraged. Individual authority may implement individual component. Coordination among the authorities is not mandatory. Locational change of the proposed components should be discouraged.

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, sugarcane, jute, vegetables and melons; also includes land left temporarily fallow; land under permanent crops (e.g., fruit plantations); areas for natural grasses and grazing of livestock.

Policies: Agricultural domination will be the prime characteristic of the Agriculture zone. Agricultural commodities as mentioned earlier are the important components of this area. Total area is 686.8 acres. Any cropping combination may be encouraged.

Strategies: Any agricultural practice will be encouraged. Individual authority may supervise and subsidize agricultural inputs to the farmers for increasing the production. Coordination among the authorities is not mandatory. Any physical development should be controlled by the Paurashava (except bridge, culvert, drain and road).

Waterbody

Water body contains 212.9 acres including khal, pond, irrigation canal and river whose area more than 0.25 acre.

Policies: Rainwater harvesting and pisciculture will be the prime characteristic of the pond and river will be preserved for outfall of the drainage system including irrigation purposes and water ways. Any contrast regarding the implementation of those components should not be encouraged.

Strategies: Individual authority may control individual component such as pond by the Paurashava and river by the Water Development Board. Coordination among the authorities is not mandatory. Any change of the components should be discouraged.

Major Circulation

Major circulation contains major road network with regional and national settings.

Policies: Easy accessibility with national, regional and local will be the prime characteristic of the circulation network. All transportation infrastructures should be incorporated as the important planning components. Total area is 168.02 acres. Any encroachment or contrast regarding the implementation of those transportation infrastructures should not be encouraged.

Strategies: Phase-wise development will be encouraged. Individual authority may implement individual component. Coordination among the authorities is not mandatory. Locational change of the proposed components should be discouraged.

7.2 Plans for New Area Development

The Paurashava is not an ideal township due to the agriculture domination. Agriculture based township should be encouraged in the preparation of Urban Area Plan. Growth of population is the natural trend and at the same time, expansion of non-agricultural use on

agriculture land is also natural tendency of the people. This will be controlled through the Compact Township concept with the encouragement of vertical development. In case of government services, specific building may accommodate different type of offices.

Future landuse will be calculated according to the development control for the masses. In case of public land, existing use and khas land will be emphasized. Willingness and participation of the people in development activities will be the key factor for future landuse demarcation. Slow change of landuse will be emphasized rather than rapid change. Let the people do whatever he likes on own land – such concept should not be considered for future projection of landuses. Three parts of the projection are landuse change, landuse control and landuse restriction will be included in the Master Plan. In any case, river front areas should be restricted for human habitation. As a result, river water will safe from contamination.

The agriculture land should be preserved (according to the Agriculture Policy) from any type of physical development. It should not be decreased with the expansion of habitable area or formation of new settlement, may be increased with the formation of char lands. In case of road, embankment, drainage and new urban area, the agriculture land may be used but such use should be guided according to this plan. For the development of pisciculture, all ponds (not lower than 0.15 acres) and ditches may be preserved, in some exceptional cases; small number of ditches and ponds may be used for physical development activities.

People's willingness will be considered as important base for the projection because the Master Plan is for the inhabitants of the Paurasava. They will be the beneficiary group of that Master Plan. Their willingness in case of use and land allocation, location, expansion provision will be the important consideration. On the basis of fulfillment of their demand, they will like to involve them willingly in the implementation procedure of the Master Plan.

Policies and Strategies

A large number of constraints are involved with the development of new area. Following strategies are involved with the development of new areas:

- Low incomes;
- Difficulties associated with assembling parcels of land which are large enough to make viable development sites;
- Disputes over ownership;
- Absence of private sector land developers;
- Lack of access (capable of resolution often only by works on land under the control of others); and
- The need in most cases for land to be prepared in some way prior development either by filling where it is subject to flooding or by earth moving where it is too

steep to develop. In both cases, drainage works have to form an essential part of the land preparation task.

The policies and strategies of the Paurasava related to new area development are –

Explore and Implement means of increasing the number and pace of public sector land development projects: This is one area where government can have a direct influence on accelerating the rate of conversion of non-urban to urban land.

Explore and Implement, with the private sector, means of increasing the number and pace of private sector land development projects: In moving towards realization of the objective of government supporting the private sector in its development role (i.e. acting as an enabler rather than a provider), the Paurasava will examine, with the private sector, the means of overcoming the constraints to new area development.

Realization of the above two strategies is likely to require changes in legislation and administrative procedures at the national level. The other strategies of the Paurasava relating to new area development are set out below.

Promote upgrading of the existing urban area: As densities within the existing Paurasava Town increase, there will be growing pressure for upgrading to ensure that infrastructure provision is adequate and that living conditions are acceptable.

Most of the parts of the Paurasava are in agriculture practice and few parts are in urban area will require no upgrading at all. Accordingly the Paurasava will set priorities throughout the study area and ensure, through its own efforts or the efforts of others, that upgrading projects are necessary. Obvious areas for early consideration will be slum and squatter settlements. Local community and NGOs may involve with the upgrading projects.

Assist the transition of areas on the fringes of the extension urban areas from non-urban to urban use: The main priority here seems to be space for adequate access and drainage. Once this space is available, the roads, drains and other services can be installed as and when the resources are available to provide them. But without this space, rational development of such areas is impossibility, environmental problems occur and the pace of development is often seriously impeded.

If the Paurasava has the resources and to achieve this by acquiring land (either through negotiation or compulsory purchase) and ensuring that it remains free from development until needed, then the Paurasava will purchase this as a policy. If not, then a potential alternative approach is to work with the local community, particularly the landowners, to see if the space can be made available by readjustment of existing ownerships. Given the importance of this task the Paurasava will pursue an active policy of assisting the rational development of the fringe areas, by whatever means proves workable.

Ensure that land is available for all income groups: In accordance with Government's commitment to poverty alleviation, as expressed in the Poverty Reduction Strategy and the objectives of the National Housing Policy, a further major task facing the Paurasava is to ensure that land is made available for all income groups.

Reconsider the role that development control plays in the planning and management of new area: Where development control is institutionally well-established (with adequate legislation, administrative resources and enforcement power) it can be a very effective 'tool' in restricting new area development where it is considered unsuitable; encouraging it in areas where it is considered suitable; and influencing the type of development that takes place in any particular location. It can attempt to strengthen development control institutionally to enable it to perform its role more adequately. On the other hand, it can consider restricting the role of development control to those functions which it considers critical such as ensuring that development does not take place in corridors required for new road construction or road widening, or ensuring that polluting industry takes place only in areas which are suitable for it.

Encourage the development of unused or underutilized land rather than new areas: The Paurasava is characterized by having much unused or underutilized land within the heart of the town. This land represents a wasting asset. If maximum use is to be made of the existing investment in infrastructure and if journey times are to be kept short, then fuller utilization of this land is essential. The Paurasava will examine the reasons why such land remains unused or underutilized and will endeavour to overcome the constraints to its development.

7.3 Areas for Conservation and Protection

Type of area and structure which will conserve and protect is presented here.

- Historical building, monument, sculpture or any other related articles.
- Park, important playfield or any other active recreational areas.
- Government buildings like Dakbanglow, Court Building, Circuit House, D.C office, Paurasava office and official residence of the Paurasava Mayor.
- Riverfront areas where people spent their leisure time.
- Any other public establishment like Zoo, Museum, Flood shelter, etc.
- BM Pillars.
- Rail station, Bus Terminal and Launch / boat ghat.

Policies and Strategies

For conservation and protection areas, following policies and strategies are considered –

Map 7.1: Structure Plan of Naria Paurasava

Take environmental issues into account in all decisions related to the future development: By considering environmental issues in its entire decision making, the Paurasava aims to ensure that progress is made towards resolving the environmental problems exist and towards resisting the further deterioration of conditions beyond their present level.

The issue of polluting manufacturing processes is best dealt with by legislation at the national level. However, the Paurasava has a valid and important role to play in deciding the location of industry. It can confine polluting industry to a single or a limited number of locations, where prevailing winds will not carry airborne pollution over the Paurasava Town and where facilities for dealing with water borne effluent and solid waste disposal have a greater chance of being provided.

Impose restrictions on the location of new polluting manufacturing processes and identify suitable locations for their establishment: A long-term program of controlling the emission of pollutants from existing industrial activities and removing chronic polluting industry from unsuitable locations can also be pursued in association with the appropriate authorities. To be effective, this will need the force of law. One case is break-making. It is of value to the economy but is understood to have adverse environmental consequences. This is carried out in two locations throughout the planning area.

Monitor adverse environmental impacts of existing manufacturing processes and take measures to reduce such impacts to acceptable levels: The issues of the health hazard caused by current methods of solid waste disposal and sewage disposal can be addressed by improving the existing methods of providing these services.

Reduce noise levels from the worst noise nuisances: The issue of pollution from vehicles is unfortunately likely to get worse – as the rates of vehicle ownership and usage increase – before it gets better.

Some relief may however be afforded by improvements in the quality of emissions, as older vehicles are replaced by newer ones, and as technological developments continue to be made in emission control.

Identify and protect areas of ecological significance: It is important that such areas are protected before they are inadvertently destroyed. This policy will extend to areas of forest/ bushes and areas of un-spoilt river line. Once the initial priority of protection is successfully achieved, measures can be taken to enhance the quality of these areas.

Conserve buildings and monuments of cultural, architectural and historic interest: Such buildings and monuments are an important legacy of the past, reflecting different historical, cultural and national influences. The Paurasava will arrange for such buildings and monuments to be identified and listed. Following this, it will be necessary to draw up a program for their conservation. This program will need to consider the scope for

enhancing the settings of the buildings and monuments, as well as ensuring preservation of their fabrics.

Protect and enhance significant areas of open space within the Paurasava Town: The open spaces create character of Paurasava, distinguishing it from other Paurasavas in the country. Unless such spaces are protected, there is a strong likelihood that they will be gradually converted to urban uses and thus lost for the benefit of the community as a whole.

CHAPTER 8

STRATEGIES AND POLICIES FOR SECTORAL DEVELOPMENT OF THE PAURASAVA

8.1 Socio-economic Sectors

8.1.1 Population

The policies in relation to population are set out below.

Expected growth of population and changes of socio-economic characteristics: The population projection will need to be reviewed time to time in the light of new evidence. At a minimum this will need to be done at ten years intervals, as the results of Censuses become available. The Paurasava authority will need to monitor the factors affecting population growth – namely fertility, mortality and net inward migration and the factors reflecting changes in its socio-economic characteristics.

Rational distribution of population within the Paurasava: One of the main purposes of a master plan / development plan is to provide for the rational distribution of population, in relation to other urban activities and suitability of land for urban purposes. The Paurasava will pursue the policies required to achieve the spatial development strategy. It will also monitor change, assess the effectiveness of the policies being pursued and review the strategy as and when necessary.

Ensure availability of land, services and facilities according to the needs of the population: As the body responsible for planning and managing urban development, the Paurasava will ensure that land, services and facilities reflect the build up of population and changes in its requirements. This is a task for which it will require the co-operation of many agencies involved in urban development in the Paurasava.

8.1.2 Economic Development

The prospect related to economic activities summarizes in the following discussions:

Some small-scale pisciculture is located in the Naria Paurasava. About 48 households are involved with such pisciculture. The production mostly uses in the Dhaka City, Narayanganj and Madaripur Zila. Investment in this field will bring huge prospects of the Paurasava. Other economic prospect summarizes in the following discussions:

- Availability of unskilled and cheap manpower.
- Availability of agriculture land. The land may be used for different agricultural production and those productions may be used for the input of agro-based industries.
- Due to the nearness of Dhaka City, the Paurasava may be developed as the fringe area of Dhaka City. This fringe area with its agriculture production will support to the Dhaka City where marketing for those productions are available.

- The Paurasava has been developed as growth centre concept. Some cluster development is found around this growth centre. Planned development through this master plan will initiate to arrange the growth component in a systematic manner. At the same time, economic development parallel to the physical and social development will be encouraged.

Most of the entrepreneurs expressed their desire of implementing future development plan. A major portion mentioned that their development plan is the expansion of their enterprises (95%) and others intend to increase their production (5%). Expansion of existing industries and establishment of new industries will create more jobs and thus have multiplier effect in the overall economy leading to create more consumption capacity, investment opportunities in diversified economic fields and thus push the economy upward.

If the standard of living of the people of the Paurasava is not to deteriorate as the additional population discussed before, then the economy of the Paurasava must expand at least in step with the growth of population. For unless the population have the financial resources (through employment of business) to pay for the urban services and facilities they want, they will either have to rely on Government subsidy or they will go without.

Policies and Strategies

Given emphasize on the above situation following policies have been identified. These are all additional to the general requirement to ensure that land and infrastructure are available to support the wealth generating elements of urban development.

Encourage national business to locate in Naria Upazila / Shariatpur Zila: If national business can be encouraged to locate in promoting Paurasava / Upazila / Zila, they will provide not only earning capacity for their locally recruited employees but the opportunity for services to be provided to support the business. The Paurasava will, therefore, assist central government in promoting Paurasava as a potential location for inward investment of this type.

Encourage central government to decentralize facilities from Dhaka: Central Government has control over the location of many facilities which are currently located in Dhaka, such as Government departments, the headquarters of nationalized or Government banks and quasi Government bodies. The Paurasava will encourage Central Government to offset the current strong tendency towards centralization of facilities in the Capital by relocating some of these facilities to Paurasava / Upazila / Zila.

Overcome the constraints on compatible land use: Where established agricultural, industrial and commercial operations are compatible with the objectives of the Structure Plan, the Paurasava will work with these operations to overcome the constraints to their expansion. Where wealth generating activities are constrained in their desire for

expansion by lack of land, access or infrastructure provision, the Paurasava will, in conjunction with the other relevant authorities, endeavour to overcome these constraints.

8.1.3 Employment Generation

Two basic elements of economic development i.e. employment generation and increase of productivity are found in the cities and urban areas than the rural areas. This is a common phenomenon for the developed and developing countries. Employment opportunities act as a strong pull factor for influx of job seekers in the cities and urban areas, the centers of productivity. Special features of the Naria Paurasava are that it covers a vast rural area, besides a small urban center. This indicates general feature of the Paurasava as a mixture of rural and semi-urban nature. On the other hand, a considerable number of populations (at least one member from every family of the Paurasava) are in the Italy. Those families are enjoying remittance facilities for maintaining their daily life. These special socio-economic features have been taken into consideration in conducting the study of the prevailing economic situation.

It is found from the study that the entrepreneurs of the study area generally suffer from the following common problems:

- Lack of cheap and dependable source of energy (gas supply).
- Unreliable electricity supply.
- Absence of better access facilities with the capital city.
- Absence of railway connection with the capital city and with surrounding Zilas.
- Insufficient communication infrastructure.
- Shortage of skilled manpower.
- Complex official procedures in setting up a new industry (cumbersome processes of getting infrastructural and utility services connections, lack of manufacturing-investment-friendly banking / credit system).
- Lack of government initiatives.

Once the area developed as a trade centre based on the river communication. The traders who bring their commodities through the river the market of the Paurasava acted as a boat ghat after the unloading of commodities from the boat. From then, development activities started along the riverside. This trend has been continued up to the recent years.

Policies and Strategies

Improve industrial areas and ensure their full utilization: Conditions in the existing industrial areas of the Paurasava especially environmental ones associated with the disposal of effluent and waste are currently poor. It is the policy of the Paurasava to improve these conditions and to reduce pollution from the worst offenders to acceptable

levels. In certain cases this may require cessation of an existing activity or removal to another location.

Within each of the existing industrial areas there are vacant and underutilized areas. It is the policy of the Paurasava to ensure that the spare capacity available within these is utilized to the full. In the short and medium term these represents a better use of resources than identify new areas.

Locations for new industrial areas: For the longer term it is expected that new industrial areas will be required. Given the fact that the Paurasava wishes to encourage inward investment to the Paurasava, it will identify suitable locations for such industrial areas, will reserve them for industrial use and will plan for provision of the required infrastructure.

Provide assistance to small-scale industrial and commercial operations: Considerable potential for growth of the economy rests with small-scale industrial and commercial operations. The Paurasava will, in conjunction with other relevant authorities, provide assistance to such operations by promoting the establishment of estates specifically suited to their needs. These will probably need to be small in size and located within or close to residential areas.

The Paurasava will also consider the other needs of small-scale industrial and commercial operations and endeavour, through others, to ensure that these needs such as for credit are available.

8.1.4 Housing and Slum Improvement

Housing is one of the vital components of urban life. It is a source of security, safety and everyday comfort. Rural housing components are prevailing in the Paurasava. In most cases, housing in growth centre is appropriate for the study of housing in the Paurasava. Housing in rural environment (called rural homestead) according to the trend of primitive society is the suitable word for the identification of Paurasava housing. Amalgamation of pucca, semi-pucca and katcha housing or semi-pucca and katcha housing in a house is viewed in most of the Wards.

Residential areas in Naria Paurasava have been developed sparsely following some degree of uniformity. According to the number of residential buildings Ward No. 1, 7 and 9 dominate the highest number of residential. Pucca residential buildings are developed on and around the commercial hub of Ward No. 2, 4 and 9. About 21.5% of the dwellings in the Paurasava are in good condition, 7.5% needed to be demolished due to their dilapidated conditions and 20.0% is new construction.

Building materials

The Paurasava is dominated by rural environment; as a result about 86% residential structures are found katcha, constructed with temporary materials like bamboo thatch,

C.I. Sheet and wood. Only 7% are semi-pucca structures that are wall made with brick and the roof with C.I. Sheet. On the other hand, 7% houses are pucca that is constructed with bricks and concretes. The building materials used for the construction of houses reflects poor economic condition of the owners.

Floor area

About 667 residential structures are pucca and among them, 584 are one-storied, 68 two-storied and 15 three-storied and above. Floor area of those pucca structures are varied from 1000 sq. ft. to 2000 sq. ft. The semi-pucca structures are preserving two characters according to the location; where semi-pucca structures are in rural areas deserve large floor area rather than semi-pucca structures in urban area. In rural area, floor area of the semi-pucca structures are varied between 1500 sq. ft. to 2500 sq. ft. but in urban area it is within 1400 sq. ft. to 1600 sq. ft. Comparatively, floor area of the katcha structures are larger than the floor area of the pucca and semi-pucca structures. In an average, floor area of the katcha structures is between 2000 sq. ft. to 2500 sq. ft. Most of those structures are living room and located in the rural environment of the Paurasava.

Housing finance

Housing finance is one of the most important problems of housing promotion. Besides, the Paurasava also suffers from the problems of utility services like, waste management, sanitation and drainage. Road development can not keep pace with population and urban physical growth. Most man-made drains are clogged, causing waste water overflow at many points. There is no program for slum rehabilitation.

Overwhelming majority of the land owners are depended on self-financing for housing construction. Low house rent is a major cause for small number of constructions.

Over 97 percent of the housing supply comes from informal private sources. The formal organized private commercial housing is yet to emerge in the Paurasava. The NGOs usually operate in low income areas where they provide services and cash finance instead of complete housing units.

Problems Concerning Housing

Housing areas in the Paurasava is the composition of an admixer of housing types. Mixed residential, poor dominated rural houses and semi-urban homesteads are found. Most housing areas have developed in a spontaneous fashion. In the rural part of the Paurasava, with its rural-agricultural character, has a different housing type. The dwellings, comprising homesteads, encompass larger areas having low density. The highest gross population density in the Paurasava is only 8 persons per acre. Residential buildings in the Paurasava are dominated by katcha structure (86%). No building is found approved from Paurasava. However, owners of the buildings have been found violated

the setback rule by the construction. Except labour charge there is very little variation in building construction cost between Dhaka and Naria Paurasava.

Problems relating to the housing are mostly concerned with the poor community. Due to their low level of income a vast number of poor are squatting in public land. They are not only deprived of minimum housing but also from the personal security that endanger their health and working efficiency. Regular income can solve most of their housing problems. Apart from dwelling, pure water and transportation are real problems for the inhabitants. Municipal services are highly inadequate. Drainage is major problem in rural part of the Paurasava. The Paurasava can not solve the problems due to scarcity of fund.

In the Paurasava, about 94 percent housing structures are one-storied that includes semi-pucca, katcha and Jhupri type houses.

Prospects Concerning Housing

In the planning area above 97 percent of the households became land owners through inheritance, while about 3 percent became owners by way of purchase.

Land value in the Paurasava is very low compared with Dhaka and Gopalganj. In spontaneous housing areas of the core area, habitable land sells between Tk. 40,000 to Tk. 90,000 per decimal.

For effective promotion of housing the government should change its role to a facilitator instead of a provider. Government agencies should provide infrastructure and finance on soft terms and the rest should be left with the private sector. To realize the development and service costs of public sector infrastructure projects from the beneficiaries it is necessary to evolve new mechanism. If real estate developers encourage to come up with housing projects the Paurasava should maintain some control over them to safeguard public interest. Public sector may take up innovative cost recovery housing programs for the rural poor.

Policies and Strategies

The National Housing Policy, 2004 could have a major impact on the quality of life for Paurasava inhabitants. In this context, the Paurasava will pursue the following four policies. These are all geared to lessening the gap between need and provision of housing.

Identification and development of sites for government housing schemes: Where, as part of National Housing Policy, the Government embarks on further housing schemes either for the construction of completed units or for the provision of serviced plots, the Paurasava will assist the relevant body with the identification and development of appropriate sites.

Identification and development of sites for private sector housing schemes: Where housing is to be provided by the private sector, the Paurasava will ensure that, either by

its own efforts or by the efforts of others, the legal, technical and financial support required by the private sector is available –to enable it to assemble sites, to carryout the earthworks and drainage works needed for the development of the sites, to provide the necessary tertiary infrastructure, and to provide the units of accommodation required. The Paurasava would, in this instance, be acting as an enable to the private sector.

Provision of sites and services schemes for the low and lowest income groups: In line with National Housing Policy, greater priority needs to be given to the low and lowest income groups. Accordingly, the Paurasava will, therefore promote, either by its own efforts or by the efforts of others, the provision of sites and services schemes for these income groups.

Upgrading of slum and squatter settlements: The most disadvantaged people, in terms of access to housing, live in slum and squatters. Modest investment in terms of provision of facilities such as water supply, drainage, sanitation facilities, electricity and dry access-ways can make a considerable improvement to the living conditions of a large number of people. The Paurasava will, therefore promote, either by its own efforts or by the efforts of others, the upgrading of slum and squatter areas.

An important contribution that the Paurasava can make to meet housing, as well as other urban needs, is in exploring ways by which the process of converting land from an unimproved agricultural state to an improved state on which individuals can build their homes – can be speeded up. Because, housing is such an important landuse both in terms of the total area of land it occupies in urban and in terms of being a major determinant of the quality of life of its inhabitants, the Paurasava may pursue a further policy.

8.1.5 Social Amenities and Community Facilities

The Regional Highway passes at the southern adjacent side of the Paurasava is the destination of Shariatpur and Madaripur. The activities around the bus stand will generate employment in commercial sector. This effort will be faster with the commissioning of 1st Padma Bridge at Maowa point. New investment will gear up in to the Naria, will create new jobs. This will enhance income of the local people and raise their standard of living. Investment and employment will take place in transport, industry, construction, trade and service sectors. Besides, there is a large scope for agro-based development in Naria. This will generate new employment.

Policies and Strategies

A most important initial role of the Paurasava will be to appraise itself of the situation with regard to both the need for and supply of community facilities in the Paurasava. With this in mind, the Paurasava will pursue the following policies.

Monitoring the principal aspects of community facility provision in the Paurasava: The organizations responsible for the provision of community facilities in the Paurasava will co-operate with the Paurasava in supplying information needs to pursue the policy. At a

later stage, according to the needs of the population, the Paurasava can extend this policy to include contributions to meeting the needs such as identifying areas where demand is higher, identifying appropriate targets for provision, identifying sites and assisting in ensuring that any obstacles to the development of a site can be overcome.

Until the Paurasava is in a position to devise policies which will make a positive contribution to ensuring that the supply of community facility provision is geared to the areas and the groups of the population most in need, it is recommended that the Paurasava pursue only two further policies, such as –

Assist with the identification and development of sites for public community facilities:

Where needed, the Paurasava will work with the public agency responsible for the provision of community facilities to ensure that a suitable site is chosen and developed. In some instances the Paurasava will play the lead role in the establishment of a public community facility. As an example, establishment of wholesale or retail markets to serve local communities.

Assist with the identification and development of sites for private sector community facilities:

Where a private sector sponsor is encountering difficulties in providing a community facility, the Paurasava will also work with the sponsor to ensure that a suitable site is chosen and developed.

8.1.6 Tourism and Recreation Facilities

Recreational facilities like Cinema Hall, Theater, Shishu Park, Picnic spot, etc. are included in this category. No recreational facility is found in the Paurasava. Policy for tourism and recreational facilities may follow the policies prescribed before on the social and community facilities.

8.1.7 Safety and Security

Cantonment, however, is governed by its own Act, BDR, Police, etc. areas have to be safeguarded from any possible incompatible development. The key point installations including radio, television, water treatment and pump station and power station sites, Circuit House will have to be safeguarded from any possible undesirable development around these areas that can endanger their security.

8.2 Physical Infrastructure Sectors

8.2.1 Transport

Transportation infrastructure is a very important element to make an urban area livable. For transportation of agro-products efficient road network is also of prime importance. The study area is a centre of agro-product and pisciculture, need good transportation linkages for their transportation in time. The potential economic activities due to agro-product oriented industry and 1st Padma Bridge need improved transport facilities with a substantial investment. The potential economic (including agriculture) development

envisages improvement of the transportation network to facilitate development that can meet the demand on regional basis. Actually, the area is served by only one Regional Highway which may become inadequate due to induced activities on completion of the 1st Padma Bridge. Several new roads will be needed for efficient movement of man and goods towards regional centres.

Policies and Strategies

Following strategies will be adopted to promote circulation network:

- A comprehensive road network will be prepared for the Paurasava using a hierarchy of road network.
- In case of local roads, a participatory approach will be developed to realize at least a part of the cost of development from the beneficiaries. This will also help to reduce delay and cost involved in land acquisition procedure.
- Proposed roads in those areas will be chosen for immediate developments that deserves growth potentiality.
- Incremental development approach will be adopted to get rid of unnecessary costs in development of roads (the road remain underutilized).
- Service roads will be created along with major roads to allow free flow of long distance traffic.
- A restricted buffer zone will be proposed along primary roads passing through agriculture and discourage roadside development.

Role of Bangladesh Inland Water Transport Authority

The Palong River is flowing on the northwestern part of the Paurasava. Bangladesh Inland Water Transport Authority (BIWTA) is responsible for maintaining its navigable character. Unauthorized encroachment in different locations of this river is performing by the dwellers. At present, the BIWTA is not performing any responsibility regarding this river. Apparently no major problem in the area of water transport services is found.

8.2.2 Utility Services

Utility services found through topographic and physical feature indicates that the Paurasava is too poor in development of those services. With the development of physical condition of the Paurasava, substantial development will be needed for utility services. Drinking water supply, sewerage and sanitation facilities and dumping of solid wastes should be emphasized as primary consideration. All the people (except 0.05%) are dependent on hand tubewell for drinking water. In the Paurasava there are 3000 tubewells and most of them are contaminated with iron and arsenic. Absence of solid waste dumping ground creates health hazards. Absence of covered drain and sewerage system creates sanitation problem in the Paurasava. Those problems should be removed through the proper planning and design.

Policies

In the Naria Paurasava, average height of the Wards is 6.56 meter and differences among the Wards are -0.36 meter to 10.2 meter, but outside the Paurasava boundary lowest land level value is lower than 0.36 meter. It means a steep slope from 0.36 meter to 10.2 meter prevails in the Paurasava and its surrounding areas. Such type of land level is ideal for construction of drain and sewerage facilities.

Due to the presence of vast agriculture land (about 49%), township should not be expanded on those lands because height of those lands are four to five meter lower than the habitable land and five to eight meter lower than the regional highway. Substantial earth filling will be needed for creating living construction on those agriculture lands.

Strategies

Based on the above understandings, following strategies follows for planning of utility services:

- Low-cost development will be promoted in phases, based on comprehensive plan for the demarcated areas.
- Only those areas will be targeted as new urban areas where urbanization is likely to be rapid and imminent.
- Except waste disposal, all other services will deliver by the concerned service giving agencies.

8.2.3 Flood Control and Drainage

A wider scope for construction of a drainage system may be provisioned in the Paurasava. At least central areas are open for such development immediately and other areas may be followed for projected period as designed in the plan. The Paurasava is a barren field for imposing drainage system. The principles required for drainage plan are available in the area. Land slope, nearness of the natural drainage, sparse population density and soil condition are in favour of drainage construction.

Projection of Drains

Existing drains in the Paurasava have not formed any network; only household centered construction to drain out waste water. Existing canal is trying to manage the drainage requirements. The canal is not well linked with man-made drain and river. No pond / ditch have been found to be connected with existing drains / canals. Lack of drainage network is causing water logging for 4 months in the Paurasava area when it rains. The entire drainage network is required to be developed with primary, secondary and tertiary drains to mitigate the current water logging problem.

Further development of drain will be followed the bulk density and establishment will be proposed in the Master Plan. Length, width and depth of the drain will be considered according to the density of population, road width and out falls. Slope of the drain will be

maintained according to the slope of the area and the level of river water according to the seasons.

8.3 Environment Issues

8.3.1 Natural Resources

Specific natural resources is absent in the Paurasava. Furthermore, in long run, if question rises for the use and preservation of natural resources, policies prescribed here on the environmental issues will be followed. In special case, the Paurasava may frame new policies with the help of the government and particular department / authority relevant with the issue.

8.3.2 Sanitation

Almost all the areas in the Paurasava are devoid of sanitation facilities. There exists a minor process of development in certain selected Wards but limited to government quarter only. Regarding ownership of toilets it varies widely in most of the Paurasava area. Most of the households have their own toilets.

Toilet system of the study area is mostly categorized as pucca and katcha. In spite of this, Paurasava has a modest development of pucca toilets in government zones. Sewerage system has not been introduced on a trial basis as to their popularity and acceptance. Ownership of toilets varies widely in most of the study areas. Most of the households have their own toilets and at the same time there is joint toilets found in slum areas. Sanitary toilets or pucca toilets are comparatively good in all the Wards. About 80% katcha toilet is found in the Paurasava and owner of those toilets are poor people.

Policies

Policies regarding sanitation facilities are –

- The organization responsible for the provision of sanitation facilities in the Paurasava should co-operate with the Paurasava authority in supplying the information needs to pursue this policy.
- According to the priorities and needs of the population, the authority (including Paurasava) can extend this policy to include contributions to meeting the needs – such as identifying areas where demand is greatest, identifying appropriate targets for provision, identifying sites and assisting in ensuring that any obstacles to the development of a site can be overcome.
- Where needed, the Paurasava will work with the government agency responsible for the provision of sanitation facilities to ensure that a suitable plan have been prepared and implemented.
- Where a private sector sponsor is encountering difficulties in providing sanitation facilities, the Paurasava will work with the sponsor to ensure that a suitable plan have been prepared based on the population demand and implemented.

Strategies

Following strategies have been followed for designing sanitation plan:

- To protect drainage system most of the natural canals and water courses will be preserved.
- As a measure of protection from encroachment restrictive buffer zone will be created on both sides of natural canals, rivers and other watercourses. Road and plantation will be created on those buffer zones.
- Cost of primary drainage system development in housing estates by public sector agencies will be realized from the developers.

8.3.3 Hazards

A disaster is the tragedy of a natural or human-made hazard (a hazard is a situation which poses a level of threat to life, health, property or environment) that negatively affects society or environment. Disaster can be classified into two categories: natural disaster and man-made disaster. A natural disaster is the effect of a natural hazard (e.g. flood, volcanic eruption, earthquake or landslide) that affects the environment and leads to financial, environmental or human losses. Man-made disasters are disasters resulting from an element of human intent, negligence, or error, or involving a failure of a man-made system.

The Paurasava area including the Naria Upazila has affected by the several major natural disasters ranging from Cyclone, Flood to Water-logging and Draughts, etc. The periods of those disasters are 1998, 2000, 2004, 2007 and 2008. Very scanty attempt has been made by government to rehabilitate people after the natural disaster.

Urbanization is taking the lands of other uses to residential use. For this purpose agricultural lands and water bodies are being chosen most frequently and the lands are being converted into urban settlement. In the Naria Paurasava, wet lands are filled up and agricultural lands are converted. This has been identified as the major man-made disaster accelerating the degree of conversion year to year. Use of poisonous insecticides on the agricultural land is another man made disaster which will affect in the long run.

8.3.4 Environment Aspects

Three aspects named provision of dustbin, public toilet and solid waste produces by the hat / bazar are presented here. In the Paurasava, in total, 1 market, no public toilet and no dustbin are being located in different Wards. The market produces about 1 ton solid wastes daily (no dumping ground in the Paurasava). The scenario demands an effective solid waste management system for the Paurasava.

Policies on Solid waste Management: In order to improve the solid waste problem and to improve the environmental condition of the Paurasava, following Macro and Micro level policy measures will be needed:

- Formation of legislation regarding solid waste management.
- Formation of standards for collection and disposal of waste.
- Incentives for introduction of environmentally clean and efficient technology for waste disposal which would help to reduce the volume of waste and facilities more recycling.
- Construction of waste as an unutilized resource and assisting in recycling of waste for conservation of resources and protection of environment.
- Introduction of environmental education especially sanitary habits in school curriculum.

Environmental Issues in Agriculture Practice

The so-called Green Revolution package was introduced into Bangladesh agriculture system in mid 1960s. It promised to increase production of cereal crops, particularly rice by the introduction of HYV seeds, application of chemical fertilizer and pesticide and irrigation. HYVs rice has contributed significantly to the progress towards the food self sufficiency in Bangladesh on the contrary increased to the environmental degradation due to the intensive use of agrochemical and other modern technology. The use of pesticide has been increased 400% per acre and its cost increased 600% during the last couple of decades. Between 1985 and 1990 the sales of pesticide became double. At present, 84 pesticides active ingredients belonging to 242 trade names have been registered in Bangladesh. Out of the total pesticide use, over 80% are used in rice fields. The rapid increase of pesticide use is causing detrimental effect on environment and health of farm workers and consumers. Pesticides are contaminating ground and surface water, which is causing depletion of inland fishing resources and ecosystem.

Pesticide use in crop production has been suspected of being a major contribution to environmental pollution. There are widespread and growing concerns of pesticide over-use, relating to a number of dimensions such as contamination of ground water, surface water, soils and food and the consequent impacts on wildlife and human health. Farmers often spray hazardous insecticides like organophosphates and organochlorine insecticides (such as DDT, lindane and toxaphene) up to five to six times in one cropping season while only two applications may be sufficient. The usual practice of draining paddy water into irrigation canals may cause river and lake contamination. Residues carried by the water can be taken up by non-target flora and fauna, leach in to soil and possibly contaminate groundwater or potable water. A greater problem lies in the bioaccumulation of pesticides in beneficial organisms like fish.

Pesticide as agricultural input was introduced in Bangladesh in 1957 and mainly DDT and BHC was distributed by the Government to the farmers free of cost until 1973. The pesticides become very popular to the farmers for two reasons; firstly quick and visible effect on pest and secondly, no cost involvement. In 1974, the subsidy was reduced to 50% and in 1979 it was withdrawn completely. Currently, 14,340.40 metric tons of

commercial pesticides are used annually, primarily in the cultivation of rice, tea, jute, sugarcane and vegetables. About 70% of pesticides are used on rice. Pesticides used on rice consist almost exclusively of insecticides, but fungicides are used occasionally. In 1989-90 almost 90% of pesticides were used on rice.

Increased use of pesticides leads to two primary concerns

- 1) Adverse effects on the health of farm workers as well as others exposed to the pesticides
- 2) Polluted ground water and surface water, causing harm to the water users as well as inland fisheries and other aquatic animals.

Biodiversity is declining due to the effect of pesticide and fertilizer use. Population of native fish species is now endangered and the traditional rice-fish systems have disappeared. The bird and other small wild animals are in threat of wide spread because of the use of pesticides in rice and vegetables. Most of the rice farmers are dependent on insecticides for pest control.

Most of the farmers of Bangladesh are not capable of taking decisions on pest management and pesticide application. Often they apply pesticides when there is no real need or they use wrong chemicals at wrong doses, methods and times. As a result they kill the beneficial organisms easily and create pest resistance causing the greater problems and crop losses.

There is a suspicion that pesticide residues are common in surface water system, especially in irrigation drains, which ultimately pollute the pond and river water. There are many undocumented cases of chronic health effect of pesticides on farmers and other people. Several factors are supposed to be responsible for chronic health effect such as; improper handling, lack of protective measure, improper storage, use of obsolete pesticides, etc.

Chemical pesticides use in crop production

A total of 15 active ingredients with 21 trade names, farmers of Bangladesh uses in their winter rice crop. Among 15 ingredients, 3 are fungicides and 12 insecticides. Most of the insecticides use to kill the stem borer, green leafhopper and some of grasshopper and gall midge. The fungicide uses to control the sheath blight and blast diseases. The frequency of pesticide use is varied from 1 to 4 sprays per crop season. Rate of application is not so high. The rate varies from about 1 kg/liter to 10 kg or liter per hectare of land. They had the knowledge about rate and frequency of pesticide application from the dealer and also they had considered the cost of the pesticides.

The farmers use an equal number of Organophosphates and Carbonates pesticides and parathyroid. Fortunately no organochlorines have been found to be used by the farmers. Bangladeshi rice farmers used mostly category Ia, Ib and II pesticides that the WHO classifies, respectively extremely, highly and moderately hazardous. Almost all of the

carbonate insecticides they used are of extremely or highly hazardous category having wide spectrum toxicity to the environment. The farmers used WHO category Insecticides named Stem borer, Agrifuran, Carbofuran, Leaf hopper, Biesterin, Defoliator, Sunfuran, Grass hopper, Furadan, Rice bug, Gall midge, Bashudin, Dioxathion, Plant hopper, Green leaf hopper, Karate, Cyhalothrin, Defoliators, Cymbush, Cypermethrin, Rice hispa, Ripcord, Diazinon, Diazinon Thrips, Nogo, Leaf roller, Sumithion, Fenitrothion, Monotaf, Monocrotophos, Thrips, Malathion, Brown grass, Faifanon, Dimecron, Phosphamidon, Cartap, Fungicide, Blast, Hinosan, Edifenfos, Sheath blight, Carbendazim and Propiconazole.

Frequency of application in a crop season by the farmers is in 1st time = 11%, in 2nd time = 11%, in 3rd time = 59% and in 4th time = 19%.

The insecticide Bashudin 10G and Organophosphates was used by the largest proportion of the farmers (44%) followed by the Dimecron (34%) and Baycarb 500 EC (26%). Fungicide Knowin was used by 44% of farmers. Bashudin is an obsolete insecticide which had been used by the largest number of farmers of Bangladesh and the average application rate was also high among the pesticides used. Monocrotophos and DDVP are also known as their wide spectrum toxicity. The mostly used fungicide Knowin 50 WP is a carbonate type and it is categorized as unlikely to present acute hazard in normal use.

Pesticide use in crop stage

Largest number of farmers used pesticides in the early tillering stage (30%) followed by the late tillering and booting stages. Vegetative growth stage is the most susceptible to the pest attack, that's why farmers applied mostly in early and late tillering stages than the booting, flowering and milky stages. Major insect pests such as stem borer, leaf hopper and plant hopper attacks are prevalent in these stages. Rice hispa is one of the major insect pests of rice attacks in the mature stage like soft dough. In Bangladesh, rice hispa infestation is common and more than 12% of farmers applied insecticides in the soft dough stage. Ten percent farmers applied insecticides at the nursery stage which is susceptible to thrip, defoliator, stem borer, green leaf hopper and plant hopper.

Application methods

About 57% farmers of Bangladesh use hand sprayer and 8% Knapsack sprayer to apply the pesticides on the crop field. Remaining 18% farmers use broadcast methods and 16% use other traditional methods. The sprayers they use are not in a good condition. The hand sprayer they use includes a container with broom and sprinkled the pesticide with broom. Most of the farmers don't have any sprayer of their own; they borrowed it from relatively richer farmers. They didn't have any training about the sprayer use and precaution. Therefore, the spray is always associated with high risk of exposure. The farmers broadcast the granular insecticide keeping in an open bowl or basket and broadcast by bare hands and feet. The traditional methods they used are very

unscientific. For example they brush the crop field. In this method, usually the insecticide is mixed with water in an open bowl or a big can then date palm leaf is soaked in it and the standing crop plant is brushed. During the mixing and brushing the farmers as well as the environment are exposed to pollution. No farmers use any protective measure such as mask or gloves. According to the pesticide agent and leaflet provided by the Department of Agricultural Extension, the measuring unit is being used as spoonful, handful or lidful.

Alternative methods used for pest control

Because of late introduction of pesticide in Bangladesh agriculture the farmers are used to control pest using other traditional methods besides insecticide. In these cases they use indigenous knowledge to control pest not to avoid the hazard of pesticide, mainly to minimize the production cost. Among the other methods, 40% of the farmers use crop rotation as an alternative to chemical pesticides use, 19% use timely planting and 15% use resistant varieties. Only 2% of the farmers use Integrated Pest Management (IPM) technique to control pest of rice. Bio-controls means that they use bird to feed the insect. Remaining 12% farmers use other methods such as, soap, kerosene oil, light and net trap to control insect. In certain extent they pull the insect larvae by hand also.

Ecological impact

- Many types of birds, fish and plant become extinct by the effect of highly toxic pesticide.
- Unbalance use of pesticide make the ecosystem worst.
- Many species of herbaceous plant of medicinal value extinct by the continuous use of highly toxic pesticides.
- Many fishes are caused by diseases by the pesticidal effect.

Impact on soil

- Application of toxic chemicals in the crop field harms the earthworms, soil microbes which deteriorated soil fertility.
- Use of excessive pesticide accumulates in the soil which is responsible for soil toxicity.
- Many pesticides (such as, DDT, aldrin, heptachlor, dieldrin and chlordane) remain unchanged in the soil.

Impact on water

- Long-term and heavy use of pesticides may pollute the aquatic environment through the contamination of unused portions of pesticides.
- Through irrigation water pesticides runoff to the rivers, canals, etc. and many fishes have been extinct by the effect of pesticides used in the crop field.
- Ground water is being polluted by pesticide leaching from crop field.

Impact on air and health

- It is very dangerous for the applicator to be affected by the poisonous pesticides if not properly handled.
- Several diseases may be observed to be caused by pesticide used.
- During the pesticide spray the air is being polluted by spray drift which causes health hazard to the applicator neighbours.
- The granular insecticide used in the paddy field exposed to the air and pollute the surroundings.

Policies and Strategies

According to 'The Pesticide Rules, 1985', all pesticide either manufactured or imported should be registered to the Authority. After submission for registration to the authority for approval, it is required to know by the authority about physical and chemical properties, efficacy data, toxicological data, residues and their fate in the environment. But in practice the assessment of environmental impacts or residue analysis is hardly undertaken due to the lack of expertise in the field as well as laboratory facilities.

In chapter II, section 8 of the Pesticide Rules, it is said that the certificate of registration may be cancelled but not mentioned when the certificate will be cancelled. Regarding import in chapter IV it is mentioned that 'No pesticide shall be imported through a route other than the recognized custom frontier stations of Bangladesh'. But huge amount of banned and highly toxic pesticides are being smuggled from India through the border. It has been reported by the Institute of Development Policy Analysis that the pesticide like Eldrin and Endrin are sold with different labels in Bangladesh. The suppliers continue to sell many chemical pesticides proscribed by the government, and 12 particularly controversial pesticides dubbed the 'dirty dozen' by activists campaigning worldwide to stop its manufacture.

There is a provision of licensing of the pesticide dealers for sale but it is not clearly stated what will be required for the qualification of the license holder, so anyone may get license. Therefore, it is found that the registered dealer also does not have any knowledge about the pesticide handling. The regulation said it could be duplicated and transferred to anybody. It is not said in the regulation that the sales dealer might have training on pesticide. The main drawback of this regulation is in chapter VII section 33 sub-section I(a) which gives the provision to state the name of the manufacturer, formulate or repacked in the label even he/she is not the person in whose name the pesticide is registered. For this reason it is very difficult to identify the respective person for punishment. Therefore, taking the advantage of the weak point of regulation the illegal business of pesticide is going on and it is not uncommon that the violation of rules is taking place.

The environmental degradation linked to agriculture is the impact of toxicity from improper pesticide use. Pesticides are responsible for health hazard or food poisoning.

Unjudicial use of pesticide makes the ecosystem vulnerable. It is not possible to produce crop without using pesticide in modern agriculture of competitive market. Therefore, crop pests can be controlled with the timely and balanced application of pesticides.

Considering the cropping intensity and toxicity of the pesticide, the environment and farmers health are at high risk under the pesticides contamination. Among the insecticides used by the farmers, Bashudin 10 G, Diazinon 60 EC, Sumithion 60 EC and Padan 50 SP have already been banned for use on rice in other developing countries. The use and availability of Bashudin, an obsolete pesticide indicates that existing pesticide laws and regulations are not strictly enforced in relation to import, formulation, repackaging, distribution, advertising and use of pesticides. Therefore, in Bangladesh the laws and regulations of pesticide should be enforced more strictly.

CHAPTER 9

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.

9.1 Institutional Capacity Building of the Paurashava

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

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

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

The present plan package imposes a large number of development projects on Naria 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.

9.1.1 Staffing and Training

As a traditional system of the Paurashava, engineer and secretary are appointed directly by the Ministry of Local Government and other staffs are appointed locally through the approval of the Ministry after the advertisement on the newspapers. In Naria 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.

9.1.2 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.

9.1.3 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. The Paurashava must strengthen its capacity to implement its Master Plan when it will be completed. It will otherwise be in trouble in the implementation, monitoring and updating the Master Plan.

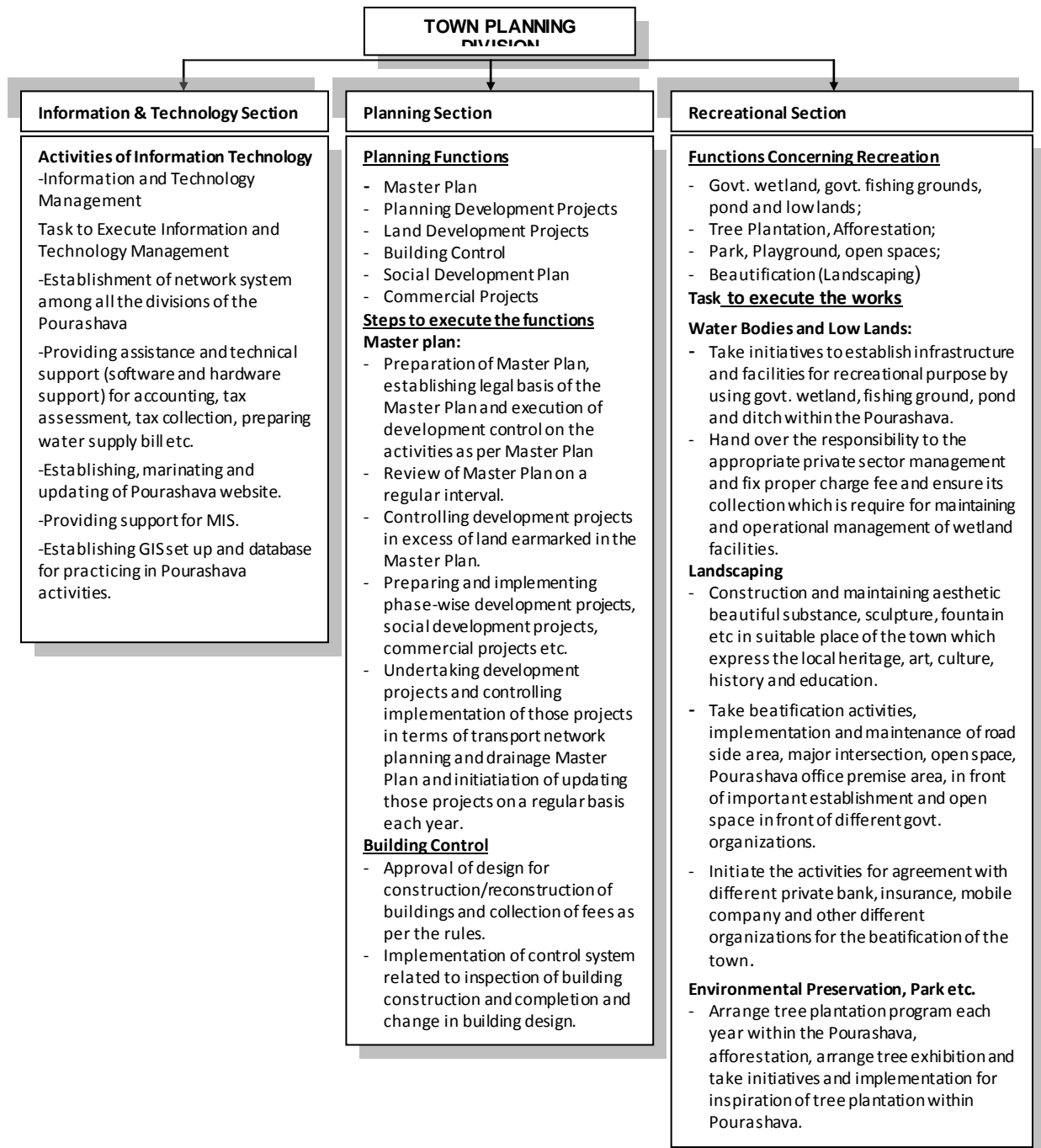
9.1.3.1 Institutional Framework

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 its 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:

Figure 9.1: Scope of Work for Planning Division



9.1.3.2 Lack of Paurashava Town Planning Capacity

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

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

Support for Planned Urbanization

For creating planned urbanization, Paurashava may:

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

Community Mobilization Program

Following are the community mobilization support activities:

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

Urban Governance Improvement Action Programme (UGIAP)

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

- To overcome the challenges, the 6th Five year plan as well as Perspective Plan of Bangladesh, 2011-31 recommends the same issues mentioned below:
- the instructional reform and decentralization of responsibilities and resources to local authorities; participation of civil society including woman in the design, implementation and monitoring of local priorities; building capacity of all actors (Institutions, groups and individuals) to contribute fully to decision making an urban development process; and facilitate networking at all levels.
- It is already tested, proven and accordingly recognized in the 6th Five year plan that urban infrastructure improvements have been proved very successful introducing governance and performance-based approach adapted by UGIIP in selected ULBs in the country. Among other suggestions the 6th Five year plan also includes nature for Urban Governance Improvement Action Programme (UGIAP) and Capacity Building of Institutes at Municipality-level in particular.

Citizen Awareness and Participation

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

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

Urban Planning and Environmental Improvement

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

Urban Poverty Reduction

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

- Establishment of Slum Improvement Committee (SIC) in selected slums and scattered area.
- Preparation of poverty reduction action plan with guideline and necessary budget allocation.

Income Generating Activities

The income generating activities include:

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

Transparency and Accountability

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

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

9.1.4 Legal Aspects

The drive to establish strong urban local governance in the Paurashava is yet to be legalized. The governance programmes at present are operated project wise based on the formulated policies of the implementing agencies of the national government. The Laws that the country inherited are mostly prepared during the colonial rule to serve its

own interests. Even after independence from the British, the issue of good governance was not infused into the new Acts formulated.

9.1.5 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.

9.1.6 Financial Issues

Governance in Naria 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.

Under different Government Projects computer and accessories are supplied for automation of the accounts system of Paurashavas within Bangladesh. Besides, trainings are also offered to the Paurashava account staffs for enabling introduction of automation in accounts system. But Naria Paurashava has not yet been enlisted under any kind of these projects.

Revenue Management

The Paurashava still follows a traditional management system in tax collection and revenue management. Assessment section is responsible to assess the tax of the Paurashava and tax collection, and license and bazar section are responsible to collect the tax of the Paurashava. Tax automation system is not established here yet. The public

is mainly informed about tax collection during the presentation of annual budget. They may, however, get information from the councilors 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 will have been supplied and installed in the Paurashavas covered by different projects. The projects also provided training to the relevant staff 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, Naria Paurashava will have to depend substantially on the government funding for implementing the development projects. But the government has limitations of its resources. In such a situation, if the Paurashava cannot raise its own revenue adequately, it will not be able to execute much of the development projects under the Master Plan.

9.1.7 Monitoring, Evaluation and Updating

An important step for implementation of the Plan is land use clearance. Land use clearance will be needed for every physical component whether it may be public or private. The Paurashava will provide such clearance. To ensure the future development according to the proposals prescribed in the Urban Area Plan and Ward Action Plan, the Paurashava must maintain the following guidelines during the land use clearance.

Must ensure 20 ft. access road for any type of land use clearance.

No permanent land use should be allowed in the area demarcated as urban reserve and the authority will follow the guideline provided to Annexure- B when the will provide land use clearance.

Must ensure that no land use clearance is issued on the lands indicated as road, drainage channel, water reservoir, educational institution, health services, open space, fruit garden / orchard in the Urban Area 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 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 Naria 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.

9.1.8 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 Naria 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.

9.2 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.

9.3 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.

PART B

URBAN AREA PLAN

Urban Area Plan is aimed to guide physical development of Naria Paurasava including its economic and social activities. The plan adhere policy directives spelled out in the Structure Plan. The 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. Preparing landuse plan on a cadastral map, the Urban Area Plan considers 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 Terms of Reference (TOR) specify (Pg. 6. Article 4) that the Urban Area Plan (UAP) / Multi-sector Investment Plan (MSIP) will consist of the following plans:

- Landuse Plan
- Transportation and Traffic Management Plan
- Drainage and Environmental Management Plan
- Plan for Urban Services

The Urban Area Plan is presented in both, map and textual format. The plan map is presented in 1:1980 scale, super imposed 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.

Urban area plan is broadly divided into two parts, plan map and explanatory report. The plan map depicts future landuse zoning, infrastructure development and other development proposals. Report elaborates all proposals proposed in the plan, including rules, regulations and recommendations for implementation of the plan.

The outline of the Urban Area Plan gives guidance to the Paurasava as to how it can develop the roles i.e. to promote development, to co-ordinate development and to control development.

The Urban Area Plan has been divided into four main parts. These are preceded by four introductory chapters which explain the scope of the report and provide background to the Urban Area Plan including its relationship with the Structure Plan.

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

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

Drainage and Environmental Management Plan is the third chapter of the Urban Area Plan. The chapter again subdivided into two parts – drainage part and environment part. Existing drainage network, land level and topographic contour, plan for drainage management and flood control and plan implementation strategies are the components of the drainage part. Existing environmental condition, solid waste and garbage disposal, environment pollution, water-logging, natural calamities and localized hazards, plan for environmental management and pollution control and plan implementation strategies are the key issues of the environment part.

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

The Urban Area Plan of the Naria Paurasava covers an area of 2717.82 acres (11.0 sq km.). The reason behind choosing such area lies in fact that this is the most urbanized part of the Paurasava, where there is still scope and possibility of urban development in near future. Paurasava operates all parts where it provides basic urban services and facilities. Considering future urbanization trend and potential development projected population is assumed 33410 for 2031.

The Urban Area Plan covers nine Ward Action Plans also.

CHAPTER 10

LAND USE PLAN

10.1 Introduction

The Landuse Plan is one of the four components of Urban Area Plan. The Landuse Plan is the first element of the Naria Paurasava Urban Area Plan. The Landuse Plan is being prepared for managing and promoting development over medium-term on the basis of the strategies set by the longer-term Structure Plan. Basically the Landuse Plan is an interpretation of the Urban Area Plan over the medium-term (10 years). The coverage of the Landuse Plan considers existing urban areas and their immediate surroundings with the purpose of providing development guidance in the areas where most of the urban development activities are expected to take place over the next 10 years. Delineation of the Landuse Plan area is based on the urban growth area identified as the planning area. It contains more details about specific programs and policies that require to be implemented over the medium-term.

10.2 Existing and Projected Landuse

10.2.1 Existing Landuse

Details of landuse include structures and uses of land in multi-dimensions. Every individual structure and its details were surveyed during the survey period and find out the uses of land. Most of the landuse information was collected through physical feature survey. Later on, landuse map is prepared showing different use categories.

Table 10.1: Existing Landuse of Naria Paurasava

| Landuse category | Area (acre) | Percent |
|---|-------------|---------|
| Residential | 849.80 | 34.95 |
| Commercial | 17.33 | 0.71 |
| Industrial/Processing and Manufacturing | 0.73 | 0.03 |
| Educational Facility | 12.50 | 0.51 |
| Governmental Services | 6.933 | 0.29 |
| NGO Services | 1.35 | 0.06 |
| Mixed-Use | 0.24 | 0.01 |
| Community Services | 7.91 | 0.33 |
| Circulation Network | 48.73 | 2.00 |
| Recreational Facility | 0.05 | 0.00 |
| Open Space | 0 | 0 |
| Transport & Communication | 0.43 | 0.02 |
| Service Activity | 2.39 | 0.10 |
| Agricultural | 1178.85 | 48.49 |
| Water body | 303.96 | 12.50 |
| Planning area | 2431.45 | 100 |

Source: Land Use Survey, 2010.

In Naria Paurasava, major landuse is agriculture (48.49%). Residential landuse occupies second position (34.95%) of the category. Only 2.0% land is using for circulation network. Though, agriculture landuse dominates the Paurasava but, after the preparation of

Master Plan, a radical change in physical development will proceed. In consideration of such concept, the Master Plan will be delighted in favour to save the agriculture land.

Determining factors of land use change is the income of the people, government policy, new establishment like industry, higher level educational institute, construction of road and embankment and availability of services. The Paurasava was developed as a growth centre long before, than a police station. Before it known as Paurasava, agricultural domination was the key land use. During last ten years, the land use scenarios remain same. A stagnant character of land use change still stand due to the existence of river named Palong. Rapid change of land use will be viewed after construction of the Padma Bridge at Maowa point.

10.2.2 An Estimate on the Requirement of Land

The Paurasava is not an ideal township due to the agriculture domination. Agriculture based township should be encouraged in the preparation of Master Plan. Growth of population is the natural trend and at the sametime, expansion of non-agricultural use on agriculture land is also natural tendency of the people. This will be controlled through the Compact Township concept with the encouragement of vertical development. In case of government services, specific building may accommodate different type of offices.

Future land use have been calculated according to the development control for the masses and the standard supplied by the LGED. In case of public land, existing use and khas land may be emphasized. Willingness and participation of the people in development activities may be the key factor for future land use demarcation. Slow change of land use has emphasized rather than rapid change. Let the people do whatever he likes on own land – such concept should not be considered for future projection of land uses. Three parts of the projection are land use change, land use control and land use restriction has been included in the Master Plan. In any case, river front areas should be restricted for human habitation. As a result, river water will safe from contamination.

The projection of land use depends on the growth of population. After population projection it is found that, population of this Paurasava will be 29355 in the year 2031 and 25855 in 2021. Projection on land use also depends on present trend of migration.

In case of land use change, the standard given by the LGED according to the projected population and area for the specific service is being calculated. Minimum use of agriculture land for physical development is emphasized in the plan. The vertical expansion will be emphasized rather than horizontal. In case of road network planning, missing links will get priority rather than new roads. For the development of pisciculture, most of the ponds and ditches may be preserved, in some exceptional cases; small number of ditches may be used for physical development activities. Land use control and land use restriction will be imposed by the Paurasava according to the prescribed plan.

Map 10.1: Existing Landuse

The standards presented in the Table-10.2 are fairly generous and considered for the Paurasava (including extended areas). Adjustments have to be made in the core areas and a time line may be set to gradually achieve these standards over a five, ten and fifteen years period.

Commerce

In total, 6.0 acres commercial land is in the Paurasava.

Determination of Standard: According to the standard on Wholesale Market/bazar, 1 acre land is to be provided for every 10,000 populations and 1 acre land for every 1000 population for Retail sale market. Again, 0.25 acre of land is being standardized for per corner shop, 1 acre per neighbourhood market, 1.5 to 2.5 acre per super market and 1 acre per 25,000 populations for bank, hotel, garage and godown. The Consultant has considered 29355 populations for the planning area up to the year 2031. For this population total land required wholesale market/bazar stands 2.98 acres up to the year 2031 and 29.3 acres for retail sale market. The planning area already has 1 retail sale market including wholesale market/bazar.

Recommendation / Forecast: The Consultant recommends a market area on 20.98 acres of land. Necessary planning permission and design criteria will be provided by the Paurasava. The lands may be allowed to use for other commercial purposes like bank and hotel.

Industry

In the Paurasava, 0.73 acres land is under industrial development.

Determination of Standard: According to the standard, land is being allocated as 1.5 acres for every 1000 populations in case of small-scale industry, 5 acres per 10000 populations for heavy industry and service industry and 1 acre per 1000 population for cottage/agro-based industry. The Consultant has estimated 29355 populations for the planning area up to the year 2031. For this population total required land for industry stands 44.03 acres land for small-scale industry, 346.19 acres for cottage / agro-based industry and 29.36 acres each for heavy industry and service industry (including agro-based industry), up to the year 2031.

Recommendation / Forecast: The Consultant recommended some land for industrial development.

Primary School

Determination of Standard: According to the standard on primary school, 1 school with 2 acres of land is to be provided for every 5,000 population. The Consultant has estimated 29355 populations for the planning area up to the year 2031. For this population total number of required primary school stands 6 schools with 11.74 acres land is being needed up to the year 2031. The planning area already has 11 primary schools.

Recommendation / Forecast: According to the standard there is no need for new primary school but considering the standard existing primary school may be expanded vertically based on the enrolment.

Secondary School

There are 6 secondary schools in the planning area covering together 1.24 acres land. Average area of a secondary school is 0.26 acre.

Determination of Standard: According to the standard, 5 acres of land may be provided for every 20,000 population for one secondary school. The projected population of the planning area is 29355 persons up to the year 2031. Therefore, as per standard the planning area needs 7.3 acres land up to the year 2031 for secondary school. At present, there are 6 secondary schools with 1.24 acres land in the planning area. Number of schools already exceeds the requirement.

Forecast / Recommendation: As per above standard, no more secondary school is needed but by considering the horizontal distance a high is proposed.

College / Higher Secondary School

There are two colleges in the planning area, located on 2.9 acres land.

Determination of Standard: The standard for college is 10 acres per 20000 populations.

Recommendation / Forecast: The planning area already has two degree level colleges apart from higher secondary level education with several high schools. By considering the area two new colleges also proposed in this area.

Vocational Training Centre

An important component for the rural masses is vocational training. Multi-dimensional training may be offered through the centre. People are being benefited directly and prepare him as a technical person enjoying training from vocational centre. At present, no vocational training centre in the Paurasava.

Determination of Standard: The prescribed standard for vocational training centre is 5 to 10 acres for Upazila.

Recommendation / Forecast: The study team recommended a vocational training centre.

Health Facilities

At present, no health facility is in the Paurasava premises.

Determination of Standard: The prescribed standard for health facilities are 10 to 20 acres for Upazila Hospital and 1 acre per 5000 population for Health centre/Maternity clinic. According to the standard, up to the year 2031, 15.87 acres land will be needed for Health centre/Maternity clinic.

Recommendation / Forecast: The study team is recommended 12.81 acres land for health facilities.

Open Space

At present, no open spaces are in the Paurasava.

Determination of Standard: The standard recommends 3 acres per 20000 populations for playground, 1 acre per 1000 population for park and 1 acre per 1000 population for Neighbourhood Park. Total land required for open spaces is 69.58 acres up to the year 2031.

Recommendation / Forecast: The study team recommended several numbers of play fields and parks. About 68.2 acres land is being proposed for open spaces.

Community Facilities

Community facilities include Community centre, Graveyard/ Burial ground, Electric sub-station, Water supply pump, Post office, T&T office, Public library, Eidgah, Mosque/Church/Temple, Police station, Police box/outpost, Fire service station, Waste disposal site, club, etc. Existing land under community facilities is 7.91 acres.

Determination of Standard: The standard suggests 1 acre per 20000 for the community centre, Graveyard/ Burial ground and Eidgah. Again, 0.5 acre per 20,000 populations prescribed for Mosque/Church/Temple, Post office and T&T, 1 acre per 20,000 populations for Fire service station and 3–5 acres per Upazila Headquarters and police station. Total land required for community facilities is 7.84 acres up to the year 2031.

Recommendation / Forecast: The study team recommends an auditorium on 0.67 acres of land, shasan ghat on 0.04 acres of land, two graveyards on 0.83 acres of land, surface water treatment plant on 0.61 acres of land and a library on 0.81 acres of land. Areas for Mosque/Church/Temple, Post office, Fire service station and T&T remain with existing areas.

Administration

In the Paurasava, 6.93 acres land is under administrative use.

Determination of Standard: According to the standard for administrative land, 15 acres land is to be provided for every Upazila, 3 to 5 acres per Paurasava office, 0.10 acres per Union and 10 acres for jail/sub-jail. Total required land for administration stands at about 18 acres. The planning area already has 6.93 acres administrative land. New administrative land will be needed and it is being proposed.

Recommendation / Forecast: The planning area already has one Upazila office, one Paurasava office and other govt. offices. In total, 17 acres of land is being proposed for administrative use.

Recreation

Only 0.05 acres land is under recreational facility in the Paurasava.

Determination of Standard: According to the standard for recreational facilities, 1 acre of land is to be provided for every 20,000 population for cinema/theatre, 5 to 10 acres land

for stadium/sports complex and 1.75 acres land per 10,000 populations for a shishu park. The study team has estimated 29355 populations for the planning area up to the year 2031. For this population total land required for cinema/theatre stands 1.67 acres up to the year 2031, 6 acres for stadium and 5.85 acres for shishu park.

Recommendation / Forecast: The study team recommends a stadium/sports complex on 10.2 acres of land and a shishu park on 1.13 acres of land.

Residential

Existing residential areas of the Paurasava is 849.80 acres. All type of residential lands is included with such amount of land. About 23% residential land belongs with the rural homestead. Therefore, rural environment will be considered for creating better living areas.

Table 10.2: Existing and proposed landuses including standard (acre)

| Types of Land Uses | Recommended Standard Provision unit) | Existing (acre) | Estimated area (acre) | | | | |
|-----------------------------------|---|-----------------|-----------------------|--------|--------|--------|--|
| | | 2011 | 2016 | 2021 | 2026 | 2031 | |
| Residential | | 849.8 | | | | | |
| General residential | 100–150 persons/1 acre | | 242.65 | 258.55 | 9.18 | 293.55 | |
| Real Estate – Public/Private | 200 population/ 1 acre | | | | | | |
| Considered | 30 person /acre | | 808.84 | 861.85 | 918.33 | 978.51 | |
| Roads | | 48.73 | | | | | |
| -Paurashava primary roads | 150 -100 feet | | | | | | |
| -Paurashava secondary roads | 100 - 60 feet | | | | | | |
| Paurashava local roads | 40 - 20 feet | | | | | | |
| Education | | 12.5 | 41.40 | 43.78 | 46.32 | 49.03 | |
| -Nursery | 0.5 acre/10,000 population | | 2.43 | 2.59 | 2.75 | 2.94 | |
| -Primary School/ kindergarten | 2.00 acres/5000 population | | 9.71 | 10.34 | 11.02 | 11.74 | |
| -Secondary/High School | 5.00 acres /20,000 population | | 6.07 | 6.46 | 6.89 | 7.34 | |
| -College | 10.00 acres/20,000 population | | 12.13 | 12.93 | 13.77 | 14.68 | |
| -Vocational Training Centre | 5 - 10 acres / Upazila | | 5.00 | 5.00 | 5.00 | 5.00 | |
| -Other | 5.00 acres / 20,000 population | | 6.07 | 6.46 | 6.89 | 7.34 | |
| Open Space | | 0 | 58.38 | 61.88 | 65.61 | 69.58 | |
| -Play field/ground | 3.00 acres/20,000 population | | 3.64 | 3.88 | 4.13 | 4.40 | |
| -Park | 1.00 acre /1000 population | | 24.27 | 25.86 | 27.55 | 29.36 | |
| -Neighborhood park | 1.00 acre /1000 population | | 24.27 | 25.86 | 27.55 | 29.36 | |
| -Stadium/sports complex | 5 – 10 acres/Upazila HQ | | 6.00 | 6.00 | 6.00 | 6.00 | |
| -Cinema/ Theatre | 1.0 acre /20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 | |
| Health | | 0.5 | 14.85 | 15.17 | 15.51 | 15.87 | |
| -Upazila health complex/ hospital | 10 -20 acres/Upazila HQ | | 10.00 | 10.00 | 10.00 | 10.00 | |
| -Health centre/Maternity clinic | 1.00 acre/ 5,000 population | | 4.85 | 5.17 | 5.51 | 5.87 | |
| Community Facilities | | 7.91 | 6.12 | 6.96 | 7.39 | 7.84 | |
| -Mosque/Church/Temple | 0.5 acre /20,000 population | | 0.61 | 0.65 | 0.69 | 0.73 | |
| -Eidgah/ | 1.0 acre/20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 | |
| -Graveyard | 1.00 acre /20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 | |
| -Community centre | 1.00 acre /20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 | |
| -Police Box/outpost | 0.5 acre/ per box | | 0.05 | 0.50 | 0.50 | 0.50 | |
| -Fire Station | 1.00 acre/ 20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 | |
| Post office | 0.5 acre /20,000 population | | 0.61 | 0.65 | 0.69 | 0.73 | |
| Commerce and Mixed | | 17.33 | 29.69 | 31.44 | 33.30 | 35.29 | |

| Types of Land Uses | Recommended Standard Provision unit) | Existing (acre) | Estimated area (acre) | | | |
|---------------------------|---------------------------------------|-----------------|-----------------------|-------|-------|-------|
| | | 2011 | 2016 | 2021 | 2026 | 2031 |
| -Wholesale market | 1.0 acres/ 10000 population | | 2.43 | 2.59 | 2.75 | 2.94 |
| -Retail sale market | 1.0 acres/ 1000 population | | 24.27 | 25.86 | 27.55 | 29.36 |
| -Corner shops | 0.25 acre/per corner shop | | 0.00 | 0.00 | 0.00 | 0.00 |
| -Neighborhood market | 1.00 acre/per neighborhood market | | 1.00 | 1.00 | 1.00 | 1.00 |
| -Super Market | 1.50 – 2.50 acres/per super market | | 2.00 | 2.00 | 2.00 | 2.00 |
| Utilities | | 0 | 9.85 | 10.17 | 10.51 | 10.87 |
| Drainage | As per local requirement | | | | | |
| Water supply | 1.00 acre /20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 |
| Gas | 1.00 acre /20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 |
| Solid waste disposal site | 5– 10 acres/Upazila HQ | | 5.00 | 5.00 | 5.00 | 5.00 |
| Waste transfer station | 0.25 acres/per waste transfer station | | 0.25 | 0.25 | 0.25 | 0.25 |
| Electric sub-station | 1.00 acre/20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 |
| Telephone exchange | 0.5 acre/20,000 population | | 0.61 | 0.65 | 0.69 | 0.73 |
| Fuel Station | 0.5 acre/20,000 population | | 0.61 | 0.65 | 0.69 | 0.73 |
| Industry | | 0.73 | 60.66 | 64.64 | 68.87 | 73.39 |
| -Small scale | 1.50 acres /1000 population | | 36.40 | 38.78 | 41.32 | 44.03 |
| -Cottage/agro-based | 1.00 acres /1000 population | | 24.27 | 25.86 | 27.55 | 29.36 |
| Transportation | | 0.43 | 1.82 | 1.94 | 2.07 | 2.20 |
| -Bus terminal | 1.0 acre /20,000 population | | 1.21 | 1.29 | 1.38 | 1.47 |
| -Truck terminal | 0.50 acre /20,000 population | | 0.61 | 0.65 | 0.69 | 0.73 |
| -Baby taxi/tempo stand | 0.25 acre /one baby taxi/tempo stand | | 0.00 | 0.00 | 0.00 | 0.00 |
| -Rickshaw/van stand | 0.25 acre /one baby taxi/tempo stand | | 0.00 | 0.00 | 0.00 | 0.00 |
| -Passenger Shed | 0.25 acre /one baby taxi/tempo stand | | 0.00 | 0.00 | 0.00 | 0.00 |
| Administration | | 6.93 | 18.00 | 18.00 | 18.00 | 18.00 |
| -Upazila complex | 15.00 acres | | 15.00 | 15.00 | 15.00 | 15.00 |
| -Paurashava office | 3 – 5 acres | | 3.00 | 3.00 | 3.00 | 3.00 |
| Agri-extension Farm | 10 acres/Upazila HQ | | 10 | 10 | 10 | 10 |
| Urban Deferred | 10 percent of the total build up area | | 81 | 86 | 92 | 98 |

Determination of Standard: The standard recommends in Table-10.2 is 100-150 persons per acre (gross). Again, it is recommended 200 persons per acre for real estate or housing areas both for public and private. No standard is being recommended for low-income group.

Recommendation / Forecast: According to the standard (30 persons per acre), 978.5 acres land will be needed up to the year 2031. Existing residential area (849.80 acres) is lower than the projected areas. Allocation of general residential land for future is not prescribed by the Consultant.

Conservation and harvesting of rain water in Government Blocks, Commercial Buildings and Institutional Buildings. They should provide required facilities and infrastructure for conservation and harvesting of rain water available to them.

The paved surface around the building shall have percolation pits of 4'x4' covering at least 30% of such areas. Such pits shall be filled with small pebbles or such absorbing materials or river sand and covered with perforated concrete slabs.

Following requirements are optional and should be provided in residences depending on site conditions and as per case to case basis.

Terrace Water Collection: The terrace shall be connected to a sump or well through filtering tank by PVC pipes. A valve system shall be incorporated to enable the first part of the rain water collected to be discharged to the soil if it is dirty and make arrangements to collect subsequent discharge.

Open Ground: Whenever there is open ground a portion of top soil should be removed and replaced with sand to allow percolation of rain water.

10.3 Landuse Proposals

Basically, landuse proposal involves with the existing conflicting landuses. Those conflicts may be raised due to different causes. Inhabitants of the Paurasava are not aware about the land level and slope direction of the Paurasava. Without knowing this information they are raising their land up to a mark and constructing permanent structure. As a result, water-logging problem during rainy season is viewed all over the residential areas.

Due to the absence of development control, the core area of the Paurasava is already developed as mixed-use area. Commercial, residential, administrative, educational uses are admixture in the core area. Zoning provision, landuse control should not be enforced in such type of the core area.

At present, the Paurasava is a natural developed area. Rearrangement of the existing use is not possible. Land acquisition for expansion of road (to increase the width of road) will create socio-political hazards. As a result, the roads in the core area remain as today.

For water supply network, construction of sewerage facilities and removal of fire hazards, at least 24 feet width road is necessary. In the Paurasava, except Regional Highway, such type of road is absent. New road will form new township on agriculture land. These processes will washout agriculture domination from the Paurasava. Compact Township will be effective for new formation, not for the mixed-use areas where most of the roads are 8 to 10 feet width.

Residential: Present residential development is covered 849.80 acres of land. According to the calculated housing demand, 1026 acres land will be needed up to the year 2031. The Consultant emphasizes to save agriculture land according to the Agriculture Policy of Bangladesh and honoured compact township development. According to this concept, 963 acres land is being proposed for residential purposes (918.6 acres for urban residential areas and 44.4 acres for rural settlement). Existing form of residential development is being emphasizes for demarcating proposed residential development.

Commercial: Present commercial development is covered 17.33 acres of land. According to the standard, 37.6 acres land will be needed up to the year 2031. The commercial zone includes mixed-use development also. As a result, 27.61 acres land for mixed-use and 10.48 acres for commercial use is being proposed (in total 38.09 acres). Ward No. 4 and 9 is the major commercial zone considered in the plan.

Industrial: Present industrial development is covered 0.73 acres of land. According to the standard, 76.98 acres land will be needed up to the year 2031. In the landuse plan more 70.98 acres land is being proposed for industrial development.

Education: Present educational development is covered 12.50 acres of land. According to the standard, 43.5 acres land will be needed up to the year 2031. In the landuse plan, 37.79 acres land is being proposed for educational facilities.

Health: At present, 0.5 acre of land is under health facilities. According to the standard, 6.16 acres land will be needed up to the year 2031. In the landuse plan, 6.67 acres of land is being proposed for health facilities.

Community facilities: Present community facilities cover 7.91 acres of land. According to the standard, 8.20 acres land will be needed up to the year 2031. In the landuse plan, 10.99 acres land (about 2 acres lower than existing) is being proposed for community facilities. Those facilities are dumping site, graveyard and slaughter house.

Open space: At present, no land under open space in the Paurasava. According to the standard, 72.74 acres land will be needed as open spaces up to the year 2031. One stadium on 2.44 acres of land is being proposed as open space in the Ward No. 7.

Transportation facilities: At present, 0.43 acres land is under transportation facilities. According to the standard, 3.06 acres land will be needed for these purposes up to the year 2031. In the plan, 3.61 acres land (0.10 acres lower than existing) is being proposed for transportation facilities.

Government services: At present, 6.93 acres land is under government services. According to the standard, 18 acres land will be needed for these purposes up to the year 2031. In the plan, 12.69 acres of land is being proposed for government services.

10.3.1 Designation of Future Landuse

- Identification and development of sites for government housing. After preparation and implementation of the master plan, different types of government activities will be increased. Residential accommodation will be needed for those government employees. A site for government housing should be reserved. National Housing Authority is appropriate for performing this responsibility.
- Encourage central government to decentralize industrial development from Dhaka. Those facilities may be relevant with specific agro-product such as jute for jute industry, cane and bamboo for handicrafts, poultry and horticulture farming, export-

oriented vegetation, etc. Different authorities such as Agriculture Development Corporation, Small and Cottage Industries Corporation, Directorate of Livestock and Poultry may be the responsible authority.

- Provision of sites and services schemes for the low and lowest income groups. The Paurasava authority and Schedule Bank may be appropriate for performing these responsibilities. Housing for low-income group, distribution of khas land among the lowest-income group and loan with low-interest for house construction may be the appropriate schemes.
- Upgrading of slum and squatter settlements. Mostly, the vulnerable groups are affected by river erosion, form slum and squatters on public land. If possible, those formations should be upgraded providing basic utility services. It is better, in Paurasava context, the people are living in the slum and squatters, rehabilitate them with the provisioning of housing for lowest-income group. The Paurasava and NGOs can perform such role.
- Monitoring the principal aspects of community facility provision in the Paurasava. Wholesale or retail market, specialized clinic, etc. are under this community facility. When any difficulties will be encountered in case of suitable site selection considering demand of the inhabitants, the Paurasava will perform the lead role.
- Location for new industrial development. The industrial area prescribed in the Landuse Plan will be developed provisioning all utility services. The authorities relevant with those utility services will perform the responsibilities. At first, the polluting industries (water and noise) from their original location should shift to the new location. Imposition of taxes, tax holiday and subsidized taxes may be imposed by the Paurasava for such rearrangement.

10.3.2 Landuse Zoning

Zoning is a classification of landuses that limits what activities can or cannot take place on a parcel of land by establishing a range of development options.

Zoning has been defined as an action through legislation provided to a development authority / Paurasava to control a) heights to which buildings may be erected; b) the area of lots that must be left un-built upon; and c) the uses to which buildings may be constructed.

Area / Use Zoning

The objective of area zoning is to specify which types of landuse are considered appropriate for different areas or 'zones', and it therefore indicates the planning control objectives of the authority or municipality for its administrative area. The authority is obliged under the planning acts to designate in its development plan objectives for the use solely and primarily of particular areas for particular purposes.

According to the landuse table, area zoning is divided as agriculture, residential, commercial, industrial, administrative and institutional. The zone has further segmented

and detailed in the Ward Action Plan. A detailed scenario as plot-to-plot basis is also presented with the calculation of covered area in the landuse plan.

Density / Bulk Zoning

Aim of the density zoning is to provide an acceptable density which is related to the designed facilities and amenities especially for the residential areas. This will ensure a healthy community and enjoyable community life. In a particular area, how much number of buildings will be permitted and constructed, the decision is under the density zoning. Provisioning of setback rule and percent of land uses for different purposes is the prime consideration of density zoning. The proposed percentage mentioned in the landuse table is the only tool to control building density in the Paurasava.

Height Zoning

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

For effective development control, in addition landuse zoning individual facility and the structures therein is complied certain regulations imposed to ensure desirable end. Relation between ground cover of buildings and the land parcel that house it, minimum setback of building from the adjoining plot boundaries and the maximum floor area that can be constructed in relation to plot size and the connecting road among many other details, are controlled by Building Construction Rules, 1996. Besides, Bangladesh National Building Code focuses on the appropriate materials, construction method, building safety and associated issues. In absence of Paurasava Master Plan the above rules did not have scope for area specific rules and hence were common for the whole development process.

According to the Building Construction Rule, 1996, minimum permissible road width for obtaining plan permission is to shown, construction is allowed on plots connected by narrow roads provided the plot owner leaves formally half of the addition area needed to make the road 6m for widening the road to the permitted minimum. Perhaps the intension behind this was that gradually the whole road would rise up to 6m in short time and it is true for new areas. But congested unplanned area represents an alarming picture. In commercial area, most of the plots are occupied almost entirely by pucca structures covering the property line connected by the narrow pathways. Those owners did not bother for Paurasava's plan permission and a handful of those who obtained plan permission did not care to follow them. It is suggested that existing rules need to be modified to tackle the environmental problems created by illegal building construction.

10.3.3 Classification of Land Use Zoning

After a detailed consultation with the LGED counter-part, the land use classification for the Paurasava Master Plan is being finalized as shown in the Table-10.3. Map 10.2 and Appendix -2 shows the Land Use Plan of the Naria Paurasava.

Table 10.3: Landuse Plan of the Naria Paurasava according to the zone

| 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. | 1038.99 | 42.73 |
| 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. | 47.01 | 1.93 |
| 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. | 21.02 | 0.86 |
| 4 | Mixed Use Zone | Mixed land use refers to the area without a dominant land use (Residential, commercial, industrial etc.). | 27.89 | 1.15 |
| 5 | General Industrial Zone | Green and Orange A categories as per The Environment Conservation Rules, 1997 | 35.99 | 1.48 |
| 6 | Heavy Industrial Zone | Other toxic and pollutions Industries (Orange B and Red categories as per The Environment Conservation Rules, 1997) | 34.22 | 1.41 |
| 7 | Government Services | All Government Offices except large scale service based offices as Civil Surgeon Office, DC Office, Police Box, Police Fari, Police Station, LGED Office, Paurasava Office, Settlement Office, Union Parishad Office, Upazila Headquarter, BADC Office, Fisheries Office, Ansar/VDP Office, Agriculture Office, Zila Parishad Office, Post Office, Telephone Exchange Office and Other Government Offices. | 18.03 | 0.74 |
| 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. | 37.88 | 1.56 |
| 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. | 686.87 | 28.25 |
| 10 | Water body | Equal or More than 0.25 acre and justification by the consultant and wet land will merge with water body | 212.92 | 8.76 |
| 11 | Open Space | Playground, Botanical Garden, Stadium, Zoo etc. (Facilities without or with minimum buildings structure) | 71.37 | 2.94 |
| 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 | 0 |
| 13 | Circulation Network | Road communication | 168.02 | 6.91 |
| 14 | Transportation | Under transport and communication land use both transport and | 3.77 | 0.15 |

| SL. | Land use Category | Remarks | Area (acre) | % |
|-------|------------------------------|--|----------------|------|
| | Facilities | communication services are considered. This category includes airport, bus terminal/stand, ferryghat, filling station, garage, launch terminal, post office, passenger shed, telephone exchange, ticket counter, transport office etc. | | |
| 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. | 0.93 | 0.04 |
| 16 | Health Services | This land will be used to provide health facility. | 14.41 | 0.59 |
| 17 | Community Facilities | All community facilities including funeral places and other religious uses. | 12.32 | 0.51 |
| 18 | Historical and Heritage Site | The entire mentionable historical and heritage site. | Not applicable | |
| 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. | Not applicable | |
| 20 | Overlay Zone | If the consultant justifies 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 Paurasava and the Consultant's judgment | 0 | 0 |
| 22 | Forest | Designated Forest Area. | Not applicable | |
| 23 | Beach | Sea Beach | Not applicable | |
| 24 | Non Government Services | Any other categories which are not related to above 23 categories. | 0 | 0 |
| Total | | | 2431.5 | 100 |

In the paragraphs 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 Restricted Use for the corresponding land use category and shall not be permitted only except unanimously decided otherwise by the appropriate authority. In such situations, the use shall get permission in the category of New Use. Following is a short description of recommended land use zones.

Urban Residential Zone

Urban residential zone refers to all categories of urban residential areas, including existing and proposed residential land. In total, this zone covers 1038.99 (42.73%) acres of land delineated up to the year 2031, considering standard provided by LGED. 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. Potential area for high dense residential area near to urban core area (influences of close proximity to commercial hub, administrative, educational facilities, road way network, service facilities and flood free suitable land for development) and large portion area both side of Dhaka-Shariatpur via Naria road demarcated for such kind of use.

Rural Settlement

Naria Paurasava includes some rural characteristics. The Land use category supplied by LGED for identification of residential settlements in the agricultural belt is categorized as rural settlements. These settlements usually constructed with temporary building materials. Naria Paurasava is mostly rural in character. About 48% existing land is under agriculture practice and most of the settlement situated surrounding or within the agricultural land. In planning consideration, to save agriculture land according to the Agriculture Policy of Bangladesh, a portion of land declares as rural settlement. This settlement occupies 47.01 acres of land (1.93% of the total land). The areas of rural settlement have some restrictions for non-agricultural development. Annexure-B shows the permitted land use of rural settlement.

Commercial Zone

The commercial zone is intended to provide locations, where commercial activities including retail and wholesale can be set up and function without creating hazards to surrounding land uses. In the zone, it is proposed 21.02 acres land for commercial activity. In the Paurasava, existing commercial land is 17.33 acres.

Table 10.4: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|--------------------|----------|-----------------|-----------------|-----------------------|-------|
| Proposed Market | Commercial | 01 | Naria_99_01 | 295, 301 | 1 st Phase | 0.21 |
| Total | | | | | | 0.21 |
| Proposed Shosan Ghat | Community Facility | 02 | Naria_99_01 | 65 | 1 st Phase | 0.04 |
| Proposed Graveyard 01 | Community Facility | 06 | Naria_99_02 | 1423-25 | 1 st Phase | 0.36 |
| Proposed Graveyard 02 | Community Facility | 03 | Lonshinha_65_01 | 561 | 3 rd Phase | 0.47 |
| Proposed Graveyard 03 | Community Facility | 02 | Naria_99_01 | 76,79,649 | 1 st Phase | 0.56 |
| Proposed Graveyard 04 | Community Facility | 03 | Lonshinha_65_01 | 562 | 3 rd Phase | 0.48 |
| Proposed Ward Center 01 | Community Facility | 01 | Naria_99_01 | 319, 322-23,630 | 1 st Phase | 0.31 |
| Proposed Ward Center 02 | Community Facility | 02 | Naria_99_02 | 1153 | 3 rd Phase | 0.25 |
| Proposed Ward Center 03 | Community Facility | 03 | Naria_99_02 | 1579 | 2 nd Phase | 0.53 |
| Proposed Ward Center 04 | Community Facility | 04 | Naria_99_02 | 1729 | 1 st Phase | 0.55 |
| Proposed Ward Center 06 | Community Facility | 06 | Naria_99_02 | 1440 | 3 rd Phase | 0.57 |
| Proposed Ward Center 07 | Community Facility | 07 | Lonshinha_65_03 | 2003 | 1 st Phase | 0.20 |
| Proposed Ward Center 08 | Community Facility | 08 | Lonshinha_65_02 | 1768 | 3 rd Phase | 0.18 |
| Proposed Ward Center 09 | Community Facility | 09 | Lonshinha_65_01 | 335 | 1 st Phase | 0.40 |
| Proposed Eidgha | Community Facility | 09 | Lonshinha_65_01 | 45 | 3 rd Phase | 1.19 |
| Proposed Central Mosque | Community | 01 | Naria_99_01 | 78,636 | 2 nd Phase | 0.31 |

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-----------------------------|--------------------|----------|------------------|-----------------------------|-----------------------|--------|
| | Facility | | | | | |
| Proposed Zoo | Community Facility | 05 | Kalukati_98_00 | 28,32-3, 112-12 | 1 st Phase | 1.78 |
| Total | | | | | | 8.18 |
| Proposed Library | Education | 07 | Lonshinha_65_03 | 2424 | 2 nd Phase | 0.81 |
| Proposed University | Education | 01 | Naria_99_01 | 417-31 | 3 rd Phase | 9.21 |
| Proposed High School | Education | 04 | Naria_99_02 | 2405-07,2418 | 3 rd Phase | 2.6 |
| Proposed College 01 | Education | 07 | Lonshinha_65_02 | 1297-1308 | 1 st Phase | 4.157 |
| Proposed College 02 | Education | 04 | | 628-29,634, 2412, 2414,2415 | 3 rd Phase | 4.63 |
| Total | | | | | | 21.407 |
| Proposed Hospital/Clinic 01 | Health | 04 | Naria_99_02 | 2136-53 | 1 st Phase | 6.16 |
| Proposed Hospital/Clinic 02 | Health | 01 | Naria_99_01 | 373-75 | 2 nd Phase | 2.03 |
| Proposed Hospital/Clinic 03 | Health | 08 | Lonshinha_65_02 | 1156-72 | 3 rd Phase | 3.49 |
| Proposed Clinic | Health | 02 | Naria_99_02 | 1007-9 | 1 st Phase | 1.13 |
| Total | | | | | | 12.81 |
| Proposed Shishu Park | Open Space | 01 | Naria_99_01 | 295, 300-305 | 2 nd Phase | 1.13 |
| Proposed Auditorium | Open Space | 01 | Naria_99_01 | 303-305, 310 | 3 rd Phase | 0.67 |
| Proposed Park 01 | Open Space | 08 | Lonshinha_65_02 | 1413, 1415,1417 | 1 st Phase | 0.76 |
| Proposed Park 02 | Open Space | 04 | Naria_99_02 | 1675-89 | 2 nd Phase | 4.01 |
| Proposed Park 03 | Open Space | 06 | Lonshinha_65_01 | 484-90, 502-08 | 3 rd Phase | 6.50 |
| Proposed Stadium | Open Space | 09 | Lonshinha_65_01 | 212-224 ,238-48 | 3 rd Phase | 10.2 |
| Total | | | | | | 15.51 |
| Proposed Bus Stand | Transport | 02 | Naria_99_02 | 1161 | 1 st Phase | 0.21 |
| Proposed Bus Terminal | Transport | 01 | Naria_99_01 | 416 | 1 st Phase | 1.64 |
| Proposed Truck Terminal | Transport | 01 | Naria_99_01 | 416 | 3 rd Phase | 1.63 |
| Total | | | | | | 3.48 |
| Proposed Housing Estate | Urban Residential | 01 | Naria_99_01 | 380-81 | 3 rd Phase | 0.74 |
| Total | | | | | | 4.22 |
| Proposed Dumping Ground | Utility | | Out Of Paurasava | | 3 rd Phase | 3.24 |
| Water Treatment Plant | Utility | 08 | Lonshinha_65_02 | 1911 | 2 nd Phase | 0.61 |
| Proposed Water Pump 01 | Utility | 09 | Lonshinha_65_05 | 4090 | 1 st Phase | 0.047 |
| Proposed Water Pump 02 | Utility | 07 | Lonshinha_65_03 | 2072 | 3 rd Phase | 0.037 |
| Proposed Water Pump 03 | Utility | 09 | Lonshinha_65_01 | 36 | 1 st Phase | 0.028 |
| Total | | | | | | 3.96 |
| Gross Total | | | | | | 72.63 |

Mixed-Use Zone

Mixed-use zone is recommended to allow some flexibility in development. In a small urban area like Naria, as the trend shows, an exclusive commercial land use is unlikely to function. Admixture of land uses will allow flexibility of development, instead of restricting development. Total proposed area for mixed-use is 27.89 acres (1.15% of total

area) including existing and proposed use. This zone will allow residential structures together with commercial use.

- Civic center will treat as the hub of local civic functions and it will provide the following facilities as per the requirements of the locality:
- Counselor office
- Community Center
- Community Clinic
- Post Box
- Small shops
- Club
- Office of Utility Services

General Industrial Zone

Industrial/Manufacturing/Processing Zone intends to provide locations, where Orange B and Red categories (as per Environmental Conservation Rule, 1997) industrial, manufacturing and processing.

Establishments can be setup and function without creating hazards to surrounding landuses. Due to the availability of gas facilities and well road connection by Dhaka-Shariatpur highway and availability of land creates scope industrial development in the Paurasava. Since there is no industrial agglomeration in the Paurasava, the industrial zone will mean for new industries. Total proposed land is 35.99 acres. In this zone, a complex line of industrial and supporting non-industrial land uses will be permitted.

Government Services

Administrative zone covers all kinds of government and non-government offices. Total area under this use has been proposed 18.03 acres that include existing and proposed land uses. This land will be used for established Paurasava office and other administrative uses as prescribed in the plan.

Education and Research Zone

Education and Research zone refers to mainly education, health and other social services. Total area under this use has been proposed as 37.88 acres that include existing and proposed uses.

Agricultural Zone

The Paurasava has a vast area of agricultural land that demands formation of a separate zone like agriculture. Agriculture zone primarily mean for agriculture and agriculture-related functions. Total area under this use has been proposed as 686.87 acres.

Map 10.2: Landuse Plan of Naria Paurasava

Map 10. 3: Development Proposal

Water Body and Retention Area

Total 212.92 acres water body (8.76% of total land) is in the Paurashava whose area more than 0.25 acre. The plan suggests preserving most of those 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.

Open Space

This zone has been provided to meet the active and passive recreational facility needs of the people and at the same time, conserve the natural resources. Total area estimated for this zone is 71.37 acres (2.94%).

Recreational Facilities

This zone has been provided to meet the active and passive recreational needs of the people. Cinema hall, auditorium, gymnasium, etc. is being considered as recreational facilities.

Circulation Network

The road network is considered as circulation network. National highway, regional highway, local road whether pucca/semi-pucca/katcha, footpath, flyover, over-bridge, underpass, bridge, culvert, etc. are being included in circulation network. In total, 168.02 acres land covers (6.91% of total planning area) as circulation network. Details are given in Chapter 11, Part B of this report. At present, 48.73 acres land is under circulation network.

Transportation Facilities

Transportation facilities incorporate transport and communication services. For an example airport, bus terminal/stand, ferry ghat, filling station, garage, launch terminal, passenger shed, ticket counter, transport office, etc. In total, 3.77 acres land (0.15% of the planning area) is being proposed for this purpose.

Utility Services

It incorporated all utilities and service facilities except health services. Utility services include water treatment plant, water reservoir, water pump house, public toilet, fire service, waste disposal centre, sewerage facilities including office, electricity supply including office or control room and over head water tank. In survey stage this type of land use was defined as service activity. No land is being proposed for this zone.

Health Services

This land will be used to provide health facilities. In total, 14.41 acres land (0.59% of the planning area) is being proposed for this purpose. A community based health centre will be provided at Ward Councillor's Office. Ward Councillor's Office is under in mixed-use category in land use plan proposal.

Community Facilities

Community services include community centre, club house, fire service, civic centre, family planning facilities, religious centres, etc. In addition, all funeral places and other religious uses incorporated in this category. In total, 12.32 acres land (0.51% of the planning area) will be used for this purpose.

Overlay Zone

The overlay land uses refer to those uses that are not compatible to the surrounding land uses but, anyhow, they need to stay there and therefore will not be removed. Those uses are only identified as sites, not zones. They have local, regional or national importance, though they do not conform to surrounding land uses. No other use except the use of overlay site will be permitted in this zone. There is no scope for permitting or conditionally permitting the functions or uses as the zone itself is an overlay. Present and proposed use of the zone will continue until the next zoning regulation is imposed on those specific parcels of land.

A variety of overlay zones are in the Paurasava. Some of the important types of overlay sites are listed below including the purpose of retaining them.

Urban Deferred

The Urban Deferred refers to lands lying outside the urban growth area and identified as Urban Reserve. No land is being proposed for urban deferred.

10.4 Plan Implementation Strategy

10.4.1 Land Development Regulations to Implement the Landuse Plan

Effective implementation of a plan is the most important part of the planning process. The process of Implementation needs to be carried out with care and efficiency in order to produce best outcomes. This chapter highlights various measures needed to be taken in order to implement the landuse plan proposals.

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

The factors that have been taken into account in deciding the priority include such things as— the importance of the issue that the policy addresses, its potential impact on the lives of the population, the ease with which it can be implemented, its urgency and its interdependence with other policies.

Prior to introduction of the regulations to implement the landuse plan, legislative involvement is recommended here.

1. Impose control on all type of buildings in the Paurasava according to the setback rule prescribed in the Building Construction (Amendment) Rules, 1996 (Notification No. S. R. O. No. 112-L/96). Building permission for extended areas shall be according to the landuse provision prescribed in the plan. Any permission for building construction, front road width shall not be less than 16 ft. and the construction must follow the Building Construction (Amendment) Rules, 1996.
2. To control the air, water, noise and soil pollution, Conservation of Environment and Pollution Control Act, 1995 (Act No. I of 1995) was enacted. In the Paurasava, there is no authority for enforcing the provisions prescribed in the said Act. The pollution related with the implementation of landuse component may be controlled with this Act.
3. Haphazard development of commercial activities is the general scenario of the Paurasava. It is necessary to impose control on commercial activities provisioned in the Shops and Establishments Act, 1965 (Act No. VII of 1965).
4. In case of man-made canal, regulations prescribed in the Canal and Drainage Act, 1873 (Act No. VIII of 1873) is the best weapon. For the linking of canal with others and river considering drainage facilities the Act may be enforced.
5. For the conservation of archeological monuments or structures or historical development the Ancient Monuments Preservation Act, 1904 (Act No. VII of 1904) may be enforced. Archeological Department of Bangladesh and Paurasava authority through a partnership process may preserve such type of development.
6. To control air pollution due to brick burning with the establishment of brick field, Brick Burning Control Ordinance, 1989 (Ordinance No. VIII of 1989) is the appropriate regulation. The Paurasava authority may enforce this Ordinance with the authorization given by the government to him.
7. To control the medical practitioner, establishment of private clinics and pathological laboratories, the statute named Medical Practice, Private Clinics and Laboratories (Regulation) Ordinance, 1982 (Ordinance No. IV of 1982) was enacted. For efficient enforcement of the Ordinance, the Paurasava authority may execute the Ordinance with the authorization of government.
8. The Paurasava will have to exercise strictly Playfield, Open space, Garden and Natural Tank in Urban Areas Preservation Act, 2000 (Act No. XXXVI of 2000) to some specially important areas like, riverfront and water bodies, drainage channels, low land below certain level, designated open space, etc. Development restrictions are needed around security and key point installations. The provision of restriction will

strengthen the power of the plan to safeguard its development proposals and landuse provisions.

9. The government is authorized for establishment of hat and bazar with the acquisition of land through the statute named Hat and Bazar (Establishment and Acquisition) Ordinance, 1959 (No. XIX of 1959). In case of private hat and bazar, a management body is being empowered through the Bangladesh Hats and Bazars (Management) Order, 1973 (P.O. 73/72). The Paurasava authority is also empowered establishing hat and bazar in his jurisdiction through the Local Government (Paurasava) Act, 2009. Coordination may be framed among the government (Upazila Parishad), Paurasava and private owner for the establishment, development and management of the hat and bazar located in the Paurasava premises.
10. In the Paurasava premises, industrial development is controlled by the Bangladesh Cottage Industries Corporation through Bangladesh Cottage Industries Corporation Act, 1973 (Act No. XXVIII of 1973), Industrial Development Corporation through East Pakistan Industrial Development Corporation Rules, 1965 (No. EPIDC / 2A-2/63/354) and Factory Inspector through Factories Act, 1965 (Act No. IV of 1965). Locational aspects and issuing of trade license is controlled by the Paurasava authority. A joint coordination cell among those four authorities may control the establishment of factories and industries in the Paurasava.
11. In the Paurasava, for rain water harvesting, some specific ponds / tanks will needed to be preserved. A number of derelict tanks may be improved through tank improvement project and in this case Tanks Improvement Act, 1939 (Act No. XV of 1939) will support the Paurasava is regulatory aspects.
12. Except Khas land, a considerable amount of public land in the Paurasava may be identified as fallow land or unproductive land. In regulatory term those lands are considered as culturable waste land and those lands are being fallow during five consecutive years. Those lands may be utilized under the guidance of Culturable Waste Land (Utilization) Ordinance, 1959 (Ordinance No. E.P. XIII of 1959).
13. The Paurasava should raise its efforts on the imposition and realization of betterment fees to raise its income. In this case, East Bengal Betterment Fees Act, 1953 may be enforced.

10.4.2 Implementation, Monitoring and Evaluation of the Landuse Plan

Implementation through Multi-Sectoral Investment Programme: Major infrastructure development works such as primary roads, water supply, drainage, etc., will largely be controlled by Government. Public works requires efficient co-ordination through the Multi-Sectoral Investment Programme (MSIP).

Objective of a Multi-Sectoral Investment Programme (MSIP) will match a list of the development projects with the funding stream necessary to implement them. There are

two basic activities that would determine the contents of MSIP. One activity would be to prioritize and schedule the investment projects of all public agencies so they will collectively help to achieve the development goals and objectives of the Landuse Plan. Second activity would be to analyze the source and availability of fund for the prioritized list of development projects.

Implementation through Action Plans and Projects: Action Plans and Projects will be the implementation plans to solve problems at the local level. Action plans will take a direct approach toward plan implementation with a minimum of research, reports or elaborate planning methods. These projects will be easily identifiable and will require minimum resource.

Implementation through Development Control: Landuse zoning is one of several methods of plan implementation to be considered. In all cases where some form of development, landuse control may be applied; careful consideration requires the following ideologies:

- the purpose to be achieved by the development controls;
- where controls should be applied;
- what aspect of development needs to be controlled;
- what type of development controls are required;
- what degree or level of development control is required;
- who will be affected by the required control;
- who will be affected by the controls and in what manner;
- when the controls should be applied;
- what will be the likely impact of the controls;
- how and by whom will the controls be administered and enforced.

Development control as an instrument of plan implementation may be selectively applied within the Landuse Plan. Development controls would also be varied in intensity and detail to suit the particular circumstances. It is important that they should be clear and easily understood by all parties concerned. Since the entire Paurasava Master Plan 'package' has become statutory, development controls associated with its component plans would also be statutory.

Implementation by Facilitating Private Investment: Another approach that would be taken by government toward plan implementation will be to guide and facilitate investments made by the private sector. Government can achieve this with relative ease and at very low cost by setting up a legal and operational framework, coupled with suitable incentives, to facilitate land consolidation, plot boundary readjustment, efficient lay out of plots and provision of local infrastructure by the private sector. The benefits of this approach would be:

- increased efficiency of the urban land market would make, more private land available to urban households;
- would pass much of the development costs for local infrastructure to the private sector and land market mechanisms;
- would increase in land for development without large cash outlays by government to purchase land for development schemes; and
- would keep provision of land for community facilities virtually no cost to government.

Plan Monitoring

The Landuse Plan would simply be tools for guiding and encouraging the growth and development of the Paurasava in a preferred manner. In a rapidly changing urban environment, the Landuse Plan would require to keep up to date. If this is not done, within a few years it will be obsolete. Therefore, it is imperative that the requirement for regular updating of the Landuse Plan be made a legal requirement.

For implementation of the various programme components of the Landuse Plan appropriate administrative measures will have to be undertaken. This will essentially include project preparation and monitoring of their execution and evaluation. For carrying out all these activities appropriate institutional measures are also needed.

Evaluation

Monitoring and evaluation of on going and implemented projects is essential to keep the future course of action on the right track. An on going project should be regularly monitored and handicaps identified to enable taking appropriate measures at the right time.

Post implementation evaluation is also needed to take appropriate measures correcting past errors-from project preparation to implementation.

The top level supervision has to be done by a high level supervisory committee headed by Paurasava Mayor, LGED representative and Local Government Ministry. Other members of the committee will be local Ward Councilors, local community leader/social workers and the Town Planner of the Paurasava. The committee will supervise implementation works regularly and issue necessary instructions to expedite the works of implementation.

Co-ordination

A Planning Section of Paurasava should have close interaction with the citizen of Paurasava at large in order to make people aware of the benefits of a good plan and, therefore, their social responsibility to promote plan implementation in one hand and also resist contraventions on the other. A specific interactive cell is recommended to operate in this regard with following responsibilities:

Provide pre-application advice to residents, consultants and developers about landuse management issues and application procedures for the submission of development applications.

Enforce planning and landuse management related legislation and zoning scheme regulations.

Issue of property zoning certificates.

Investigate and resolve landuse management complaints, illegal landuse and prosecuting contraventions.

Such interactive windows may be opened in various convenient locations to ensure ease of the answers to commonly asked questions may be shown in the internet. Besides, those may be shown in the print and electronic media time to time.

In spontaneous areas, while all out people's co-operation is needed for project implementation; there will also be some elements of negotiation. Negotiation will be particularly needed in case of road widening projects. It will be a crucial task for Paurasava to convince the affected people to give up their land for road use. Efforts should be made to convince the land owners on the ground of enhancement of property value due to road widening. In case people refuse to offer land free of cost necessary arrangements may have to be made for payment of compensation. This process of negotiation will be very critical, cumbersome and time consuming, and therefore, has to be handled with utmost care and patience. The best results can be accrued only by winning people's confidence. In case the authority fails to get peoples co-operation they should exercise power of compulsory acquisition of land. Attempts may be made to engage NGOs / CBOs to work as catalysts in negotiation.

CHAPTER 11

TRANSPORTATION AND TRAFFIC MANAGEMENT PLAN

11.1 Introduction

Transportation system directs the urban development pattern. Performance of the transportation system largely influences the economy and social progress of an area. It provides mobility of people, goods and services to their destination. It has linkages with other sections of development and for a sustainable development of any area, its traffic and transportation system should be adequately addressed. This chapter of the report is on Transportation and Traffic Management Plan covering 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 planning area up to 2031. The report also provides the purpose and the rule of Transportation and Traffic Management Plan and its relation with Structure Plan and Land Use Plan.

11.2 Approach and Methodology

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 both 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 survey and O-D survey.

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.

Two intersections are situated in the center of Naria Paurasava have been selected for traffic count survey. These locations are considered as the key locations of Naria Paurasava. Those intersections are Naria Bazar Mor and Jatio Bir Colonel Shawkat Ali Mor. Again, those two locations have been formed six important links named Naria Bazar mor - Chandipur, Naria Bazar mor - Jajira, Naria Bazar mor – Paurasava, Jatio Bir Colonel Shawkat Ali mor – Ghorisal, Jatio Bir Colonel Shawkat Ali mor - Lungsing and Jatio Bir Colonel Shawkat Ali mor - Naria Bazar.

11.3 Existing Conditions of Transportation Facilities

This section describes existing transportation facilities namely roadway characteristics, modal share of vehicular traffic, level of service which incorporate degree of traffic congestion and delay analysis and existing deficiencies in transport sector of Naria Paurasava.

11.3.1 Roadway Characteristics and Functional Classification

The planning area covers 9.48 sq. km. (2431.21 acres) and road length is 75.92 km. One Regional Highway runs through the side of the Paurasava and links a number of Connector Roads and Access Roads. Regional Highway is the major arterial road of the Paurasava. It provides connection with Madaridpur and Dhaka. There are two important road intersections named Naria Bazar Mor and Jatio Bir Colonel Shawkat Ali mor providing linkages with other access roads. Those access roads are Naria Bazar mor to Chandipur, Naria Bazar mor to Jajira, Naria Bazar mor to Paurasava, Jatio Bir Colonel Shawkat Ali mor to Ghorisal, Jatio Bir Colonel Shawkat Ali mor to Lungsing and Jatio Bir Colonel Shawkat Ali mor to Naria Bazar.

Roads of the Paurasava belonging to number of agencies named Roads and Highways Department (RHD) responsible for Regional Highway, Local Government Engineering Department (LGED) responsible for construction and maintenance of Upazila and Union roads and Naria Paurasava responsible for construction and maintenance of roads within the Paurasava area.

Table 11.1: Road network of the Paurasava

| Type | Frequency | | Length | | Area | |
|------------|-----------|--------|--------|-------|-------|-------|
| | Nos. | % | KM | % | Acres | % |
| Pucca | 85 | 19.02 | 43.30 | 57.03 | 31.24 | 64.11 |
| Semi-pucca | 152 | 34.00 | 13.84 | 18.23 | 7.15 | 14.67 |
| Katcha | 210 | 46.98 | 18.78 | 24.74 | 10.34 | 21.22 |
| Total | 447 | 100.00 | 75.92 | 100 | 48.73 | 100 |

Source: Physical Feature Survey, 2010.

Existing transportation system is dominated by road network catering to the passenger service and freight transport. The Paurasava is covered with 75.92 km. various types of roads. The Inland Water Transport system mainly meets the national needs and used as passenger and vehicles through ferry to cross the Padma River at Maowa point, not within the jurisdiction of Naria Paurasava. The Ghat is the most vibrant one used mostly as a passenger ferry ghat.

The road network provides access to various places within the planning area and connects various parts of the country following bus routes. Major trips of vehicles are generated from Chandipur, Ghorisal, Gopalganj, Jajira, Mulfatgonj, Sariatpur and Naria. All inter district vehicles towards and from Madaripur, Shariatpur, Jajira and Naria runs through the Regional Highway.

Motorized and non-motorized vehicles are operated in all the nodes of the study area. The non-motorized vehicles are mainly operated within short distance and meet the local needs. The motorized vehicles are mostly intercity passenger buses and trucks, mainly carry agro product from the Naria towards Naria, Jajira, Sariatpur, Madaripur and Dhaka. Locally modified motorized transport vehicle named Nosimon also uses for short distance passenger and goods transportation.

Table 11.2: Major roads in the Naria Paurasava

| Sl. No. | Road Type | Name of Road | Avg. Width (f) | Length (m) |
|---------|----------------|---------------------------------|----------------|------------|
| 1 | Secondary Road | Veer Colonel Sowkat Ali Sarak | 10.00 | 2518.65 |
| 2 | Secondary Road | Shariatpur to Darbar Sarif Road | 16.00 | 2317.08 |
| 3 | Secondary Road | Sadhin Road | 10.00 | 598.45 |
| 4 | Secondary Road | Naria to Bhedergang Road | 16.00 | 2933.09 |
| 5 | Tertiary Road | Mukti Joddha Ali Ajgor Road | 10.00 | 1299.23 |

Source: Physical Feature Survey, 2010.

11.3.2 Mode of Transport

Road is the only mode of transport in the Paurasava. 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.

11.3.3 Intensity of Traffic Volume

Traffic volume studies are conducted to determine the number, movements and classifications of roadway vehicles at a given location. These data help to identify critical flow time periods and determine the influence of large vehicles on vehicular traffic flow, or document traffic volume trends. Traffic volume survey shows that average traffic movement through the intersections per hour is 380 at hat day and 370 at non-hat day. Among the total traffic, 20% MV and 80% NMV both in hat day and non-hat day.

11.3.4 Level of Service: Degree of Traffic Congestion and Delay

11.3.4.1 Traffic Congestion

Traffic conflict is common and frequent in the planning area, where there is combination of transport vehicles-slow and fast-on the streets. Major conflict and congestions occur in the places, where intensity of traffic movement is high, on street parking is made and on street loading or unloading of goods are taken place. The consultant surveyed the traffic movement all over the Paurasava and has identified three main points, where the traffic congestion is the highest. Those areas are bus stand intersection, Paurasava intersection and bazar intersection. At these points, the slow moving vehicles like, rickshaws and vans come in conflict with motorized vehicles, creating traffic congestion, as the number of slow moving vehicles is higher and the conflicts are usually frequent.

11.3.4.2 Delay

The traffic delays in Naria Paurasava is caused by the interaction of various factors, such as congestion, inadequacy of carriageway widths, mixed traffic conditions, parked vehicles and heavy pedestrian flow and such delays are called congestion delays or operational delays are difficult to measure precisely. It is observed that peak hour period takes on an average 10%-15% excess time than off-peak hour period due to congestion, narrow road and improper design of intersections.

11.3.5 Facilities for Pedestrians

During field survey, it was observed that people move in both directions, going in and out of the both sides of the roads. It is noted that the planning area is without any footpath for pedestrian movement. Pedestrian movements take place mostly on carriageway and right of way of the roads.

11.3.6 Analysis of Existing Deficiencies

11.3.6.1 Roadway Capacity Deficiencies

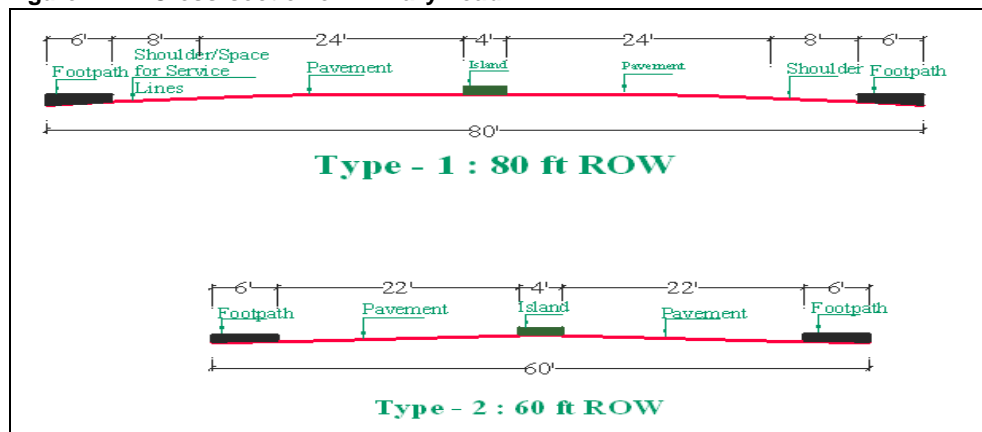
As like other small towns in Bangladesh, Naria has also its own road and transportation deficiencies. The physical feature survey and traffic survey of major intersections revealed that none of roads and transportation facilities is properly designed. Traffic level is far behind the actual capacity of the intersections. Congestion is created by large number of slow moving vehicles waiting for passengers at the intersections.

Narrow Road Width

Narrow width of roads and poor maintenance of roads has been mentioned by most respondents as the major road problems in the Paurasava. About 46% of the respondents have pointed out the misery of road movement during monsoon when unpaved roads get muddy. Narrow width of roads is likely to become a major problem of traffic movement when the Paurasava will expand and density of population will increase in future with consequent increase of road traffic. The field survey shows, 92% of the households reported that the road widths in front of their houses are 8 ft. or less. This is alarming as this condition will become a source of traffic problem, when road traffic will increase. At present, no traffic problem regarding road width is in the Paurasava. Specific example on road width for creating traffic problem is presented below:

Primary Road (Regional Road): No primary road is in the Paurasava. But a regional highway passed in the western part (out side of the Paurashava) of the Paurashava.

Figure 11.1: Cross-section of Primary Road

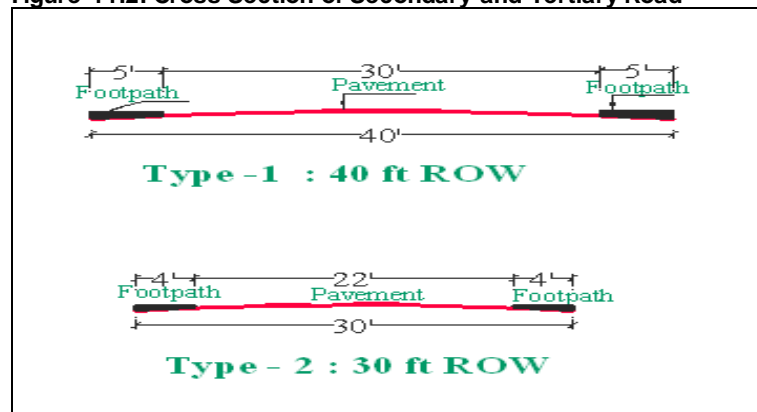


Map 11.1: Important Roads of Bhedarganj Paurashava

Secondary Road: Four secondary roads are in the Paurasava named Veer Colonel Sowkat Ali Sarak, length is 2.52 km and width 3.0 meter, Shariatpur to Darbar Sarif Road, length is 2.32 km and width 4.8 meter, Sadhin Road, length is 0.59 km and width 3.0 meter and Naria to Bhedergang Road, length is 2.93 km and width 3.0 meter. Road standard (ROW) recommended in the Table-11.4 is 60 feet to 100 feet, proves that the standard (ROW) of the existing secondary roads in the Paurasava is lower than the standard (ROW) recommended.

Moreover, in hat day and non-hat day, highest volume of traffic flows on those secondary roads is above 1000PCU/hour. No deficiencies regarding the capacity of those secondary road exits.

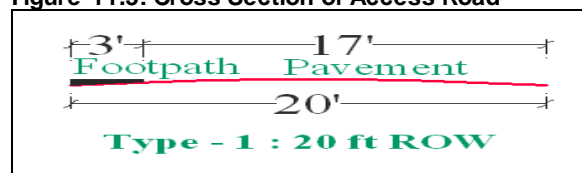
Figure 11.2: Cross Section of Secondary and Tertiary Road



Tertiary Road: In the Paurasava, one tertiary road named Mukti Joddha Ali Ajgor Road is found; length 1.30 km and width 3.0 meter. Road standard (ROW) recommended in the Table-11.4 for tertiary road is 20 feet to 40 feet, proves that the standard (ROW) of the existing tertiary roads in the Paurasava is lower than the standard (ROW) recommended. Moreover, in hat day and non-hat day, highest volume of traffic flows on those tertiary roads is about 300PCU/hour. No deficiencies regarding the capacity of those tertiary road exits.

Access road: Road standard (ROW) recommended in the Table-11.4 may be imposed on access road and it is 20 feet to 40 feet. In the Paurasava, all access roads are less than 12 feet and most of them are using as footway. Non-motorized vehicles named Van sometimes use those walkways. No deficiencies regarding the capacity of those access road exits.

Figure 11.3: Cross Section of Access Road



Tortuous Road and Missing Link

A major characteristic of spontaneously developed roads is that they are tortuous in their shapes. This is because land owners allow roads to follow the alignment of the edges of the tortuous plot boundaries. Another problem of community initiated roads is that they are not in a well linked network. Sometimes links to nearby roads are missing. This causes people to travel comparatively longer distances to reach a nearby destination. In the Paurasava, though, such type of problems is not in scenarios but with the increase of physical growth this type of problem will be specific.

11.3.6.2 Operational, Safety, Signal and Other Deficiencies

Traffic management system is absent in the Paurasava. 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 Paurasava.

Traffic signaling system is totally absent in the Paurasava. 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.

11.3.7 Condition of Other Mode of Transport (Rail/Water/Air)

No railway, water way and air way facilities in the Paurasava.

11.4 Future Projections

This section presents future projection on transportation requirement of Naria Paurasava up to the year 2031. The chapter also provides information on transport network and future traffic volume and level of service.

11.4.1 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 need to be constructed as pucca or at least semi-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 use 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 planning area is largely dependent on road transportation. This dependency is being 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. Accordingly different standards have been suggested for different types of Paurasava roads.

Present population of the Paurasava is 20058 (2001) and after 20 years it will be 28120 (2021). Highest PCU/hr. at hat day is above 1000 and non-hat day is 390. The scenario proves that traffic congestion is not alarming. At the sametime, highest road width at present is 24 feet (ROW) and it will be saturated with the traffic if the PCU/hr. increases above 1500.

About 32% people's income of the Paurasava is between Tk. 4000 to Tk. 6000. On the other hand, 35% are involved with small business and 14% with agriculture. Housing condition is 7% semi-pucca and 86% katcha structures. The scenario proves that the Paurasava dwellers have no capability to increase traffic volume provisioning motorized vehicles. They will increase non-motorized vehicles and Nosimon.

After construction of road cum embankment, a large amount of single-crop land will turn into double-crop land. As a result, agro-product will be increased. With the increase of agriculture production, non-motorized vehicles will be increased for marketing of agro-product.

With the expansion of administrative services, motorized public vehicles will be increased and at the sametime, traffic volume also.

At present, about 98% traffic is under the private sector and 88% enjoying by the non-motorized vehicles. It is expecting that the scenario remain stable for next 20 years.

Table 11.3: Geometric Design Standards of Roads Proposed by LGED

| Class of Roads | Standards recommended |
|-----------------|-----------------------|
| Primary roads | 150-100 ft. |
| Secondary roads | 100-60 ft. |
| Local roads | 40-20 ft. |

Source: UTIDP, LGED, 2010.

11.4.2 Transportation Network Considered

The physical feature survey has identified a number of problems constraining the development of the Paurasava, such as:

- Lack of a hierarchy of roads within the Paurasava with many of the roads unable to fulfill their intended functions adequately;
- Scarcity of reserves of land for future roads; and
- A tradition of encroachment in those areas where road reserves have been made.

To establish a rational hierarchy of roads in the Paurasava, it will be needed to use development control to ensure that reserves of land, once established are maintained.

In the Transportation Plan, north, south, east and west direction links with the Paurasava have been considered. To maintain an effective linkage, the plan proposes one primary road and others are secondary and tertiary roads.

11.5 Transportation Development Plan

11.5.1 Plan for Road Network Development

For an efficient road network development, implementation of some of the recommendations made by the Roads and Highways Department in 2008 would be essential. It is found that many of the road links are not recommended by the Roads and Highways Department. Further analysis under the Transportation Plan will be revealed that most of the links suggested by this study are in fact required to be developed in a phased manner. Under the Transportation Plan, an attempt is being made to promote three major link roads in the Paurasava. These could be called the “east-west link roads”. At present, from north to south all vehicles movement is through the Naria Bus Stand (uses Sariatpur to Madaripur Regional Highway). Naria Bus Stand is the mid point of the Sariatpur to Madaripur Regional Highway and Naria to Bhedarganj link road. Most of the road links with these two roads is already in place, except the following links.

The standard considered here is given by the UTIDP, LGED to draw the transportation development plan. Following are the suggested planning standards for road network development. These road hierarchies are proposed based on the functional linkage of the road of Naria Paurasava.

Table 11.4: Proposal for Road Standard

| Class of Roads | Standards recommended |
|---------------------------|-----------------------|
| Paurasava Primary roads | Row 60+ ft. |
| Paurasava Secondary roads | Row 40 ft. |
| Tertiary Road | Row 30 ft. |
| Local roads / Access Road | Row 20 ft. |

Source: Consultant

Neighborhood and Local Road

The right of way (RoW) of neighborhood (mahallah) roads may be in between 20ft. to 30ft wide depending on their functions.

Road Design Standard

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

Functions of Road

Each category of road has its particular function to perform. Access road carries traffic from buildings to the collector road and collector road carries traffic to the major road and vice versa. In reality, however, it is almost impossible to maintain this hierarchical use of roads except in an entirely planned area. However, functions will not be dependent on the road width, rather on the location of the road, surrounding land use and the link it is providing or the volume of traffic it is carrying. Thus a 40 feet wide secondary road can become a major road due to its strategic location and the purpose it is serving.

East-West Link Roads

Three roads (as a secondary road) will be needed for connecting east-west of the Paurasava. Those link roads are –

Naria to Madaripur Link Road through the Ward No. 2.

Bhedarganj – Sariatpur - Madaripur Link Road through Ward No. 7 and 8.

An embankment cum road will be needed at the northern part of the Paurasava along the Palong River. This road will connect the two roads named Naria to Madaripur Link Road and Naria to Bhedarganj Link Road.

The proposed East–West Link Roads will serve both Paurasava and regional traffic and will reduce traffic congestion on the regional road. It will help in distributing traffic around the Naria Bus Stand area and thereby reduce traffic congestion. The missing links of this link road naturally deserve priority in terms of resource allocation and emphasis on their early implementation.

The other road links which deserve priority attention and could contribute a lot in reducing pressure on the inner roads of Paurasava are as follows:

- Widening and improvement of local road from Palong River to the southern boundary line in Ward No. 1 and 9.
- Widening and improvement of local road Palong River to the southeastern boundary line through the Ward No. 2, 3 and 6.
- Widening and improvement of link road from Ward No. 3 to the southern boundary line through the Ward No. 5 and 7.
- Widening and improvement of link road from the western boundary line to the eastern boundary line through the Ward No. 9 and 7.
- Widening and improvement of link road from Naria to Madaripur Link Road to the local road from Palong River to the southeastern boundary line through the Ward No. 4 and 3.
- Widening and improvement of link road laying at the northeastern boundary line laying in the Ward No. 4 and 5.

An initiative should be taken to develop an effective and efficient arterial road network, which could provide a gridiron system with lots of alternative links for movement in different directions.

11.5.2 Proposal for Improvement of the Existing Road Networks

Use of road reserve is the initial stage for improvement of existing primary road. The maximum recommended reserve width for a primary road that will be adopted and maintained is 48 meters; with an initial basis the extremities of the reserve being 24 meters on either side of the road centre line. This may vary, especially on existing roads, due to localized circumstances.

Alternative cross-sections for the primary road is –

- a primary road with no collector roads (22 meters);
- a primary road with a collector road on one side only (32 or 35 meter);
- a primary road with collector roads on both sides (42, 45 or 48 meters).

Regardless of which option is required, initially the full 48 meter reserve will be applied, although not necessarily purchased in the first instance, until such time as more detailed site investigations have been undertaken.

For new road, the 48 meter reserve will be adopted in the short-term to prevent development encroaching in to it before construction of the road.

Within the established reserve, no further non-road related development will be permitted, with the exception of utility networks. The utilities should not fall under the main carriageways due to the disruption to traffic flows when the system requires repair or maintenance. Localized drainage channels should, where possible, also fall within the road reserve, preferably under the footpath or hard shoulder to reduce land requirements. If, however, this is not possible an additional reserve to cover the drainage channel will be required, increasing the overall width of the reserve.

Permanent structures that currently fall within the reserve should be permitted to remain until such time as they are redeveloped. Redevelopment of existing properties should fall wholly outside the reserve. Temporary structures should not be permitted even on a short-term basis. Existing structures should be removed as and when feasible.

For new roads, where reserves have been identified but implementation is unlikely to commence for a number of years, agricultural use of the land within the reserve should be permitted until such time as the land is required for construction. No structures, of whatever materials, will be permitted within the road reserve.

No direct access should be allowed onto the main carriageways (of primary road). Access should be gained only at controlled junctions—roundabouts or traffic-lights. The number of junctions or intersections should be minimized with desired spacing being not less than 500 meters.

Primary road with secondary roads should be provided in areas where there is considerable roadside development. These should generally be two-way service roads and will be used by non-motorized vehicles like rickshaw, van, pushcart and bullock carts including pedestrians. Controlled parking will be permitted where necessary.

Where secondary roads will not be required either immediately or in the long-term, the full reserve should be maintained (for utilities, etc.) unless there is clear reason why these reserves should be decreased.

Functions of the secondary roads is to act as –

- Links between the Paurasava and primary roads;

- Links between various important nodes of activity within the Paurasava.

The secondary roads are also intended to be high capacity routes, although their design speed will be significantly less than primary roads due to their being a far higher percentage local, inter-Paurasava traffic movements rather than intra-Paurasava. On many occasions within the Paurasava, existing routes will require the provision of tertiary roads to provide access to shop frontages and on-street parking for those shops. The tertiary roads also serve to collect traffic which currently enters at random from side streets.

The maximum recommended reserve that will be adopted and maintained for secondary road is 48 meters, preferably with the extremities of the reserve being 24 meters either side of the road centre line, although this may vary especially on existing roads due to localized circumstances.

Regardless of which option is required ultimately, initially the full 48 meter reserve should be applied until such time as a more detailed site investigation has been undertaken and the actual reserve required has been defined.

No non-road related development will be permitted within the road reserve. For new roads which will not be constructed in the foreseeable future, agricultural use of the reserve will be permitted until such times as the road is constructed. No permanent or temporary structure will be permitted.

In general, no direct access will be permitted onto the main carriageways (of secondary roads) with access gained only at controlled junctions. Occasionally, due to existing situations, access from a side road may be entertained. The number of junctions should be minimized with desired spacing being at 200 meter intervals.

Limited direct access will be allowed from major traffic generators such as Paurasava Office complexes, factories and shopping centres where no other alternative access arrangement is feasible. Car parking arrangements for those large landuses must be provided on off-street.

Functions of the tertiary road are:

- collect and distribute traffic to and from access roads from predominantly residential areas to other parts of the hierarchy;
- provide direct access to roadside landuses.
- The recommended reserve for tertiary road is 18 meters, 9 meters either side of the centre line. On-street parking may be permitted.
- No development will be permitted within the 18 meter reserve.
- Direct access will be permitted although major generators should be required to have off-street parking areas. Junctions should be a minimum of 150 meters apart.

- **Access roads** provide access to residential areas and properties therein. On-street parking is permitted providing that this will not block the access road.
- Recommended reserve for access is 10 meter, although in existing situations, a minimum reserve of 6 meter will be entertained.
- Junctions and access roads should be a minimum of 50 meters apart, although deviation to this will need to be accommodated in existing areas.
- Direct access from residential properties will be permitted.

The process that the Paurasava/RHD can undertake to establish new road reserves for each of the proposed roads shown on the Transportation and Traffic Management Plan is described below:

Initial step will be to determine two points between which the new road will be required. In certain instances, the precise intersection or connection point will be obvious, whilst in other cases only a generalized location is identifiable in the first instance. Determination of the exact connection points can only be made once further steps in the process have been undertaken.

Having identified two connection points (either known or vague), next step will be to conduct a search of a wide area to identify a number of alternative routes. Width of the area subjected to this search will vary according to individual circumstances, with the area being relatively narrow in dense Paurasava locations (say 80 to 100 meters), but wider in more rural settings (say 200 to 300 meters).

The number of alternative alignments to be identified will also vary, but as a general rule, a maximum of five alignments will be chosen. When identifying each of the different alignments, care will be taken to ensure that they are realistic and capable of accommodating the width of reserve required for the standard of road envisaged.

During this stage of the process, number of buildings, other structures or natural environment affected by the proposal should be seen as a constraint, but not yet as a major constraint. That being said, following the rule for realism stated above, the alignments will need to respect as much existing permanent development as possible, aiming instead, in dense situations, to target gaps between developments rather than through them. Only where the avoidance of specific buildings or groups of buildings is unavoidable, to produce a worthwhile alignment, should their removal be seen as part of that alternative's cost.

Similarly, in rural locations or in areas of high natural environmental quality, extreme care should be exercised when choosing the alternatives to respect the natural environment and choose options that are going to minimize the visual impact of a new road or avoid destruction of areas of the highest environmental quality.

Having established the alternative alignments, these will now be assessed, against set criteria to enable the Paurasava to choose a preferred option. The criteria that must be taken into account during this exercise include:

The impact of the alternative on existing properties: whether these are permanent or temporary and the type of development that is being affected. This, in part, will identify the general scale of compensation that will accrue with each of the alignments and therefore the viability of a route to be chosen as the preferred option.

The impact that each alignment will have on the general and natural environment: routes which have a high visual impact in an area of natural beauty will, for example, score badly on this criteria.

Amount of vacant public land available along each route: more land the government owns, the easier the project will be to implement and equally the lower the cost of an option, as the need to compensate landowners will be reduced.

The ease of construction: each alignment will need to be considered with again easier solutions not requiring major development items – bridges – for example, being preferred to more difficult proposals which will increase the cost of construction.

The severance of landuses and communities: need to be assessed, with preference been given to those routes that minimize severance.

Other more localized criteria may be included at the time of assessment.

The result of this assessment exercise will identify for the Paurasava the route that should be considered as its preferred alignment. The reserve for this alignment will then become the area within which no development, other than for agricultural use, will be permitted.

A number of new roads including improvement of existing roads are presented in the following table. Outside the Paurasava, one primary road from Naria to Madaripur (as a regional road) is lying.

All the roads may be constructed under the road development scheme approved by the government for the authorities named RHD, LGED and Paurasava. In total, 54895.60 meter roads have been proposed for efficient accessibility of the Paurasava.

Table 11.5: List of proposed new roads

| Road Id | Width (ft) | Road Type | Length (m) | Phase |
|---------|------------|-----------|------------|-------------|
| RS13 | 40 | Secondary | 2744.2 | 2nd Phasing |
| RS40 | 40 | Secondary | 2280.2 | 1st Phasing |
| Total | | | 5024.4 | |
| RT20 | 30 | Tertiary | 361.6 | 3rd Phasing |
| RT33 | 30 | Tertiary | 536.1 | 3rd Phasing |
| RT34 | 30 | Tertiary | 531.9 | 3rd Phasing |
| RT39 | 30 | Tertiary | 1431.8 | 1st Phasing |
| RT42 | 30 | Tertiary | 632.2 | 2nd Phasing |

| Road Id | Width (ft) | Road Type | Length (m) | Phase |
|-------------|------------|-----------|------------|-------------|
| RT53 | 30 | Tertiary | 1423.0 | 2nd Phasing |
| RT1 | 30 | Tertiary | 500.1 | 1st Phasing |
| Total | | | 5416.6 | |
| RA18 | 20 | Access | 1420.1 | 1st Phasing |
| RA30 | 20 | Access | 391.9 | 3rd Phasing |
| RA31 | 20 | Access | 537.3 | 3rd Phasing |
| RA43 | 20 | Access | 864.4 | 2nd Phasing |
| RA48 | 20 | Access | 565.4 | 3rd Phasing |
| RA55 | 20 | Access | 652.6 | 3rd Phasing |
| Total | | | 4431.8 | |
| Gross Total | | | 14872.7 | |

Table 11.6: List of proposed Widening roads

| Road Id | Width (ft) | Road Type | Length (m) | Phase |
|---------|------------|-----------|------------|-------------|
| RA2 | 80 | Primary | 6081.409 | 1st Phasing |
| Total | | | 6081.409 | |
| RS3 | 40 | Secondary | 3255.615 | 1st Phasing |
| RS4 | 40 | Secondary | 3414.765 | 1st Phasing |
| RS10 | 40 | Secondary | 1288.220 | 2nd Phasing |
| RS14 | 40 | Secondary | 1241.024 | 3rd Phasing |
| RS16 | 40 | Secondary | 2644.249 | 1st Phasing |
| RS19 | 40 | Secondary | 1924.888 | 2nd Phasing |
| RS24 | 40 | Secondary | 1193.403 | 3rd Phasing |
| RS32 | 40 | Secondary | 869.475 | 3rd Phasing |
| RS47 | 40 | Secondary | 531.067 | 3rd Phasing |
| RS1 | 40 | Secondary | 2093.395 | 1st Phasing |
| RT5 | 30 | Tertiary | 501.565 | 3rd Phasing |
| RT6 | 30 | Tertiary | 395.046 | 3rd Phasing |
| RT7 | 30 | Tertiary | 247.172 | 3rd Phasing |
| RT8 | 30 | Tertiary | 419.652 | 3rd Phasing |
| RT9 | 30 | Tertiary | 1345.053 | 2nd Phasing |
| RT15 | 30 | Tertiary | 810.285 | 3rd Phasing |
| RT17 | 30 | Tertiary | 1743.951 | 3rd Phasing |
| RT21 | 30 | Tertiary | 583.791 | 3rd Phasing |
| RT22 | 30 | Tertiary | 360.275 | 3rd Phasing |
| RT23 | 30 | Tertiary | 555.855 | 2nd Phasing |
| RT26 | 30 | Tertiary | 1276.210 | 1st Phasing |
| RT36 | 30 | Tertiary | 2157.774 | 3rd Phasing |
| RT37 | 30 | Tertiary | 546.955 | 3rd Phasing |
| RT38 | 30 | Tertiary | 462.489 | 3rd Phasing |
| RT49 | 30 | Tertiary | 602.920 | 2nd Phasing |
| RT52 | 30 | Tertiary | 634.582 | 2nd Phasing |
| Total | | | 31099.676 | |
| RA11 | 20 | Access | 669.582 | 3rd Phasing |
| RA12 | 20 | Access | 299.101 | 3rd Phasing |
| RA25 | 20 | Access | 448.384 | 3rd Phasing |
| RA27 | 20 | Access | 385.870 | 3rd Phasing |
| RA28 | 20 | Access | 131.708 | 3rd Phasing |
| RA29 | 20 | Access | 152.262 | 3rd Phasing |
| RA35 | 20 | Access | 521.160 | 3rd Phasing |
| RA41 | 20 | Access | 530.670 | 3rd Phasing |
| RA50 | 20 | Access | 422.094 | 3rd Phasing |
| RA51 | 20 | Access | 575.735 | 3rd Phasing |

| Road Id | Width (ft) | Road Type | Length (m) | Phase |
|-------------|------------|-----------|------------|-------------|
| RA54 | 20 | Access | 476.290 | 3rd Phasing |
| Total | | | 4612.856 | |
| Gross Total | | | 41793.900 | |

11.5.3 Plan for Transportation Facilities

11.5.3.1 Transportation Facilities Plan

Transportation facilities and services include Bus Terminal, Bus Stoppage with Shade, Ticket Counter, Waiting Place for Travelers, Parking Space for Motorized and Non-motorized Vehicles, Service Centre and Washing / Toilet Facilities. At present, no formal transportation facilities and services are available in the Paurasava.

The bus terminal proposed in the plan will accommodate all type of transportation facilities. The proposed area for bus terminal is 1.64 acre and it is located in the Ward No. 1.

Bus stand and intersections are using as bus stops including loading and unloading of man and materials. Those intersections are also using for parking both motorized and non-motorized vehicles. Informal economic activities also often encroaches road space. All those factors are together resulted in traffic congestions and also for a cause of accident. Naria Bus Stand (locally known as Bus Stand Mor) is the key intersection that connects with main road. The intersection deserves highest volume of traffic and most of those traffics use the carriageway for parking, loading and unloading of man and goods.

Table 11.7: Proposed Transport Facility

| Proposed facility | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|----------|-------------|----------|-----------------------|-------|
| Proposed Bus Stand | 2 | Naria_99_02 | 1161 | 1 st Phase | 0.21 |
| Proposed Bus Terminal | 01 | Naria_99_01 | 416 | 1 st Phase | 1.64 |
| Proposed Truck Terminal | 01 | Naria_99_01 | 416 | 3 rd Phase | 1.63 |

An architectural design of transport terminal should incorporate the transportation facilities as mentioned above. The proposed parking areas mentioned in the plan is 0.21 acres and located in the Ward No. 2.

11.5.3.2 Development of Facilities for Pedestrian, Bicycle and Rickshaw

During field survey, it was observed that people move in both directions, going in and out using both sides of the roads. It is noted that no footpath is available in this Paurasava for pedestrian movement. Pedestrians mostly use carriageway and right of way of the roads. In most cases, pedestrians use road shoulders for walking but they are being obstructed by the informal business men. Separate provision for bicycle and rickshaw is not needed.

From Traffic volume survey it is gathered that following roads carry extreme pedestrian due to eminent commercial activities in the heart of Paurasava. Following table shows roads carrying most of the pedestrians and recommendation thereof.

Table 11.8: Proposed footpaths on the major roads

| Sl. No. | Road Name | Average width (M) | Length (km) | Proposed footpath (km) |
|---------|---------------------------------|-------------------|-------------|------------------------|
| 1. | Veer Colonel Sowkat Ali Sarak | 3.0 | 2.52 | 2.00 |
| 2. | Shariatpur to Darbar Sarif Road | 4.8 | 2.32 | 2.00 |
| 3. | Sadhin Road | 3.0 | 0.59 | 0.30 |
| 4. | Naria to Bhedergang Road | 3.0 | 2.93 | 2.50 |
| 5. | Mukti Joddha Ali Ajgor Road | 3.0 | 1.30 | 1.00 |

Source: Based on Physical feature survey, 2010.

11.5.3.3 Other Transportation Facilities

No waterway network is found in the Naria Paurasava but, a number of launch ghats and boat ghats are in the Paurasava and they are –

Table 11.9: Major launch and boat ghats in the Naria Upazila

| Sl. No. | Name of Ghat | Position |
|---------|--|---------------|
| 1. | Vojeshar ghat | Naria Upazila |
| 2. | Godownghat | Paurasava |
| 3. | WAPDA ghat | Naria Upazila |
| 4. | Chandipurghat | Naria Upazila |
| 5. | Sureshar ghat | Naria Upazila |
| 6. | Dular charchat | Naria Upazila |
| 7. | Kartikpurghat (Active in rainy season) | Naria Upazila |

Source: Physical feature survey, 2010.

11.5.3 Waterway Development / Improvement Options

11.5.3.1 Proposal for Improvement of the Existing Waterway

Palong River can play an important role to improve the existing waterway system. The river connects with Palong River. So Paurashava and BIWTA should take necessary to improve the water way.

11.5.3.2 Proposal for New Waterway Development

Encourage private sector to involve with the construction of water ways. BOT (Build Operate and Transfer to the Government) system for private sector will appropriate.

The Paurasava may, in collaboration with the Inland Water Transport Authority (IWTA), develop the water ways using the Palong River.

11.5.4 Railway Development Options

No railway development is possible in the Naria Paurasava.

11.6 Transportation System Management Strategy (TSMS)

11.6.1 Strategies for Facility Operations

Following strategies will be adopted to operate the facilities related with the provisioning of suitable transportation system.

An improved traffic management system should be imposed. All facilities involved with this system should be provisioned.

The land uses at the intersections should be controlled with the provisioning of passenger shade, public toilet, ticket counter, tea stall and other necessary facilities.

Parking facilities for motorized and non-motorized vehicles should be provisioned during construction of roads.

11.6.2 Strategies for Traffic Flow and Safety

Following strategies will be adopted to implement circulation network in the planning area:

A comprehensive road network plan has been prepared for the Paurasava using a hierarchy of road network. Implementation will also be followed following this hierarchy.

In case of local roads a participatory approach will be developed to realize at least a part of the development cost bears by the beneficiaries. This will also help to reduce delay and cost involved in land acquisition for road construction.

Proposed roads in those areas will be chosen for immediate construction that is needed to promote growth in that area.

Incremental Road Construction Approach will be adopted to get rid of unnecessary construction costs, where roads remain underutilized.

Service roads will be constructed along with the major roads to allow free flow of long distance traffic.

A restricted buffer zone will be created along primary roads passing through agriculture to discourage roadside development.

11.6.3 Strategies for Traffic Management

- Linking the missing links of primary, secondary and tertiary roads on priority, and widen some tertiary roads to make networks for efficient circulation.
- Provide adequate pedestrian facilities and off-street parking wherever needed.
- Not to allow any development within the right of way (ROW).
- Separate lane for non-motorized vehicles should be provisioned on the primary and secondary roads.

11.7 Plan Implementation Strategies

11.7.1 Regulations to Implement the Transportation Plan

Following regulations will be needed for implementation of the plan.

Public Roads Act, 2004: Objectives of the Public Roads Act, 2004 is prescribed in the section 2. Those objectives are to:

- a) establish ownership and responsibilities for roads;
- b) establish the framework for managing the road network;
- c) establish general principles for road management;
- d) provide for general design and planning principles for roads;
- e) confer powers and responsibilities on road authorities;

- f) commit road authorities to provide and maintain safe roads, and to do so using resources efficiently;
- g) provide for the establishment and classification of public roads;
- h) provide for data bases of public roads, and public access to them;
- i) set out rights and duties of road users;
- j) control activities on roads;
- k) make special provision for restriction on access to roads;
- l) identify characteristics of new road types;
- m) provide a legal framework for private sector participation in road construction, operation and maintenance, including tolling of roads;
- n) establish defenses for civil liabilities; and
- o) create offences and provide for penalties.

Section 5 has defined public roads as-

- 1) The Government may declare a public road.
- 2) The declaration may be made in relation to land, whether or not it is currently used for passage by members of the public.
- 3) In the declaration, the Government shall classify the public road as:
 - (a) a national road; (b) a regional road; (c) a Zila road; (d) an urban road;
 - (e) an Upazila road; (f) a union road; (g) a village road.

Motor Vehicles Ordinance, 1983 (Ordinance No. LV of 1983) was enacted in 22nd September, 1983: The Ordinance will be needed mostly for the registration of motor vehicles and issuing of driving license.

Stage Carriages Act, 1861 (Act No. XVI of 1861) was enacted in 7th July 1861. Section 1 of the Act has defined the term Stage Carriage and said, "every carriage drawn by one or more horses which shall ordinarily be used for the purpose of conveying passengers for hire to or from any place in Bangladesh shall, without regard to the form or construction of such carriage, be deemed to be a Stage Carriages within the meaning of this Act." Again, according to the section 2, no carriage shall be used as a Stage Carriage unless licensed by a Magistrate.

The Paurasava may, in communication with the RHD and LGED and with the prime approval from the Government may enforce the regulations as mentioned above. Again, some of the relevant regulations of developed countries may be enforced by the appropriate authority for the betterment of accessibility, road safety and road management. In connection with this concept, Highways Act of England and Wales may be followed.

Map 11.2: Proposed Circulation Network for Naria Paurasava

According to the section 70(1a) of the Highways Act of England and Wales, the owner or occupier of any structure and the owner or occupier of any land on which a structure is situated shall take all reasonable steps to ensure that the structure or the use of the structure is not a hazard or potential hazard to persons using a public road and that it does not obstruct or interfere with the safe use of a public road or the maintenance of a public road.

(b) Where a structure or the use of a structure is a hazard or potential hazard to persons using a public road or where it obstructs or interferes with the safe use of a public road or with the maintenance of a public road, a road authority may serve a notice in writing on the owner or occupier of the structure or on the owner or occupier of any land on which the structure is situated to remove, modify or carry out specified works in relation to the structure within the period stated in the notice.

(2 a) The owner or occupier of land shall take all reasonable steps to ensure that a tree, shrub, hedge or other vegetation on the land is not a hazard or potential hazard to persons using a public road and that it does not obstruct or interfere with the safe use of a public road or the maintenance of a public road.

(b) Where a tree, shrub, hedge or other vegetation is a hazard or potential hazard to persons using a public road or where it obstructs or interferes with the safe use of a public road or with the maintenance of a public road, a road authority may serve a notice in writing on the owner or occupier of the land on which such tree, shrub, hedge or other vegetation is situated requiring the preservation, felling, cutting, lopping, trimming or removal of such tree, shrub, hedge or other vegetation within the period stated in the notice.

Again, section 71(1a) said that, any person who, without lawful authority or the consent of a road authority-erects, places or retains a sign on a public road, or

erects, places or retains on a public road any caravan, vehicle or other structure or thing (whether on wheels or not) used for the purposes of advertising, the sale of goods, the provision of services or other similar purpose, shall be guilty of an offence.

Section 76(1) of the Highways Act of England and Wales have provisioned regulations for a road authority and said, a road authority may-

construct and maintain drains in, on, under, through or to any land for the purpose of draining water from, or preventing water flowing onto, a public road,

use any land for the temporary storage or the preparation of any gravel, stone, sand, earth or other material required for the construction or maintenance of a public road.

11.7.2 Implementation, Monitoring, Evaluation and Coordination of the Plan

Implementation through Multi-Sectoral Investment Programme: Major infrastructure development works such as primary roads, secondary roads, transportation facilities etc.,

will largely be controlled by Government. Public works requires efficient co-ordination through the Multi-Sectoral Investment Programme (MSIP).

Objective of a Multi-Sectoral Investment Programme (MSIP) will match a list of the development projects with the funding stream necessary to implement them. There are two basic activities that would determine the contents of MSIP. One activity would be to prioritize and schedule the investment projects of all public agencies so they will collectively help to achieve the development goals and objectives of the Transportation and Traffic Management Plan. Second activity would be to analyze the source and availability of fund for the prioritized list of development projects.

Implementation through Action Plans and Projects: Action Plans and Projects will be the implementation plans to solve problems at the local level. Action plans will take a direct approach toward plan implementation with a minimum of research, reports or elaborate planning methods. These projects will be easily identifiable and will require minimum resource.

Implementation through Development Control: Landuse zoning is one of several methods of plan implementation to be considered. In all cases where some form of development, landuse control may be applied; careful consideration requires the following ideologies:

- the purpose to be achieved by the development controls;
- where controls should be applied;
- what aspect of development needs to be controlled;
- what type of development controls are required;
- what degree or level of development control is required;
- who will be affected by the required control;
- who will be affected by the controls and in what manner;
- when the controls should be applied;
- what will be the likely impact of the controls;
- how and by whom will the controls be administered and enforced.

Development control as an instrument of plan implementation may be selectively applied within the Urban Area Plans. Development controls would also be varied in intensity and detail to suit the particular circumstances. It is important that they should be clear and easily understood by all parties concerned. Since the entire Paurasava Master Plan 'package' has become statutory, development controls associated with its component plans would also be statutory.

Implementation by Facilitating Private Investment: Another approach that would be taken by government toward plan implementation will be to guide and facilitate investments made by the private sector.

Map 11.3: Proposed Transport Infrastructure of Naria Paurasava

Government can achieve this with relative ease and at very low cost by setting up a legal and operational framework, coupled with suitable incentives, to facilitate land consolidation, plot boundary readjustment, efficient lay out of plots and provision of local infrastructure by the private sector. The benefits of this approach would be:

- increased efficiency of the urban land market would make more private land available to urban households;
- would pass much of the development costs for local infrastructure to the private sector and land market mechanisms;
- would increase in land for development without large cash outlays by government to purchase land for development schemes; and
- would keep provision of land for community facilities virtually no cost to government.

Plan Monitoring

The Transportation and Traffic Management Plan would simply be tools for guiding and encouraging the growth and development of an urban area in a preferred manner. In a rapidly changing urban environment, the Transportation and Traffic Management Plan would require to keep up to date. If this is not done, within a few years it will be obsolete. Therefore, it is imperative that the requirement for regular updating of the Transportation and Traffic Management Plan be made a legal requirement.

For implementation of the various programme components of the Transportation and Traffic Management Plan appropriate administrative measures will have to be undertaken. This will essentially include project preparation and monitoring of their execution and evaluation. For carrying out all these activities appropriate institutional measures are also needed.

Evaluation

Monitoring and evaluation of on going and implemented projects is essential to keep the future course of action on the right track. An on going project should be regularly monitored and handicaps identified to enable taking appropriate measures at the right time.

Post implementation evaluation is also needed to take appropriate measures correcting past errors-from project preparation to implementation.

The top level supervision has to be done by a high level supervisory committee headed by the Paurasava Mayor, LGED representative, RHD and Local Government Ministry. Other members of the committee will be local Ward Councilors, local community leader/social workers and the Town Planner of the Paurasava. The committee will supervise implementation works regularly and issue necessary instructions to expedite the works of implementation.

Co-ordination

A Planning Section of Paurasava should have close interaction with the citizen of Paurasava at large in order to make people aware of the benefits of a good plan and, therefore, their social responsibility to promote plan implementation in one hand and also resist contraventions on the other. A specific interactive cell is recommended to operate in this regard with following responsibilities:

Provide pre-application advice to residents, consultants and developers about landuse management issues and application procedures for the submission of development applications.

Enforce planning and landuse management related legislation and zoning scheme regulations.

Issue of property zoning certificates.

Investigate and resolve landuse management complaints, illegal landuse and prosecuting contraventions.

Such interactive windows may be opened in various convenient locations to ensure ease of the answers to commonly asked questions may be shown in the internet. Besides, those may be shown in the print and electronic media time to time.

In spontaneous areas, while all out people's co-operation is needed for project implementation; there will also be some elements of negotiation. Negotiation will be particularly needed in case of road widening projects. It will be a crucial task for Paurasava to convince the affected people to give up their land for road use. Efforts should be made to convince the land owners on the ground of enhancement of property value due to road widening. In case people refuse to offer land free of cost necessary arrangements may have to be made for payment of compensation. This process of negotiation will be very critical, cumbersome and time consuming, and therefore, has to be handled with utmost care and patience. The best results can be accrued only by winning people's confidence. In case the authority fails to get peoples co-operation they should exercise power of compulsory acquisition of land through Acquisition of Requisition of Immovable Property Ordinance, 1982. Attempts may be made to engage NGOs / CBOs / RHD / LGED to work as catalysts in negotiation.

CHAPTER 12

DRAINAGE AND ENVIRONMENTAL MANAGEMENT PLAN

12.1 Drainage Management Plan

The consultant has made an extensive drainage network study in Naria Paurasava to improve the living standard of urban dwellers. Major activities of drainage study include:

Survey for the alignment of drains/drainage channels by using DGPS, Data Logger and Path Finder software;

- Survey for the cross sections of drains by using optical level;
- Survey for the bottom level and area of local depressions;
- Identification of outfalls and drainage structures with their conditions;

Development of Maps showing drains (with drainage direction).

The study has conducted with the concern of Paurasava Mayor, Councilors and other Paurasava representatives as well as PMO, LGED as per ToR in concentrating on following major issues:

- Information regarding type of man-made drains.
- Alignment and crest level of embankments, dykes and other drainage divides.
- Identification of missing links.
- Direction, depth of flow, maximum and minimum tidal level of river, flooding condition, condition of river side settlements during high tide and flood.
- Location, number and condition of pump station, sluice gates, drainage structures.
- Location and area of outfalls, ponds, tanks, ditches; condition in dry and wet season.

12.1.1 Goals and Objectives

Objective of Drainage Plan is to find out the present functions of main and secondary drains and natural streams within the Naria Paurasava. Secondly, to find out level of encroachment over drainage reservations responsible for flooding, water logging of neighborhoods during heavy rains. Thirdly, to find out, the existing roadside drainage pattern including capacities and collected gradients. Since planned development of Paurasava is very much desirable, Drainage Master Plan is necessary to ensure operation and maintenance of the present facilities including new proposal for future. For this, both short and long term project improvement plan involving area based drainage master plan is necessary to ensure proper drainage of the Paurasava.

12.1.2 Methodology and Approach to Planning

In implementing various infrastructural developments, 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 spend 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 has given on road network in terms of conflict of drainage and waterways with roads. Drainage and environmental survey was followed the proto-type questionnaire supplied and suggested by the LGED.

12.2 Existing Drainage Network

12.2.1 Natural Drainage System

The natural drainage network composed of 1 river and 12 khals/canals plying within the Paurasava area. They are naturally formed. Generally those khals are flowing towards north-south. Those natural canals are in total 23.88 km length and covers 47.34 acres land. The River is flowing beside the Paurasava. Generally, over the year this river came about to calm. But, during monsoon season all drainage water release to this river and becomes flooded almost every year.

There are linkages between natural and man-made drains. 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 garbages; as a result, the channel is not functioning properly.

Table 12.1: Natural drainage in the Naria Paurasava

| Type | Nos. | Length (Km) | Area | |
|------------|------|-------------|--------|-------|
| | | | Acres | % |
| Ditch | 196 | - | 29.97 | 9.86 |
| Pond | 690 | - | 222.08 | 73.06 |
| Khal/canal | 12 | 23.88 | 47.34 | 15.57 |
| River | 1 | 2.67 | 4.57 | 1.50 |
| Total | 921 | 26.55 | 303.96 | 100 |

Source: Physical Feature Survey, 2010.

Twelve important khals and the Palong River is playing important role in the natural drainage system of the Paurasava. Those canals should be preserved from any type of

development activity. All type of river encroachment will be controlled for the sake of smooth flow of rain and flood water.

Table 12.2: Existing natural canals

| SL. No. | Type | Length (KM) | Width (F) | SL. No. | Type | Length (KM) | Width (F) |
|---------|------|-------------|-----------|---------|------|-------------|-----------|
| 1. | Khal | 3.90 | 10.00 | 8. | Khal | 0.98 | 6.69 |
| 2. | Khal | 2.29 | 5.97 | 9. | Khal | 3.71 | 11.78 |
| 3. | Khal | 2.28 | 10.91 | 10. | Khal | 2.18 | 6.54 |
| 4. | Khal | 1.94 | 6.96 | 11. | Khal | 1.46 | 6.24 |
| 5. | Khal | 2.35 | 9.35 | 12. | Khal | 1.06 | 5.36 |
| 6. | Khal | 2.11 | 6.93 | | Toal | 23.88 | |
| 7. | Khal | 2.52 | 7.51 | | | | |

Source: Drainage Survey, 2010.

12.2.2 Man-made Drains

In the Paurasava, 4 man-made drains cover different parts of different Wards. Total length of these drains is 1.65 km. covering an area of 0.22 acres land. All the drains are pucca with one meter average width. Uncovered drains are mostly in existence with poor condition. Detail statistics of existing man-made drain is shown in the Table-3.6.

Table 12.3: Existing man-made drains

| Ward No. | Type | Length (KM) | Area (Acre) | Quality | Status |
|----------|-------------|-------------|-------------|---------|-----------|
| 1 | Drain Pucca | 0.55 | 0.08 | Average | Uncovered |
| 2 | Drain Pucca | 0.96 | 0.07 | Average | Uncovered |
| 4 | Drain Pucca | 0.10 | 0.01 | Average | Uncovered |
| 6 | Drain Pucca | 0.04 | 0.06 | Average | Uncovered |
| Total | | 1.65 | 0.22 | | |

Source: Drainage Survey, 2010.

Man-made drain is found in the Ward No. 1, 2, 4, and 6. Highest part of the drain is in Ward No. 2. All drains in the Paurasava are constructed privately. Status of the drains is covered and uncovered. The average condition of drains usually damaged side walls, surfaces with obstructions, debris, solid waste, irregular water way, etc.

The drains are poorly managed. Uncovered drains are common feature and the result of uncovering is ultimately filling and losing the drain. Necessity of covering the drains are not only from environmental and safety perspective but also it is a local need. The adjacent river is using as a part of natural drainage system.

The drainage condition, serviceability, structural condition, obstruction, situation, blockage are found in those drains. Water drained irregularly through those drains and they are also using as solid waste dumping ground.

12.2.3 Analysis on Land Level Topographic Contour

The Paurasava is mainly medium-high land except some low-lying strips, canals and river. A small part of it is urban, sign of very slow urbanization process is visible in few isolated locations and generally it is an agricultural area characterized by crop production. Alignment and crest level survey has conducted to measure the elevation of the existing

road network, khal, drainage channel (no embankment or dyke has found). In the Paurasava, it has found that usually roads are not very high than the surrounding area.

The height varies from 2 meter to 8 meter among the adjacent lands and roads. Lowest land elevation is found in the Ward No. 4 highest in the Ward No. 3. Height of the high land is varied from 2 meter to 8 meter.

Table 12.4: Spot Interval and Frequency

| Sl. No. | Spot Interval | Spot Number (Frequency) | % |
|---------|---------------|-------------------------|-------|
| 1. | -1.01 to 3.00 | 300 | 28.09 |
| 2. | 3.01 to 5.00 | 767 | 71.82 |
| 3. | 5.01 to 7.00 | 288 | 26.97 |
| 4. | 7.01 to 9.00 | 13 | 1.22 |
| 5. | 9.01 to 11.00 | 0 | 0 |
| | Total | 1368 | 100 |

Source: Topographic Survey, 2010.

A total of 1368 measurements have taken in the Paurasava area to ascertain the topographic condition. According to the survey findings, the lowest land elevation is found in Ward No. 04 and highest elevation in Ward No.03.

Table 12.5: Spot Value and their Unit (Number of Spot (Z) Value and their Statistics)

| Sl. No. | Spot Unit | Value | Sl. No. | Spot Unit | Value |
|---------|------------------------|-------|---------|--------------------|-------|
| 1. | Total Spot Number | 1368 | 4. | Minimum (Meter) | 2 |
| 2. | Mean (Meter) | 4.27 | 5. | Standard Deviation | 1.20 |
| 3. | Maximum Height (Meter) | 8 | | | |

Source: Topographic Survey, 2010.

The river named Palong is adjacent to the Paurasava and flowing through northeast to southwest. A gentle meandering is viewed on the northern point of the Paurasava and it is in the Ward No. 2. The land elevation of that Ward, adjacent with the river is varied within 2 meter to 6 meter. Steep slope (about 90o angle) of the side wall of the river adjacent with the Ward No. 2 is prominent. Alignment of khals and natural channels are in somewhere 2 meter to 4 meter high than the normal river water.

Table 12.6: Description of maximum and minimum land level (in meter)

| Value Rank | Value | Ward No | Mouza Name | JL No | Sheet No | Plot No |
|---------------|-------|---------|------------|-------|----------|---------|
| Maximum value | 8.0 | 03 | Naria | 99 | 2 | 2491 |
| Minimum value | 2.0 | 04 | Naria | 99 | 2 | 1962 |

Source: Topographic Survey, 2010.

Peak Hour Run-off Discharge and Identification of Drainage Outfalls

Naria Paurasava lies in the tropical monsoon climatic region and more specially, represents the climate of Sariatpur district. It has a normal rainfall of 325.4 mm in the month of June which is highest among all other months. In September, it falls to 232.5 mm; again falling to 145.8 mm in October. The rainy season begins with April/May and usually ends in the end of October.

Map 12.1: Existing Drainage Network of Naria Paurasava

The highest number of normal rainy day is in July, which is the highest rainfall month. About 14 rainy days at an average in July, followed by 15 rainy days in August, 14 in June, 11 in May and September has been the characteristics of rainy day as the data reveals.

No peak hour run off storm water discharge is found. During rainy season, rain water is being drained through the man-made drains. All pucca drains are linked with the natural water bodies like canal and river as an outfall. As a result, waters of the river and canals are polluting through those discharging elements. The Palong River is the outfall of all natural and man-made drained water.

12.2.4.1 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 –

$$Q = C_s C_r I A$$

Where:

- Q = Design runoff flow rate (cfs)
- I = Rainfall intensity (in/hr)
- C_s = Storage coefficient
- C_r = 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 Kirpitch 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), 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-12.7.

Map 12.2: Land Level of Naria Paurasava

$$V = [1.49/n] [R^{2/3}] [S^{1/2}]$$

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

Manning's roughness coefficient for channel flow is listed in Table -12.7.

Table 12.7: Manning's "N" Values for Channel Flow

| Conduit Material | Manning's "n" | Conduit Material | Manning's "n" |
|---|---------------|--------------------------------|---------------|
| Closed conduits | | Pipes | 0.011-0.015 |
| Asbestos-cement pipe | 0.011-0.015 | Liner plates | 0.013-0.017 |
| Brick | 0.013-0.017 | Open Channels | |
| Cement-lined & seal coated | 0.011-0.015 | Lined channels | |
| Concrete pipe | 0.011-0.015 | a. Asphalt | 0.013-0.017 |
| Helically corrugated metal pipe (12" – 48") | 0.013-0.023 | b. Brick | 0.012-0.018 |
| Plain annular | 0.022-0.027 | c. Concrete | 0.011-0.020 |
| Plan helical | 0.011-0.023 | d. Rubble or riprap | 0.020-0.035 |
| Paved invert | 0.018-0.022 | e. Vegetation | 0.030-0.400 |
| Spun asphalt lined | 0.011-0.015 | Earth, straight and uniform | 0.020-0.030 |
| Spiral metal pipe (smooth) | 0.012-0.015 | Earth, winding, fairly uniform | 0.025-0.040 |
| 3 – 8 in. diameter | 0.014-0.016 | Rock | 0.030-0.045 |
| 10 – 12 in. diameter | 0.016-0.018 | Un maintained | 0.050-0.140 |
| Larger than 12 in. diameter | 0.019-0.021 | Fairly regular section | 0.030-0.070 |
| Plastic pipe (smooth interior) | 0.01-0.015 | Irregular section with pools | 0.040-0.100 |

Source: Municipality of Anchorage. Drainage Design Guideline, March 2007 ver. 4.08 pp-62.

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-12.8.

Table 12.8: Storage Coefficients for flat land

| Characteristics of surface | Storage Coefficient | | |
|----------------------------|---------------------|----------------|----------------|
| | 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 |
| Paved area/road | 0.80 | 0.90 | 1.00 |

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

Runoff Coefficient (Cr): The runoff coefficient (Cr) values shall be assigned to the various land use zoning classifications. The runoff coefficient values are based on the slope of the land surface, degree of imperviousness and the infiltration capacity of the land surface. The type of land use can greatly affect the amount of runoff. The quantity of runoff and peak flow rates are increased when the land is developed because the impervious surface area increases with the addition of roads, driveways, roofs, etc. The values of the runoff coefficient (Cr) for each land use classification are listed in Table-12.9.

Table 12.9: Modified Rational Method Runoff Coefficients

| Land use designation | Runoff Coefficient 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 |
| Slum area | 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 |
| Paved area/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:

The peak rate of runoff at any point is a direct function of the average rainfall 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.

12.3 Plan for Drainage Management and Flood Control

12.3.1 Plan for Drain Network Development

Drain Network Plan

The activity for the relevant authority will be assisted by the preparation of the drainage master plan for the Paurasava 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 Paurasava 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.

Works to include:

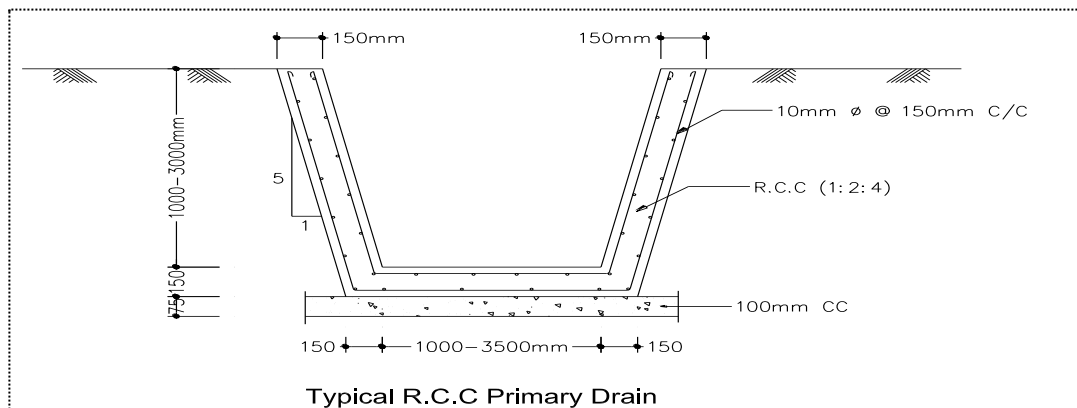
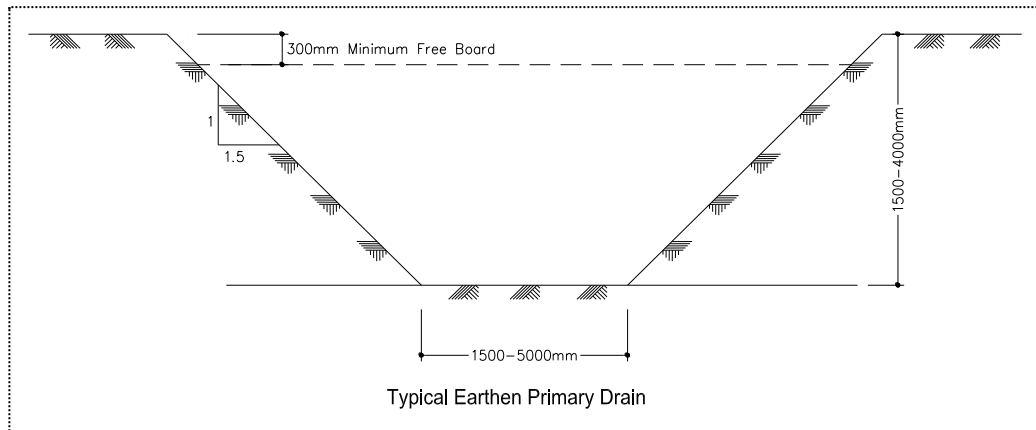
- Redesign of hydraulically inefficient bends, entrances and exists.
- Rising and / or widening of bridges and culverts to give unobstructed flows.
- Returning the channels to a uniform cross-section by removal of encroaching properties and structures.
- Raising crossings over roadside channels to adjacent properties above the flood level of the waterway.

Phase-2 (Rain water and household drainage)

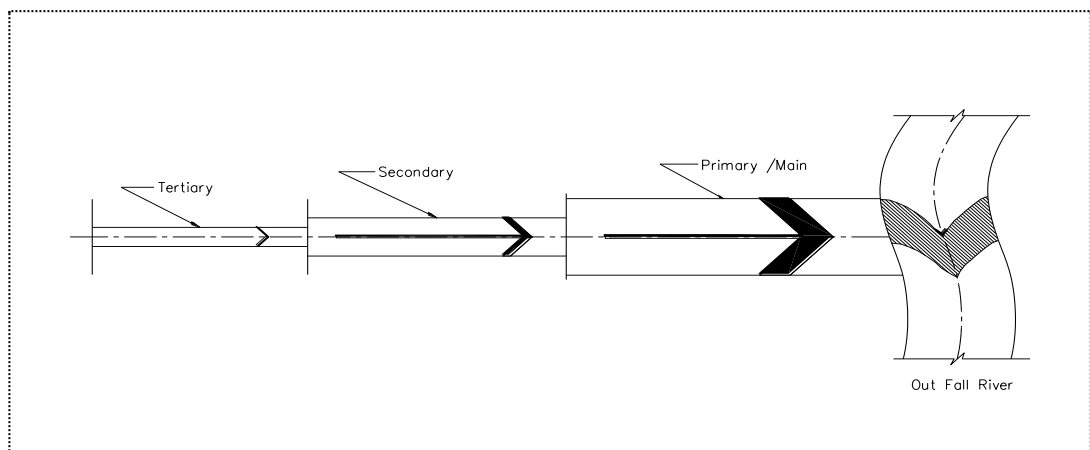
- Construction of surface drain linked with the residences, may be covered or uncovered.
- Provide linkages with secondary and tertiary drains.
- Out-fall of such drains may be nearby canals and low-lands.

For discharging of rainwater from commercial areas, covered surface drain may be constructed and they will be linked with the secondary and tertiary canals.

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. Sketch below shows the typical cross-section of the primary drain.



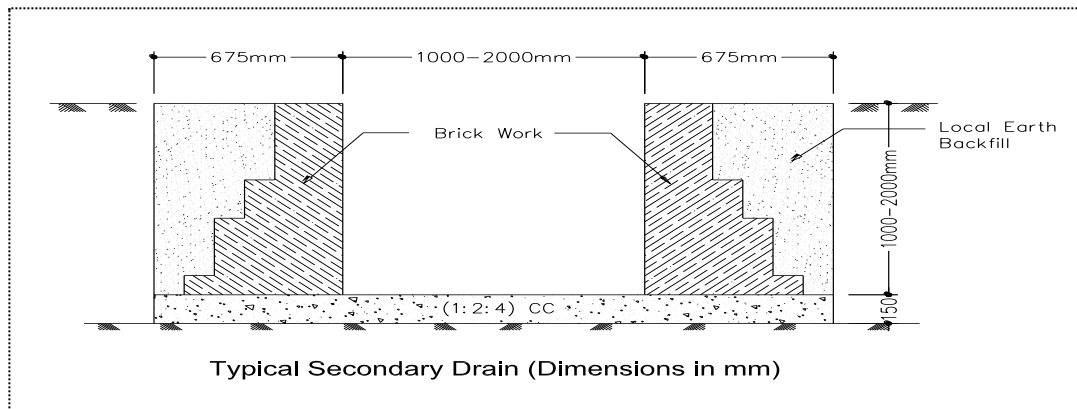
A schematic diagram showing the origin of Tertiary, Secondary and Primary drains and their destinations to the outfall river, presented above, are also presented here.



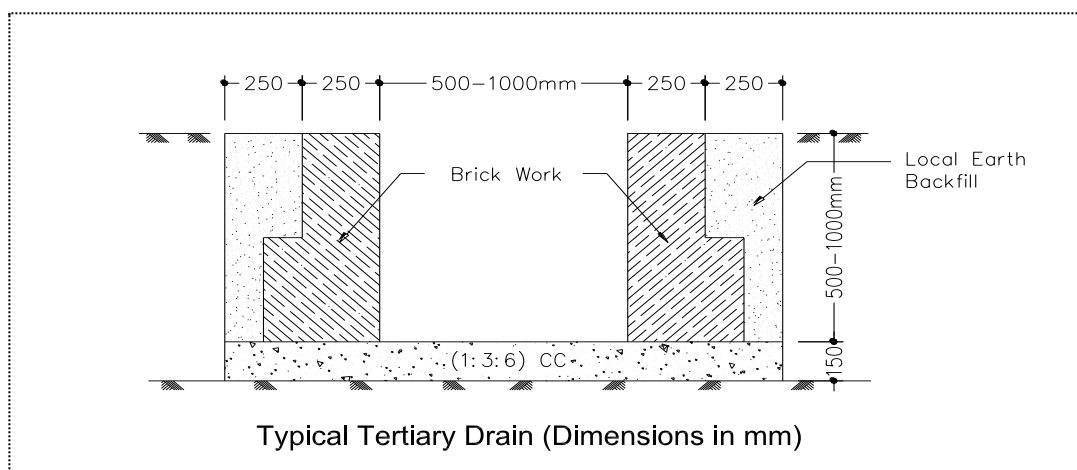
Schematic diagram of Tertiary, Secondary and Primary drains

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. The typical cross-section, size and shape, and its construction material are shown below.

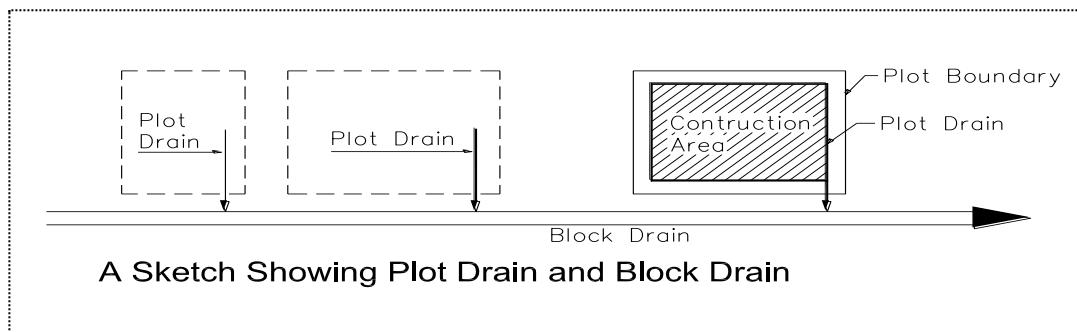


Tertiary Drain: Tertiary drain carry run-off or storm water received from the above mentioned plot drains and block or Mohallah drains. Their catchment area or storm water contributing area is bigger than Mohallah drains. In most Paurasava areas it is difficult to find such naming or classifications. However, such classifications can be seen in references. Tertiary drains generally are the under jurisdiction of Paurasava. Those drains or drainage networks are constructed and maintained directly by the Paurasava. These drains are constructed by bricks, cement concrete and sometimes by excavating earth in their alignments. These drains may run parallel to road or across the catchments area. Sometimes borrow pits of the road serves as drains provided borrow pits are uniformly and continuously excavated. Borrow pits that serve as drains may be lined or channeled by brick works. Tertiary drains deliver its discharge usually to secondary drains. A typical tertiary drain is shown below.



Plot Drain: 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. The

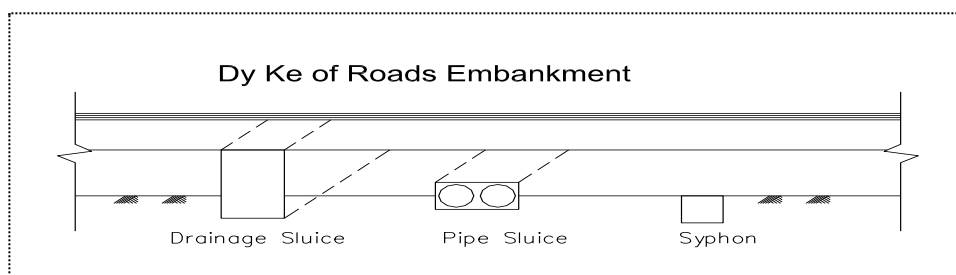
sketch below gives an impression of plot drain usually constructed in a plot and block drains that follow plot drain.



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.

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 study area free from flood.

However, storm water from rainfall-runoff within the area causes localized flood, drainage congestion and submergence. Sketch below shows a few of such structures. A schematic view of drainage sluice, pipe sluice and siphon on embankment, which relieve drainage congestion presents below.



Rainfall is the source of storm drainage water irrespective of urban or rural catchments. Average annual rainfall in Naria is about 2000mm. After infiltration, deep percolation and evaporation is about 50% of this rainfall water takes the form of drainage water for semi-urban and urban areas.

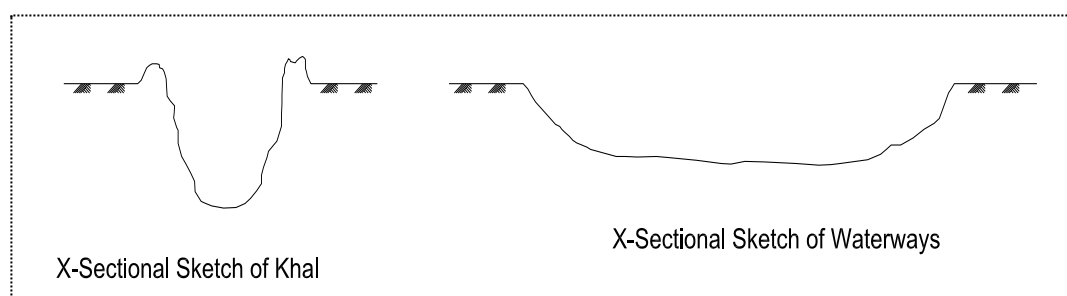
Sluice gates, Regulators and Navigation locks: These types of structures are provided on the flood control embankments. Sluice gates are functioning to vent out water from the countryside to the river. Flap gates are generally installed in the riverside so that river

water cannot enter into the main land. On the other hand whenever the river water level becomes low and countryside water level is high, countryside water drains out through sluice.

Regulators also serve the similar purpose as sluice gates; however the size of regulators is much bigger than sluice gates. Regulators may have control gates in the countryside and in the riverside. Drainage of water to the river or flashing of water into countryside are possible by operating simultaneously countryside and riverside mechanical gates. Navigation lock sometimes is provided on the flood embankment to allow boat and ferry passages from the river and from the countryside. It is a simple structure with bigger chamber and large lift gates both at riverside and countryside. By operating these gates, boats and river crafts can be transferred from the river to countryside and vice versa.

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.

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. The sketches below show the sectional view of khals and waterways.



12.3.2 Proposal for Improvement of the Existing Drain Networks

A wider scope for construction of a drainage system may be provisioned in the Paurasava. At least central areas are open for such development immediately and other areas may be followed for projected period as designed in the plan. The Paurasava is a barren field for imposing drainage system. The principles required for drainage plan are available in the area. Land slope, nearness of the natural drainage, sparse population density and soil condition are in favour of drainage construction.

Drainage corridors: If a drainage network has to be installed, the drainage originating throughout the Paurasava 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 Paurasava. For sewerage pumping station, small plots throughout the Paurasava 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 Paurasava is found towards east and southeast. Slope of all drains should maintain this direction.

12.3.3.1 List of Proposed New Drains

For removal of existing drainage congestion and provisioning of effective drainage system, a number of new drains have been proposed. Those drains are a part of drainage system and another part is the natural canals and river. In the Paurasava, existing length of the drain is 1.65 km. and more 39.1 km. drain is being added as a proposal. At present, no drain is found in the Ward No. 3, 5, 7, 8 and 9. To develop a network, all Wards have been considered and in some places emphasize has given providing on missing links rather than new.

Table 12.10: List of proposed new drains

| Drain_Id | Drain_Type | Width (m) | Length (m) | Phase |
|----------|------------|-------------------|------------|-----------|
| PD02 | Primary | Above 3m | 2133.49 | 2nd Phase |
| PD03 | Primary | Above 3m | 2004.07 | 2nd Phase |
| PD01 | Primary | Above 3m | 1605.44 | 1st Phase |
| PD04 | Primary | Above 3m | 2874.47 | 1st Phase |
| Total | | | 8617.48 | |
| PS08 | Secondary | Within 1.5m to 3m | 1354.85 | 2nd Phase |
| PS05 | Secondary | Within 1.5m to 3m | 2967.64 | 3rd Phase |
| PS06 | Secondary | Within 1.5m to 3m | 1268.61 | 1st Phase |
| PS07 | Secondary | Within 1.5m to 3m | 427.12 | 1st Phase |
| Total | | | 6018.23 | |
| TD55 | Tertiary | Less 1.5m | 601.39 | 1st Phase |
| TD46 | Tertiary | Less 1.5m | 478.46 | 3rd Phase |
| TD41 | Tertiary | Less 1.5m | 574.36 | 3rd Phase |
| TD34 | Tertiary | Less 1.5m | 916.65 | 3rd Phase |
| TD31 | Tertiary | Less 1.5m | 9.60 | 3rd Phase |
| TD29 | Tertiary | Less 1.5m | 858.45 | 3rd Phase |
| TD09 | Tertiary | Less 1.5m | 94.09 | 1st Phase |
| TD10 | Tertiary | Less 1.5m | 522.63 | 3rd Phase |

| Drain_Id | Drain_Type | Width (m) | Length (m) | Phase |
|-------------|------------|-----------|------------|-----------|
| TD11 | Tertiary | Less 1.5m | 583.52 | 2nd Phase |
| TD12 | Tertiary | Less 1.5m | 121.43 | 1st Phase |
| TD13 | Tertiary | Less 1.5m | 199.03 | 3rd Phase |
| TD14 | Tertiary | Less 1.5m | 147.70 | 1st Phase |
| TD15 | Tertiary | Less 1.5m | 6.63 | 2nd Phase |
| TD16 | Tertiary | Less 1.5m | 140.70 | 3rd Phase |
| TD17 | Tertiary | Less 1.5m | 295.19 | 1st Phase |
| TD18 | Tertiary | Less 1.5m | 236.36 | 3rd Phase |
| TD19 | Tertiary | Less 1.5m | 6.10 | 2nd Phase |
| TD20 | Tertiary | Less 1.5m | 479.44 | 3rd Phase |
| TD21 | Tertiary | Less 1.5m | 603.63 | 1st Phase |
| TD22 | Tertiary | Less 1.5m | 1607.36 | 3rd Phase |
| TD23 | Tertiary | Less 1.5m | 533.09 | 3rd Phase |
| TD24 | Tertiary | Less 1.5m | 534.50 | 1st Phase |
| TD25 | Tertiary | Less 1.5m | 658.81 | 2nd Phase |
| TD26 | Tertiary | Less 1.5m | 346.38 | 3rd Phase |
| TD27 | Tertiary | Less 1.5m | 982.51 | 1st Phase |
| TD28 | Tertiary | Less 1.5m | 468.83 | 2nd Phase |
| TD56 | Tertiary | Less 1.5m | 532.29 | 2nd Phase |
| TD30 | Tertiary | Less 1.5m | 307.06 | 1st Phase |
| TD32 | Tertiary | Less 1.5m | 539.06 | 3rd Phase |
| TD33 | Tertiary | Less 1.5m | 354.42 | 1st Phase |
| TD35 | Tertiary | Less 1.5m | 936.20 | 2nd Phase |
| TD36 | Tertiary | Less 1.5m | 566.66 | 3rd Phase |
| TD37 | Tertiary | Less 1.5m | 464.29 | 1st Phase |
| TD38 | Tertiary | Less 1.5m | 506.47 | 2nd Phase |
| TD39 | Tertiary | Less 1.5m | 1072.67 | 3rd Phase |
| TD40 | Tertiary | Less 1.5m | 422.81 | 1st Phase |
| TD42 | Tertiary | Less 1.5m | 490.53 | 2nd Phase |
| TD43 | Tertiary | Less 1.5m | 466.81 | 3rd Phase |
| TD44 | Tertiary | Less 1.5m | 303.45 | 1st Phase |
| TD45 | Tertiary | Less 1.5m | 560.42 | 2nd Phase |
| TD47 | Tertiary | Less 1.5m | 506.14 | 1st Phase |
| TD48 | Tertiary | Less 1.5m | 542.50 | 3rd Phase |
| TD49 | Tertiary | Less 1.5m | 1202.67 | 2nd Phase |
| TD50 | Tertiary | Less 1.5m | 1326.19 | 1st Phase |
| TD51 | Tertiary | Less 1.5m | 153.45 | 3rd Phase |
| TD52 | Tertiary | Less 1.5m | 184.37 | 2nd Phase |
| TD53 | Tertiary | Less 1.5m | 453.41 | 1st Phase |
| TD54 | Tertiary | Less 1.5m | 581.55 | 2nd Phase |
| Total | | | 24480.25 | |
| Gross Total | | | 39115.96 | |

12.3.3.2 List of Infrastructure Measures for Drainage and Flood Control Network

There are altogether 22 bridges (RCC) and 75 culverts (RCC) in the Paurasava. Bridges are found in all the Wards except Ward No. 2 and 9 and highest number is found in the Ward No. 4 and 5. Ward No. 3 is preserved 4 bridges and 3 bridges each in the Ward No. 7 and 8. RCC Box culvert is found in all the Wards and highest number of culverts (i.e. 12) is in the Ward No. 7. Those bridges and culverts are located on the canals and drainage channels.

Table 12.11: Existing and proposed infrastructures for drainage and flood control

| Name of infrastructure | Existing (No.) | Proposed (No.) |
|------------------------|----------------|----------------|
| Bridge | 22 | 17 |
| Culvert | 75 | 0 |
| Sluice Gate | 0 | 2 |
| Flood Wall | 0 | 0 |
| Road cum Embankment | 0 | 5.5 |
| Flood Embankment | 0 | 0 |

Source: Based on Physical feature survey, 2010.

Except the above infrastructure, more 17 bridges will be needed on different proposed roads as presented in the map. Two sluice gates have been proposed to control intrusion of river water through the canals. About 5.5 km. road cum embankment will be needed on the northern part of the Paurasava for prohibiting flood water intrusion from north to south.

12.4 Plan Implementation Strategies

12.4.1 Regulations to Implement the Drainage and Flood Plan

The regulations which will be needed for the implement of drainage and flood plan are:

1. Section 3 of the Acquisition and Requisition of Immovable Property Ordinance, 1982 is needed for acquisition of land in view to construct drainage and flood control components. The Water Development Board, according to the demand, will apply to the Deputy Commissioner for such acquisition.
2. Water Development Board Ordinance, 1976 delegate power to the Water Development Board for construction of embankment. To control intrusion of flood water and improvement of drainage facilities, the Board is empowered to take necessary actions according to the regulations prescribed in the Ordinance.
3. Irrigation Act, 1876 has prescribed regulations for the improvement of irrigation facilities through the improvement of drainage facilities in view to increase agriculture production. Deputy Commissioner may enforce any regulations prescribed in the Act necessary for irrigation facilities.
4. Canal and Drainage Act, 1872 has enacted for excavation of canal and removal of drainage congestion from agriculture land. The Deputy Commissioner may authorize any person, through a written approval, for excavation of canal in view to improve irrigation facilities for agriculture practices.
5. Public Health (Emergency Provision) Ordinance, 1944 has enacted for the improvement of drainage and sanitation facilities. Department of Public Health Engineering (DPHE) is authorized to enforce the regulations prescribed in the Ordinance. The government approves project for DPHE mostly for the improvement of drainage and sanitation facilities in urban areas.

12.4.2 Implementation, Monitoring, Evaluation and Coordination of the Plan

Implementation through Multi-Sectoral Investment Programme: Major infrastructure development works such as primary roads, water supply, drainage, etc., will largely be controlled by Government. Public works requires efficient co-ordination through the Multi-Sectoral Investment Programme (MSIP).

Map 12.3: Proposed Drainage and Flood Control Components

Objective of a Multi-Sectoral Investment Programme (MSIP) will match a list of the development projects with the funding stream necessary to implement them. There are two basic activities that would determine the contents of MSIP. One activity would be to prioritize and schedule the investment projects of all public agencies so they will collectively help to achieve the development goals and objectives of the Urban Area Plan. Second activity would be to analyze the source and availability of fund for the prioritized list of development projects.

Implementation through Action Plans and Projects: Action Plans and Projects will be the implementation plans to solve problems at the local level. Action plans will take a direct approach toward plan implementation with a minimum of research, reports or elaborate planning methods. These projects will be easily identifiable and will require minimum resource.

Implementation through Development Control: Landuse zoning is one of several methods of plan implementation to be considered. In all cases where some form of development, landuse control may be applied; careful consideration requires the following ideologies:

- the purpose to be achieved by the development controls;
- where controls should be applied;
- what aspect of development needs to be controlled;
- what type of development controls are required;
- what degree or level of development control is required;
- who will be affected by the required control;
- who will be affected by the controls and in what manner;
- when the controls should be applied;
- what will be the likely impact of the controls;
- how and by whom will the controls be administered and enforced.

Development control as an instrument of plan implementation may be selectively applied within the Urban Area Plans. Development controls would also be varied in intensity and detail to suit the particular circumstances. It is important that they should be clear and easily understood by all parties concerned. Since the entire Paurasava Master Plan 'package' has become statutory, development controls associated with its component plans would also be statutory.

Implementation by Facilitating Private Investment: Another approach that would be taken by government toward plan implementation will be to guide and facilitate investments made by the private sector. Government can achieve this with relative ease and at very low cost by setting up a legal and operational framework, coupled with suitable incentives, to facilitate land consolidation, plot boundary readjustment, efficient

lay out of plots and provision of local infrastructure by the private sector. The benefits of this approach would be:

- increased efficiency of the urban land market would make more private land available to urban households;
- would pass much of the development costs for local infrastructure to the private sector and land market mechanisms;
- would increase in land for development without large cash outlays by government to purchase land for development schemes; and
- would keep provision of land for community facilities virtually no cost to government.

Plan Monitoring

The Urban Area Plan would simply be tools for guiding and encouraging the growth and development of an urban area in a preferred manner. In a rapidly changing urban environment, the Urban Area Plan would require to keep up to date. If this is not done, within a few years it will be obsolete. Therefore, it is imperative that the requirement for regular updating of the Urban Area Plan be made a legal requirement.

For implementation of the various programme components of the Urban Area Plan appropriate administrative measures will have to be undertaken. This will essentially include project preparation and monitoring of their execution and evaluation. For carrying out all these activities appropriate institutional measures are also needed.

Evaluation

Monitoring and evaluation of on going and implemented projects is essential to keep the future course of action on the right track. An on going project should be regularly monitored and handicaps identified to enable taking appropriate measures at the right time.

Post implementation evaluation is also needed to take appropriate measures correcting past errors-from project preparation to implementation.

The top level supervision has to be done by a high level supervisory committee headed by Paurasava Mayor, LGED representative and Local Government Ministry. Other members of the committee will be local Ward Councilors, local community leader/social workers and the Town Planner of the Paurasava. The committee will supervise implementation works regularly and issue necessary instructions to expedite the works of implementation.

Co-ordination

A Planning Section of Paurasava should have close interaction with the citizen of Paurasava at large in order to make people aware of the benefits of a good plan and, therefore, their social responsibility to promote plan implementation in one hand and

also resist contraventions on the other. A specific interactive cell is recommended to operate in this regard with following responsibilities:

- Provide pre-application advice to residents, consultants and developers about landuse management issues and application procedures for the submission of development applications.
- Enforce planning and landuse management related legislation and zoning scheme regulations.
- Issue of property zoning certificates.
- Investigate and resolve landuse management complaints, illegal landuse and prosecuting contraventions.

Such interactive windows may be opened in various convenient locations to ensure ease of the answers to commonly asked questions may be shown in the internet. Besides, those may be shown in the print and electronic media time to time.

In spontaneous areas, while all out people's co-operation is needed for project implementation; there will also be some elements of negotiation. Negotiation will be particularly needed in case of road widening projects. It will be a crucial task for Paurasava to convince the affected people to give up their land for road use. Efforts should be made to convince the land owners on the ground of enhancement of property value due to road widening. In case people refuse to offer land free of cost necessary arrangements may have to be made for payment of compensation. This process of negotiation will be very critical, cumbersome and time consuming, and therefore, has to be handled with utmost care and patience. The best results can be accrued only by winning people's confidence. In case the authority fails to get peoples co-operation they should exercise power of compulsory acquisition of land. Attempts may be made to engage NGOs / CBOs to work as catalysts in negotiation.

12.5 Environmental Management Part

The plan has documented Naria Paurasava area's environmental conditions, determines potentiality for present and past site contamination (e.g., hazardous substances, petroleum products and derivatives) and identifies potential vulnerabilities (to include occupational and environmental health risks).

12.5.1 Goals and Objectives

Based on the information and data on the air, water, noise, soil, drainage congestion, river erosion, garbage disposal and industrial and clinical wastes an effective and action oriented plan is required as prescribed in the ToR. Preparation of environmental management plan is the ultimate goal of this study.

12.5.2 Methodology and Approach to Planning

Environmental survey has conducted following the standard methods and procedures to determine environmental pollutions. Elements of pollutions of environment are air,

water, land and noise for the development of urban areas. The Consultants have taken necessary assistance and information from the Paurasava Mayor, Councilors, Engineers and other concerned officials as well as the general inhabitants to determine pollution in air, water, land and noise. Based on the information and data collected from the field and secondary sources, detailed report has been prepared. Data collection format and questionnaire was approved by the PD of UTIDP, LGED. The data collection procedure incorporates discussion meeting with the Paurasava Mayor, Councilors and other Paurasava representatives. Discussions were also made with other GOs like DPHE, BADC, etc. and NGOs representatives working in the Paurasava.

12.6.1 Existing Environmental Condition

The Paurasava is a part of greater Faridpur district. Some information has collected from secondary materials and they are on geology, soil and sub-soil condition, climate, temperature, humidity, rainfall, wind direction and hydrology. Other relevant information is being collected from field survey and they are mostly on the environment pollution. Those information presents sequentially in the following paragraphs.

12.6.2 Geo-morphology

Geology, Soil and Sub-soil Conditions: Soil of the Zila is mainly formed by the very young Ganges meander flood plain and the mixed young and the older Ganges meander flood plain. The northern and eastern parts of the Zila are covered by grey silty clay of the active and very young Ganges meander flood plain. Central and southern parts of the Zila are mainly formed of brown silty clay of the mixed young and the older Ganges flood plan. Northern part of the Zila is less productive and is mainly used for Aus paddy.

In the Paurasava, sub-soils are being eroded naturally and the soil varies from place to place and composed of clay to fine sand from 0-40 ft depth, fine sand to very fine sand 40-160 ft, fine sand to medium sand 160-260 ft. Medium sand to coarse sand is available from 260 ft to 380 ft depth and in rest of the depth are hard clay, fine sand and coarse sand formed entirely by the deltaic action of the Ganges, which brought mud and limestone from Himalayas.

To a great extent, soil of the Paurasava is uniform in character. Only variation observed is in greater or smaller admixture of sand, silt and clay in grayish and dark gray colours. Along the riversides, it is found that the percentage of sand is higher and in the areas where deltaic action has ceased is lower. The load bearing capacity of this soil is very poor.

Soil types, strength and density characteristics based on Standard Penetration Test Values (N) have been mentioned for the different types of deposits at various depths.

Cohesive silt and clay layers having N-values less than 4 are very soft to soft and are not considered suitable to support any civil engineering structures without ground improvement. There are only a few areas near the waterfronts (of Palong River) with

such low N-values in the surface underlain by comparatively strong clay and sand soil strata. Sand layers with variable quantities of silt/clay having N-values less than 10 are considered very loose to loose. In a few locations such weak sandy layers occurred. They occurred usually in the surface layers.

The natural clay soils of investigated area can be divided into two major groups distinguished by their colours as under:

- Red clay: Light brown to brick red and massive, containing ferruginous and calcareous nodules.
- Mottled clay: Earthy grey with patches of orange, brown colour, massive and contains ferruginous and calcareous nodules.

Again, in the filled up areas (along the Regional Highway, from Dhaka to Sariatpur via Sariatpur Ferry Ghat) there are mixtures of many coloured soils carried from different borrowing areas. Consistency of cohesive soil deposits (plastic silts and clays) and relative density of cohesion less soil deposits (non-plastic silts and sands) have been described in accordance with internationally accepted terms, which give approximate indication of strengths of the soil strata encountered at different depths.

For plastic silts and clays consistency terms like very soft, soft, medium stiff, stiff, very stiff and hard indicate the following approximate allowable bearing capacity of the different soil strata estimated on the basis of SPT N-values.

Table 12.12: SPT N-Values

| Consistency | SPT N-value | Allowable bearing Capacity (kPa) |
|-------------|-------------|----------------------------------|
| Very soft | 0–2 | < 25 |
| Soft | 2–4 | 25–50 |
| Medium | 4–8 | 50–100 |
| Stiff | 4–15 | 100–200 |
| Very stiff | 15–30 | 200–400 |
| Hard | > 30 | > 400 |

For cohesion less soil deposits (non-plastic silts and sands) relative density has been described with terms like very loose, loose, medium dense, dense and very dense on the basis of SPT N-values measured in the different cohesion less soils strata encountered within the explored depth of 15m. These relative density terms give the following approximate strength characteristics based on SPT N-values.

Table 12.13: Strength Characteristics

| Relative Density | SPT N-Value | Estimated Shearing Angles | Strength Characteristics |
|----------------------|-------------|---------------------------|--------------------------|
| Very loose | > 4 | 28° | Very poor |
| Loose | 4–10 | 30° | Poor to fair |
| Medium dense | 10–30 | 32° | Fair to good |
| Dense and Very dense | > 30 | 34° | Good to excellent |

Climate: The climate regime of the study area is that of Faridpur which is similar to that of the remainder of the country. The cool and dry winter of December – February is

followed by hot and showery pre-monsoon period of March – May and then a relatively cooler but very wet monsoon season prevails during June – September. Again, a transitional humid and showery period follows up to the beginning of winter. From mid November the weather begins to be dry and relatively cool.

Temperature: Average maximum temperature varies between 24.5° C and 36.3° C and minimum temperature varies between 12.1° C (January) and 25.9° C (August). The hottest months are March, April, May, June, July and August. From December to February, Paurasava experiences cool periods when minimum temperature varies from 12.1° C (January) to 14.6° C (February).

Humidity: The planning area is situated in the tropical zone. Heavy rains are experienced during June – September with the movement of moist monsoon wind (April to October). Almost 80 percent of the total rainfall is recorded during June – October. Average annual rainfall of the area is about 1547 mm. Rainfall in the area is very much influenced by the southwestern monsoon. Due to northwestern effect substantial rainfalls are also recorded during March to May period. Winter is generally dry with little rainfall in the months of December and January.

The weather is hot and wet from March to May with occasional storms locally known as Kalbaishaki (Tropical Cyclone). During October and November the weather is generally fine with some wet and stormy days. The characteristic feature of the climate of the study area is the salt laden air throughout the year, especially when it blows from the sea at regular intervals as a result of diurnal change.

Rainfall: The Naria Paurasava has on an average, normal rainfall 325.4 mm in the month of June which is highest among all other months. In September, it falls to 232.5 mm; again falling to 142.8 mm in October. From November to March, this rainfall varies between 6.0 mm to 45.2 mm. The rainy season begins in April / May and usually ends in the end of October. The highest number of normal rainy day is in July, called highest rainfall month. About 14 rainy days at an average in July, followed by 15 rainy days in August, 14 in June, 12 in May and September has been the characteristics of rainy day as the data reveals.

Wind Direction: In Faridpur district, general direction of the wind is same as Gangetic delta, south-west, changing to east towards the head of the valley for the greater part of the year, with a north and north-west direction during the month of April and May. It is observed that winds are stronger in summer in the months of April and May (3 to 6.5 knots) than in winter in the month of November and December (1.5 to 3.0 knots).

Hydrology: River, Canal/Khal and pond are the hydrological components of the Paurasava. Those components are occupying 12.5% (303.96 acres) land of the Paurasava. The canals are linked with the adjacent river. In dry season, most of those canals use as agriculture land and in the rainy season they submerges lowlands of the Paurasava. The

ponds are spottedly located around the Paurasava. Small numbers of them are larger than one acre. In dry season, ponds water are using for bathing and washing purposes. Canal water generally uses for irrigation purposes.

12.6.3 Solid Waste and Garbage disposal

12.6.3.1 Household Waste

Dustbin is the only system for solid waste disposal from residence of the Paurasava. But, no dustbin is in the Paurasava. People throw their household wastes on the adjacent low lands.

12.6.3.2 Clinical/Hospital waste

Existing health facilities are poor in number. There are 2 hospitals in the Paurasava. Those hospitals are located in the Ward No. 5 and 6.

There is no arrangement for clinical waste management in the Paurasava. The clinics and hospital used to dump solid wastes here and there or nearby ditches. This activity may bring serious health hazard to the inhabitants specially the nearby dwellers.

12.6.3.3 Industrial waste

No industrial waste available in the Paurasava.

12.6.3.4 Kitchen market waste

Kitchen market waste is being dumped on the low lands available around the market.

12.6.3.5 Waste Management System

Solid waste collection and disposal in Naria Paurasava is the responsibility of Paurasava authority. The logistics for collection and disposal of solid wastes include 10sweepers for collection and 1 garbage truck for transportation. Solid waste from the point of generation to the final disposal can be grouped into three functioned elements -

- Waste generation and storage
- Collection
- Final disposal

Waste Generation and storage: Households within the area are producing 1.5 tons of domestic solid wastes per day.

Collection: The waste collection is done in the following three stages:

- The residents themselves take domestic refuses from households to the intermediate dumping points.
- Street and drain wastes are collected and dumped at intermediate disposal points by the municipal sweepers and cleaners.
- Final collection from the intermediate points and its disposal to the dumping yard by the conservancy worker.

Final disposal: The authority used to dump in low lands on the basis of land owner's interest or nearest ditches.

12.6.3.6 Latrine

Toilet system of the study area is mostly categorized as pucca and katcha. In spite of this, Paurasava has a modest development of pucca toilets in government zones. Sewerage system has not been introduced on a trial basis as to their popularity and acceptance. Ownership of toilets varies widely in most of the Wards. In total, 91.4% households are enjoying pucca toilet and 8.6% katcha toilet. Katcha toilet is found in the Ward No. 4, 5, 7 and 8.

12.6.3.7 Industry

In total, 12 industries with two categories are in the Paurasava. Among those establishments, agro-based industries account for about 90% and wood based industries 10% share of the total running industries. It reflects the general agrarian character of the study area. All of those enterprises are proprietorship units meaning that private sector dominates the industrial sector of the Paurasava.

Most of the industries (except saw mills) depend on raw materials available within the Paurasava. The industrial output produces in the local market. It is also found that those establishments have problems and potentialities. Careful consideration will help to resolve those problems and adoption of necessary policy initiatives to flourish the existing units and draw more investors and entrepreneurs to set up new manufacturing industries, which will be based mainly on local raw materials.

12.6.4 Brick Field

No brickfield is in the Paurasava premises.

12.6.5 Fertilizer and Other Chemical Use

The fertilizer and chemical uses in the agriculture field for increasing agriculture production are Urea, Potash, Gypsum and Nitrogen Sulphate, Bashudin, Diazinon, Sumithion and Padan. Those chemicals are being contaminated with the surface water and create water pollution. Those chemicals and insecticides are creating water pollution of the Palong River. For more details Chapter-8 of the Structure Plan (Environmental Issues in Agriculture Practice).

12.6.6 Pollutions

12.6.6.1 Water

Water is considered polluted when it altered from the natural state in its physical condition or chemical and microbiological composition, so that it becomes unsuitable or less suitable for any safe and beneficial consumption. The used water of a community is called wastewater or sewage. If it is not treated before being discharged into waterways, serious pollution is the result. Water pollution also occurs when rain water runoff from urban and industrial areas and from agricultural land and mining operations makes its way back to receiving waters (river, lake or ocean) and into the ground.

In Naria Paurasava, there are 690 ponds, 196 ditches and 12 canals as sources of surface water. Surface water pollution has found in the planning area originating from the use of

insecticide and chemical fertilizers in crop fields. Wash out by rain water from crop fields to nearest water sources with chemicals is causing water pollution. Cattle bathing and flow of waste water from domestic use discharge into the ponds, khals and river have also identified as reasons for surface water contamination. The Paurasava authority has yet not taken any initiatives to control surface water pollution.

Ground water pollution also exists in the Naria Paurasava. Presence of iron and arsenic as pollutants in ground water are the reasons for such pollution. Not any initiative has been made by any local authority/ GOs/ NGOs to reduce arsenic problem.

12.6.6.2 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.

Operations of shallow engine driven vehicles (Nochiman/ Kariman) that are unfriendly to the environment are responsible for air pollution. Those vehicles use diesel as fuel. Diesel particulate matter (DPM) includes diesel soot and aerosols such as ash particulates, metallic abrasion particles, sulfates, and silicates. The small size inhaled particles may easily penetrate deep into the lungs with acute short-term symptoms such as headache, dizziness, light-headedness, nausea, coughing, difficult or labored breathing, tightness of chest, and irritation of the eyes and nose and throat. Long-term exposures can lead to chronic, more serious health problems such as cardiovascular disease, cardiopulmonary disease, and lung cancer.

A large number of commercial/business establishments including one small industrial establishment are found in the Paurasava premises. Those establishments are releasing different types of effluent into the air and polluting the surroundings. The Paurasava authority has yet not taken any initiative to install treatment plant in that industrial establishment.

Air pollution also occurs by the odor from the open municipal garbage. No dustbin is in the Paurasava, so, people are disposing their solid garbages in to the open ground. As a result open garbage disposal is common and it creates serious odor which ultimately affects the surrounding air.

12.6.6.3 Sound

Sound pollution is basically consists of unpleasant displeasing human, animal or machine created sound that disrupts the activity or balance of human or animal life. A common form of noise pollution is from transportation, principally motor vehicles. Other source s are car alarms, office equipment, factory machinery, construction work, audio entertainment systems, loudspeakers and noisy people.

In the Paurasava, shallow engine driven vehicles like Nochimon / Kariman are playing on roads as a mean of local transport. They are making above 200 trips throughout the

Paurasava in a day. Engine generated sounds in their operational time on roads is a matter of nuisance as well as a source of noise pollution. The Paurasava authority has already noticed them to restrict their movements. Generated sounds from industry at their operational time are also a source of sound pollution existing in Naria Paurasava.

12.6.6.4 Land Pollution

Soil pollution is basically about contaminating the land surface of the earth through dumping urban wastages indiscriminately, dumping of industrial waste, mineral exploitation and misusing the soil by harmful agricultural practices.

Soil pollution is occurring from extensive use of fertilizer in the agriculture lands and water logging. Extensive use of fertilizer is changing the bio-chemical composition and the lands are losing their productivity day by day. At the same way, water logging for four months in a year is settling non decomposable materials on lands and the lands are being polluted. Water logging, over time leads to the soaking of soils, impeding agricultural production. The water applied in excess as a stock pollutant accumulates in the underground hydrological system and causes damage to production.

12.6.6.5 Arsenic

Ground water quality in the study area is influenced by arsenic and iron. Water in most shallow aquifer is arsenic and all are contaminated with iron, not suitable for drinking purposes. Water collects from river and ponds for irrigation purposes. The lower deep aquifer is found at a depth of 200 m to 300 m. Deep aquifers with fresh water in the Paurasava are exploited to meet the demand of water for inhabitants but that is small.

12.6.6.6 Other Pollution

In the Paurasava, sub-soils are being eroded naturally and the soil varies from place to place and composed of clay to fine sand from 0-30 ft depth, fine sand to very fine sand 30-120 ft, fine sand to medium sand 130-200 ft. Medium sand to coarse sand is available from 200 ft to 300 ft depth and in rest of the depth are hard clay, fine sand and coarse sand formed entirely by the deltaic action of the Ganges, which brought mud and limestone from Himalayas.

12.6.7 Natural Calamities and Localized Hazards

12.6.7.1 Cyclone

A disaster is the tragedy of a natural or human-made hazard (a hazard is a situation which poses a level of threat to life, health, property or environment) that negatively affects society or environment. Disaster can be classified into two categories: natural disaster and man-made disaster. A natural disaster is the effect of a natural hazard (e.g. flood, volcanic eruption, earthquake or landslide) that affects the environment and leads to financial, environmental or human losses. Man-made disasters are disasters resulting from an element of human intent, negligence, or error, or involving a failure of a man-made system.

The Paurasava area including the Naria Upazila has affected by the several major natural disasters ranging from Cyclone, Flood to Water-logging and Draughts, etc. The periods of those disasters are 1998, 2000, 2004, 2007 and 2008. Very scanty attempt has been made by government to rehabilitate people after the natural disaster.

12.6.7.2 River Erosion

The main rivers flowing through the Zila are the Padma, the Jamuna, the Garai and the Kumar. The Padma and the Jamuna are navigable throughout the year. These rivers are non-tidal. In the Zila, Charjanajat is a famous steamer station, functioning as a connecting link between Dhaka to Faridpur and other Zilas of southern part of the country. Soil formation of the study area is influenced by its river system through sedimentation. Upper layer of the soil is mainly clay, silty and alluvial type. Those soils are being eroded daily in the eastern and southeastern part of the Paurasava.

The Palong River sides are erosion prone caused by seepage of water from countryside towards the river along the banks during post-monsoon period and during high flood period. Water waves created during the storm surge, cyclone and heavy rainfall are causes of erosion. The seepage of water may create unbalanced pore pressure producing severe bank scouring in loose sandy riverbank resulting river erosion.

12.6.7.3 Flood

Naria Paurasava has experienced several remarkable floods as 1998, 2000, 2004, 2007 and 2008. During heavy rain there happening some water-logging in specific low laying areas for a long time. The river and riverside area turns to run of full water all through the monsoon season.

12.6.7.4 Earthquake

The Paurasava is not in earthquake zone.

12.6.7.5 Water-Logging

Inundation within Paurasava areas is experienced in the months of Srabon to Ashwin. Due to influences of rainfall during monsoon, usually most of the Wards suffer with water-logging. Rainy season is the season when problems of water-logging begin. Generally, during rainy season, the water overflows on the both sides of the canals up to 6.0 feet. In the months of Srabon to Ashwin, the water rises with a height of 5-6 feet. This internal flood or water-logging is experienced within the Ward No. 2, 3, 4 and 6 during peak monsoon time with high rainfall for long duration. The water-logged areas are found along roads, ditches and ponds within Paurasava. In the Ward No. 2 the location is Baraipara and Nikaripara. In the Ward No. 3 the water logged area is Dhalipara and Khalifapara. In the Ward No. 4, it is in Purba Naria. In Ward No. 6, it is in Dewan Para. Water-logging situation is a major issue for this Paurasava which requires be resolved immediately through Paurasava Master Plan.

12.6.7.6 Fire Hazard

No fire hazard record is found in the Naria Paurasava. With the increase of population, chances of fire incidence may increase for offices, institutions, market places and industries. Electric short-circuit is mainly responsible for fire hazards in urban area. Human error may also cause incidence of fire hazard sometimes.

12.6.7.7 Other Hazards

Urbanization is taking the lands of other uses to residential use. For this purpose agricultural lands and water bodies are being chosen most frequently and the lands are being converted into urban settlement. In Naria Paurasava wet lands are filled up and agricultural land is converted. This has been identified as the major man made disaster which is accelerating the degree of conversion year to year. Use of poisonous insecticides on the agricultural land is another man made disaster which will affect in the long-run.

12.7 Plan for Environmental Management and Pollution Control

12.7.1 Proposals for Environmental Issues

In Naria Paurasava, noise pollution is occurring by three wheelers and sound generated from saw mills and rice husking mills. Water contamination is observed as “Arsenic” threat. Air pollution is caused by dust emitted from saw mill, rice hushing mills and furniture shops. Also flood water and water-logging are creating health hazards. Dysentery, diarrhea, etc. diseases occurs due to flood and water-logging. Habitual inundations, especially in monsoon, due to external floods from canals are another threat to environment. These above varies are extremely important uses of concern for the Paurasava. Pragmatic planning/solution and proper Drainage Master Plan are very pertinent issues which will be of utmost importance in planning the Naria Paurasava.

However, implementation of activities like roads, drainage, bridges/culverts, housing and industrial establishments and bazars will radically change the natural topography and landuse pattern. The agricultural land will be converted into urban and semi-urban area. Existing scenic beauty will disappear; water bodies will lost and general slope will be diminished for earth filling due to urbanization. Therefore, in the process of preparation of Master Plan, Structure Plan and Ward Action Plan, consideration of those factors will be made for keeping the natural environment.

For a better living environment above environmental phenomenon should be considered with the systematic planning principles and regulatory measures. With these views, people’s awareness should be increased about the fair living environment through different public activities. Arrangement of landuses should be provisioned for all the public and private organizations as their necessities.

12.7.1.1 Solid Waste Management Plan

Solid waste management is a crucial problem for the Paurasava. The Naria Paurasava does not have the sufficient capability to handle the huge waste generated by the residents due to narrowness of roads, lack of local collection sites stand as impediments

to waste management. Particularly in informal/spontaneous areas due to existence of narrow roads the garbage trucks can not enter for removal and transshipment of the garbage. In most places there is no road side open space for locating garbage bins. Garbage is often found to be disposed off on low lands. As a result rotten garbage spoils the local environment of the area posing health hazard of the local residents. No dustbin is in the Paurasava whereas the daily waste produced is about 2.0 tons and throws it to the nearby low lands.

Table 12.14: Proposed Environmental Facilities

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|---------|----------|------------------|----------|-----------------------|-------|
| Proposed Dumping Ground | Utility | | Out Of Paurasava | | 3 rd Phase | 3.24 |
| Water Treatment Plant | Utility | 08 | Lonshinha_65_02 | 1911 | 2 nd Phase | 0.61 |

For an efficient solid waste management system, it is recommended to engage, CBOs, NGOs and micro enterprises on contract basis for collection and disposal of solid waste and street sweeping.

12.7.1.2 Open space, Wet-land and Relevant Features Protection Plan

- The authority named Bangladesh Sports Council in collaboration with the Paurasava authority may construct the stadium. The stadium should use regularly with various programs.
- The land prescribed for tourism development, Bangladesh Parjatan Corporation should be the responsible authority to implement those tourism components. Domestic tourists should be emphasized rather than international in considering establishment of tourism components. Rainwater harvesting will be the major component of this tourism site. This sector can improve economic capability of the Paurasava dwellers rapidly.
- The embankment cum road proposed along the southern part of the Palong River and a number of sluice gates will control flood water intrusion. As a result, single-crop land (remain wet land in nine months of a year) available in the southern part of the Paurasava will be turned into triple-crop land.

12.7.1.3 Pollution Protection Proposals

12.7.1.3.1 Industrial / Brickfield

In total, 12 industrial establishments are in the Paurasava and among them 10 are agro-based industries and 2 wood-based industries. The industrial activities cover 0.73 acres and 0.03% land of the Paurasava. Local woods are being processed in the saw mills and locally produced paddy are using in the rice mills. Those industries are located in some selected Wards. Location of those industries will be rearranged and grouped in some selected areas. After construction of Padma Bridge at Maowa point, number of agro-based industries will be increased. The steps will be taken to protect pollution through industries are:

- All the industries are in mixed-use areas. Some of them will be re-arranged and shifted to the proposed industrial site.
- A green buffer will create around the proposed industrial site; it will separate the area from adjacent landuses and at the same time, environment will be livable.
- In future, the proposed industrial site will also be identified as a site for polluting industry (as identified by the Directorate of Environment). In that, provision of recycling plant should be attached with the individual industry.
- Any brickfield should not be allowed in the Paurasava jurisdiction.

12.7.1.3.2 Air / Water / Land / Sound

For a better living environment above environmental phenomenon should be considered with the systematic planning principles and regulatory measures. With these views, people's awareness should be increased about the fair living environment through different public activities. Arrangement of landuses should be provisioned for all the public and private organizations as their necessities.

The Paurasava is rural based urban area. River, canal and pond water are still below the danger level of pollution. Let it should not be increased. Still people awareness is possible for reducing contamination of ground water. People may aware about the use of pesticides in agriculture field, solid waste disposal in a systematic manner and improved sanitation facilities.

12.7.1.3.3 Other Pollution

At present, control of urbanization and dumping of clinical wastes are the major concern of environment pollution of the Paurasava. Controlled urbanization according to this plan may remove the pollution through urbanization. Control on area / use density, height density and bulk density are the means of pollution protection through urbanization. A specific site within the compound of health services should be provisioned, thus pollution through clinical wastes will be controlled.

12.8 Natural Calamities and Regular Hazard Mitigation Proposals

12.8.1 Protection Plans Addressing Natural Calamities

Change in Topography and Mitigation: The main ground slope of the study area is southeast and southwest direction. Natural topography of the Paurasava has already been changed for urbanization. Implementation of Master Plan activities like roads, drainage, bridge/culvert, housing and industrial estates, bazars and growth centers will radically change the natural topography and landuse pattern of the study area. Agricultural area will be converted into urban and semi-urban area. Present green scenic beauty will disappear, water bodies will be lost and general slope will be diminished for earth filling due to urbanization.

1. Careful planning will be needed to minimize the change of topography.

2. Avoid water bodies during planning of roads, housing and industrial estates.
3. Practice good architectural/engineering design during planning of housing estates, buildings and the intersections of main roads.
4. Enhancement of plantation and gardening to increase the scenic beauty of the Paurasava.
5. Preserve the Beels, khals as lakes with demarking buffer distance.

Landuse Change and Mitigation: Major portion of the study area is rural setup, with predominance of agricultural landuse. However, urban and semi-urban landuses are observed in the Paurasava and its surrounding areas. With implementation of the Master Plan, rural setup and agricultural landuse pattern will be changed radically into urban landuse type.

1. Careful planning is necessary to reduce change of agricultural landuse and rural setup.
2. Keep water bodies and productive agricultural land free from urban development as long as possible. Vertical development may be encouraged rather than horizontal.
3. Economic use of land should be emphasized.

Drainage Congestion and Mitigation: Drainage congestion may increase further with urban sprawl development. Faulty design, solid waste and rubbish dumping, encroachment and un-authorized structures, siltation, lack of renovation and re-excavation are the main causes of drainage congestion. Drainage system that exists in the study area is not well enough to carry the surface run-off properly. The outlets of these drainage networks are mostly connected with the natural channels or khals. These khals will be silted due to siltation; as a result, drainage congestion generates. And thus many areas are subjected to water-logging during the heavy rainfall causing inconvenience to the people of the area.

1. Make proper drainage network in new area considering the slope and local topographical condition.
2. Remove all unauthorized structures, which developed on drainage structures.
3. Prohibit the people in dumping of rubbish and solid waste in drain.
4. Regular cleaning and maintenance by the concerned authorities.
5. Demarcation of water bodies, which can act as retention pond to avoid water logging from heavy rainfall.
6. Demarcation of Right of Way to preserve the natural channels.

Groundwater Table Declination and Mitigation: Fall of groundwater table is a common phenomenon in the study area during dry period (February-May). With expansion of urbanization and industrialization through the Ward Action Plan, the groundwater table may further fall if present tradition of using groundwater is continued.

1. Introduce rainwater harvesting system and use in the planning area.
2. Stop land filling of ponds and water bodies to maintain the groundwater level through recharge and leaching process.

Groundwater Pollution and Mitigation: Groundwater pollution due to manganese, iron and hardness is a major problem of the study area. With expansion of urban area, more dependency on groundwater sources may increase the pollution level of sub-surface water.

1. Use surface water of Palong River for supply water.
2. Introduce rainwater-harvesting system.
3. Reduce dependency on groundwater.
4. Preserve surface water in ponds, khals, Beels, ditches and rivers for irrigation.

Noise Pollution and Mitigation: Although there is no data available on noise pollution of the study area, however, it seems that present noise level does not exceed the Bangladesh Standard. More noisy area may be the Bus Terminal area and Industrial and Market area. Hydraulic horn of buses and rickshaw bells are the main noise sources in the study area. However, some noises also generate during piling and construction works. Besides, welding workshops, saw mills, musical instruments and blacksmiths are also common sources of noise pollution in urban areas. With expansion of urban area, the noise pollution will be increased for increasing number of motor vehicles, market places, industries, etc.

1. Stop using hydraulic horn in buses, trucks and other motor vehicles.
2. Declare some areas like hospitals, schools, parks, etc. as silent zone.
3. Control abnormally high noise from saw mill, old machines should be repaired or replaced.
4. Foundation of machines should be specially prepared to reduce noise.
5. Special type of silencer may be attached with the machines to reduce noise.
6. Welding and blacksmith workshops can be fenced with glasses to protect the passersby from possible pollution effects.
7. 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.

Air Pollution and Mitigation: Present climatic condition of the study area is sub-tropical monsoon. With the implementation of Master Plan this climatic condition is expected to continue if further global climatic change does not occur. However, rainfall may slightly decrease in the study area for cutting of trees and diminishing of green vegetation for urban development. Trees and green vegetation keep environment cool and enhance precipitation and rainfall. Temperature may remain same as present. Urban development

keeping vegetation, plants, water bodies and new social forestation in homesteads, educational organizations, roads, embankment and parks will help maintain the climatic condition same as present.

Air-pollution is not a serious problem in the study area. Vehicular emission is also insignificant in the area. Industries are the main sources of air pollution. However, the air pollution will be increased in near future with increase of motor vehicles and industries. With the implementation of Master Plan more industrial zones will be developed which will also induce air pollution in the planning area.

1. Use catalytic converter in buses, trucks, taxis and tempos.
2. Use CNG instead of petrol and diesel.
3. Impose ban on movement of sand carrying trucks and conservancy vehicles during office period.

Loss of Biodiversity and Mitigation: Urbanization like roads, infrastructure development, housing, commercial places, industrialization, etc. will replace the existing natural green environment to man made environment. Trees will be cut down, water bodies will be filled up and polluted; sugarcane, paddy, banana, papaya and vegetable production will be reduced and mango 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.

1. Avoid critical ecological area and refugee sites from development activities.
2. Aware people for keeping some trees and bushes around the homesteads.
3. Increase tree plantation in roadsides and homesteads.
4. Preserve the Beels for aquatic birds and fishes and some bush areas as wildlife preservation sites.

Parasitic Diseases and Mitigation: Parasitic diseases like dengue, malaria and filaria are not common in the planning area. However, with the expansion of urban area, the prevalence of these diseases may increase in the project area. During last 3 to 4 years, the country faces dengue problem although this problem was negligible. This problem may happen also in the Paurasava for increasing urbanization and industrialization.

1. Regular mosquito eradication program in the project area.
2. Dengue carrying mosquitoes live in fresh water of tire, cans, bottles and flower tubs. Segregation of old tires; cans and bottles are required before dumping.
3. Remove additional water of flower-tubs and refrigerator cans regularly.
4. Improve drainage system and remove waterlogged areas in the project.
5. Regular cleaning of drain and removal of water hyacinth and other aquatic plants are required from ponds, ditches, khals and Beels.

6. Use mosquito net during sleeping at both night and daytime.
7. Increase people's awareness on parasitic diseases and mosquito control.

12.8.2 Protection Plan Addressing Regular Hazards

Most of the natural canals and water courses will be preserved and maintained. The ponds larger than 0.15 acres should be preserved as a water reservoir.

To protect northern and southern part from annual flood, a road cum embankment including two sluice gates will be needed and these will be controlled by the Water Development Board.

For the removal of drainage congestion, sufficient number of bridges and culverts should be provisioned during construction of roads.

Indiscriminate land filling for expansion and construction of residential areas and buildings should be controlled with the imposition of agriculture policy.

12.8.3 Protection Plan Addressing Encroachment and Other Relevant Issues

As a measure of protection from encroachment restrictive buffer zone will be created on both sides of natural canals, rivers and other watercourses (if necessary). Walkways and plantation will be needed for the protection of those buffer zones.

Formation of appropriate legislation on solid waste management will be necessary. People encroaches canal and river through dumping of solid wastes. Encroachment on road, canal and river should be removed as early as possible with the formation of joined collaboration committee. This committee may be formed with the members from Paurasava, LGED, RHD and WDB.

Using of waste as an unutilized resource and assisting in recycling of waste for conservation of resources and protection of environment.

Introduces environmental education especially sanitary habits in school curriculum.

12.9 Plan Implementation Strategies

12.9.1 Regulations to Implement the Drainage and Flood Plan

The regulations which will be needed for the implement of drainage and flood plan are:

1. Section 3 of the Acquisition and Requisition of Immovable Property Ordinance, 1982 is needed for acquisition of land in view to construct environmental components. The authority, according to the demand, will apply to the Deputy Commissioner for such acquisition.
2. Section 4 of the Conservation of Environment Act, 1995 have prescribed duties and responsibilities of the Director. Most of those responsibilities are on the control of pollution.
3. Section 28 (1, 2 and 3) of the Forest Act, 1927 has prescribed regulations on village forest, which is necessary for the formation of village / Paurasava forest.

4. Section 5 of the Playfield, Open space, Garden and Natural Tank in Urban Areas Preservation Act, 2000 will be needed for the preservation of playfield, garden, open space and natural tank of the Paurasava.
5. **Water Hyacinth Act, 1936** was enacted for preventing the spread of water hyacinth in Bangladesh and for its destruction. It is said in the section 5 that, no person shall grow or cultivate water hyacinth in any garden or in any ornamental water or receptacle. Again, according to the section 8(1) said, with a view to facilitating the discovery or destruction of water hyacinth, an Authorized Officer may, subject to any rules made under this Act, by a notice served in the prescribed manner, direct an occupier of any land, premises or water within a notified area to cause-
 - a) any branches of trees or shrubs on any such land or premises which overhang the edge of any river, stream, waterway, ditch, marsh, bil, lake, tank, pond, pool or pit to be cut back and any undergrowth or jungle thereon to be removed from such edge, within a distance specified in the notice, or
 - b) any vegetation appearing above the surface of any such water to be removed from the water, within such period as may be specified in the notice.
6. Section 7 of the Water Resources Planning Ordinance, 1992 will be needed for the development of water resources available in the Paurasava.

12.9.2 Implementation, Monitoring, Evaluation and Coordination of the Plan

Implementation through Multi-Sectoral Investment Programme: Major infrastructure development works such as primary roads, water supply, drainage, etc., will largely be controlled by the Government. Public works requires efficient co-ordination through the Multi-Sectoral Investment Programme (MSIP).

Objective of a Multi-Sectoral Investment Programme (MSIP) will match a list of the development projects with the funding stream necessary to implement them. There are two basic activities that would determine the contents of MSIP. One activity would be to prioritize and schedule the investment projects of all public agencies so they will collectively help to achieve the development goals and objectives of the Urban Area Plan. Second activity would be to analyze the source and availability of fund for the prioritized list of development projects.

Implementation through Action Plans and Projects: Action Plans and Projects will be the implementation plans to solve problems at the local level. Action plans will take a direct approach toward plan implementation with a minimum of research, reports or elaborate planning methods. These projects will be easily identifiable and will require minimum resource.

Implementation through Development Control: Landuse zoning is one of several methods of plan implementation to be considered. In all cases where some form of

development, landuse control may be applied; careful consideration requires the following ideologies:

- the purpose to be achieved by the development controls;
- where controls should be applied;
- what aspect of development needs to be controlled;
- what type of development controls are required;
- what degree or level of development control is required;
- who will be affected by the required control;
- who will be affected by the controls and in what manner;
- when the controls should be applied;
- what will be the likely impact of the controls;
- how and by whom will the controls be administered and enforced.

Development control as an instrument of plan implementation may be selectively applied within the Urban Area Plans. Development controls would also be varied in intensity and detail to suit the particular circumstances. It is important that they should be clear and easily understood by all parties concerned. Since the entire Paurasava Master Plan 'package' has become statutory, development controls associated with its component plans would also be statutory.

Implementation by Facilitating Private Investment: Another approach that would be taken by government toward plan implementation will be to guide and facilitate investments made by the private sector. Government can achieve this with relative ease and at very low cost by setting up a legal and operational framework, coupled with suitable incentives, to facilitate land consolidation, plot boundary readjustment, efficient lay out of plots and provision of local infrastructure by the private sector. The benefits of this approach would be:

- increased efficiency of the urban land market would make, more private land available to urban households;
- would pass much of the development costs for local infrastructure to the private sector and land market mechanisms;
- would increase in land for development without large cash outlays by government to purchase land for development schemes; and
- would keep provision of land for community facilities virtually no cost to government.

Plan Monitoring

The Urban Area Plan would simply be tools for guiding and encouraging the growth and development of an urban area in a preferred manner. In a rapidly changing urban environment, the Urban Area Plan would require to keep up to date. If this is not done,

within a few years it will be obsolete. Therefore, it is imperative that the requirement for regular updating of the Urban Area Plan be made a legal requirement.

For implementation of the various programme components of the Urban Area Plan appropriate administrative measures will have to be undertaken. This will essentially include project preparation and monitoring of their execution and evaluation. For carrying out all these activities appropriate institutional measures are also be needed.

Evaluation

Monitoring and evaluation of on going and implemented projects is essential to keep the future course of action on the right track. An on going project should be regularly monitored and handicaps identified to enable taking appropriate measures at the right time.

Post implementation evaluation is also needed to take appropriate measures correcting past errors-from project preparation to implementation.

The top level supervision has to be done by a high level supervisory committee headed by Paurasava Mayor, LGED representative and Local Government Ministry. Other members of the committee will be local Ward Councilors, local community leader/social workers and the Town Planner of the Paurasava. The committee will supervise implementation works regularly and issue necessary instructions to expedite the works of implementation.

Co-ordination

A Planning Section of Paurasava should have close interaction with the citizen of Paurasava at large in order to make people aware of the benefits of a good plan and, therefore, their social responsibility to promote plan implementation in one hand and also resist contraventions on the other. A specific interactive cell is recommended to operate in this regard with following responsibilities:

- Provide pre-application advice to residents, consultants and developers about landuse management issues and application procedures for the submission of development applications.
- Enforce planning and landuse management related legislation and zoning scheme regulations.
- Issue of property zoning certificates.
- Investigate and resolve landuse management complaints, illegal landuse and prosecuting contraventions.

Such interactive windows may be opened in various convenient locations to ensure ease of the answers to commonly asked questions may be shown in the internet. Besides, those may be shown in the print and electronic media time to time.

In spontaneous areas, while all out people's co-operation is needed for project implementation; there will also be some elements of negotiation. Negotiation will be particularly needed in case of road widening projects. It will be a crucial task for Paurasava to convince the affected people to give up their land for road use. Efforts should be made to convince the land owners on the ground of enhancement of property value due to road widening. In case people refuse to offer land free of cost necessary arrangements may have to be made for payment of compensation. This process of negotiation will be very critical, cumbersome and time consuming, and therefore, has to be handled with utmost care and patience. The best results can be accrued only by winning people's confidence. In case the authority fails to get peoples co-operation they should exercise power of compulsory acquisition of land. Attempts may be made to engage NGOs / CBOs to work as catalysts in negotiation.

CHAPTER 13

PLAN FOR URBAN SERVICES

13.1 Introduction

Sensible urban planning is critical to the healthy growth of cities. Unplanned growth leads a number of problems, creating misery for urban dwellers and making remedying of those difficulties. Yet flawed urban planning is little better, or perhaps worse, than no urban planning at all. It is thus important, when taking on such an enormous task as the drafting of an Urban Area Plan for a Paurasava, to ensure that the plan is well considered and likely to be conducive to good health and well-being of the urban dwellers.

During the year 1984 to 2003, Urban Development Directorate (UDD) was prepared a series of Landuse/Master Plans for Upazila and Zila Shahars of Bangladesh as a part of decentralization effort of the government. Under that project, the Naria Upazila Shahar was planned but the project area considered in the plan was far away from the planning area considered in the Paurasava Town Infrastructure Development Project.

13.2 Analysis of Existing Condition and Demand of the Services

The Paurasava is too poor in development of urban services. With the development of physical condition of the Paurasava, substantial development will be needed for those services. Drinking water supply, sewerage and sanitation facilities and dumping of solid wastes should be emphasized as primary consideration. All the people (except 2.0) are dependent on hand tubewell for drinking water. In the Paurasava there are two pump houses for drinking water supply and 700 hand tubewells, most of them are contaminated with iron and arsenic. Absence of solid waste dumping ground creates health hazards. Absence of covered drain and sewerage system creates sanitation problem in the Paurasava. Those problems should be removed through the proper planning and design.

Water Supply: Almost all the households are using hand tubewell as main source of drinking water and cooking purposes. At least 98% households are using hand tubewell and 2% supply water through two pump houses to maintain their daily needs. About 98% of the residents are using river and pond water for washing and bathing purposes. A good number of hand tubewell is available in the Paurasava but most of them are contaminated with iron and arsenic. Ground water level during dry and wet seasons are 30ft and 18ft respectively.

Electricity: The Rural Electrification Board (REB) at present is providing electricity facility within Paurasava area. There is no existing substation within the Paurasava. Electricity poles of different sizes exist in the study area to carry power network and the total number is 550 and 8 street lights. They cover almost every Ward in the study area. High

voltage towers are distributed evenly and transformers are used to transform the high voltage to low voltage for distributing to the clients. High voltage line (33KV) passed beside the link road.

There are HT/LT transformer stations which step down high voltages into low voltages which reach various Mohallah and Community areas through this electric supply line.

Telecommunication: There is a telephone exchange having a capacity of 250 lines maintained by Bangladesh Telecommunication Company Limited (BTCL) in the Paurasava area. At present there are 232 land telephone users in the area. There are also mobile phone networks of GrameenPhone, Robi, Citycell, Banglalink and Airtel which cover the entire study area.

Gas supply: Gas supply is not available in the Paurasava area.

The projection of utility service depends on the population growth and need assessment of the Paurasava inhabitants. After completion of population projection it is found that, population of the planning area will be 28120 in the year 2021 and 33410 in the year 2031. Projection on utility services also depends on present condition of urban services and future demand of those services.

Demand analysis: Existing utility facilities of the Paurasava are not sufficient and established without following any standard. Therefore, Team Leaders of all packages and urban planners from Project Management Office (PMO) have worked out and prepared different standards for projection of future facilities as per the requirement of Paurasava. Following of those standards have considered for the future demand with ensuring the quality and quantity of utility facilities.

Table 13.1: Standard of utility facilities and future need

| Facility | Standard | Existing Facility (acre) | Existing & Proposed Facility (acre) (2031) |
|---------------------------|-----------------------------------|--------------------------|--|
| Drainage | 1.00 acre /20,000 population | 0.17 | 1.67 |
| Water supply | 1.00 acre /20,000 population | 0.20 | 1.67 |
| Gas | 1.00 acre /20,000 population | 0 | 1.67 |
| Electric sub-station | 1.00 acre/20,000 population | 0 | 1.67 |
| Solid waste disposal site | 4–10 acres/Upazila HQ | 0 | 6.00 |
| Waste transfer station | 0.25 acres/waste transfer station | 0 | 0.25 |
| Telephone exchange | 0.5 acre/20,000 population | 0 | 0.84 |
| Fuel Station | 0.5 acre/20,000 population | 0 | 0.84 |

13.3 Proposals for Addressing Urban Services and Implementation Strategies

For existing urban services, the Paurasava will need to establish a communication with each of the appropriate implementing agencies the following:

- Which of the existing services run, not currently in road corridors, could or should be relocated into road corridors to facilitate planned development bearing in mind the cost implications of doing this?

- The corridor reservations that should be applied to the service networks that cannot be moved.
- The means of establishing and maintaining these reservations, free from other development.
- For future expansions of the networks (in case of sewerage, possibly a new network), the Paurasava will need to establish with the appropriate implementing agency what the future requirements are, so that reservations can be applied and maintained. The Paurasava will need as part of this process:
- Try to ensure that secondary, tertiary and where possible primary networks are located within existing or proposed road corridors to minimize the requirement for separate land reservations. In most cases, it is known that this can be achieved. The likely exception will be primary electricity networks. The scale of this will demand separate land reservations.
- Where this cannot be achieved, agree with the relevant agency about the size of the reservation required, its alignment and approximate time-scale of implementation.
- To adopt the agreed reservation and ensure that it is maintained. When development applications are received which impinge upon this reservation, the Paurasava should not permit the development within the reservation, but ensure that it will be made to setback to the limit of the reservation.

Types of urban services that will need to be considered within the Paurasava are indicated below:

Water supply: Location of water treatment plant may be on a large plot (on 1.67 acres of land) with good access, close to source of water. It should be located upstream of any polluting development. Desalination plant may be located on large plot close to the river, upstream from any polluting activities. Water reservation tanks may be constructed on medium size plot in key locations throughout the Paurasava, preferably in an elevated positioning relation to the area it is intended to serve, so as to maintain/increase pressure.

All water is carried by underground pipes of various diameters. The closer they are to the original source of treated water, the larger the pipe and therefore, trench to accommodate it must be. These pipes should be contained within road reserves.

Sewerage facilities: Location of sewerage treatment plant may be on large plot (on 1.67 acres of land), preferably on outskirts of the Paurasava. Sewerage pumping station may be located on small plots throughout the Paurasava and a system should be introduced.

If a sewerage network were to be installed, the sewerage originating throughout the Paurasava would be carried by means of underground pipes and culverts. These should be accommodated within road reserves.

Electricity: Electricity power station may be located on a large plot out of Paurasava with good accessibility. About 132/33KV switching station may be established on a large plot (on 1.67 acres of land) on the edge of the Paurasava with good accessibility. About 33/11KV switching stations may be established on medium sized plots in a small number of key locations throughout the Paurasava. Electricity sub-station may be constructed on small plots throughout the Paurasava. These can be accommodated on the plots they serve (industries) or in road corridors.

Primary networks; principally 132KV, pylon supported power lines from the existing power stations which will enter the Paurasava at purpose built switching stations. The switching stations will usually be located at the fringe of the Paurasava. Secondary networks; 33KV or 11KV pole mounted power lines, although in cases the 33KV lines can also be pylon mounted. The 33KV lines will originate at the above mentioned switching station and supply power around the Paurasava to smaller switching stations at key locations around the Paurasava where they will be down-sized to 11KV. These, in turn, will supply power to more localized electricity sub-stations. The pole mounted lines can be located within principle road corridors (primary and district distributors). Pylon mounted lines should be allocated their own reserve. Tertiary networks; at the localized sub-stations, the 11KV power will be down-sized for distribution to individual premises. Power leaving these sub-stations is usually carried by 415V pole mounted lines. These can be accommodated within road corridors.

Telephone: An additional telephone exchange is unnecessary for the Paurasava. If required, it will need a medium size plot (on 0.84 acres of land), unless it also has to accommodate a transmission / reception tower, in which case it will require a fairly large plot. Medium sized plot will be needed for local exchange, central to its catchment area. Street exchange may be located on small plot in road corridor.

Telephone exchange lines can be either overhead, pole mounted or underground using newer Optical Fiber Cables. Both of these are carried to localized exchanges and then onto small roadside exchanges. From these connections are carried on poles to individual premises. All networks can be accommodated within road reserves.

Gas supply: In the Paurasava, gas supply is not provisioned. If, in future (within 10 years), gas is being supplied by the government to the Paurasava, some necessary steps should be considered by the authority. They are, in case of gas manifold station, may be located on small to medium sized plot (on 1.67 acres of land) on the main ring, at the fringe of the Paurasava. Upazila regulator station may be located on small plots throughout the Paurasava. These will be located at the break-off point on the main line, where smaller diameter spurs extend into the area that the gas will serve.

When gas supply will be available in the Paurasava, all gas will be supplied by varying diameter underground pipes. These can be accommodated in road reserves.

Sewerage facilities: Location of sewerage treatment plant may be on large plot (on 0.84 acres of land), preferably on outskirts of the Paurasava. Sewerage pumping station may be located on small plots throughout the Paurasava and a system should be introduced.

If a sewerage network were to be installed, the sewerage originating throughout the Paurasava would be carried by means of underground pipes and culverts. These should be accommodated within road reserves.

Electricity: Electricity power station may be located on a large plot out of Paurasava with good accessibility. About 132/33KV switching station may be established on a large plot (on 0.84 acres of land) on the edge of the Paurasava with good accessibility. About 33/11KV switching stations may be established on medium sized plots in a small number of key locations throughout the Paurasava. Electricity sub-station may be constructed on small plots throughout the Paurasava. These can be accommodated on the plots they serve (industries) or in road corridors.

Primary networks; principally 132KV, pylon supported power lines from the existing power stations which will enter the Paurasava at purpose built switching stations. The switching stations will usually be located at the fringe of the Paurasava. Secondary networks; 33KV or 11KV pole mounted power lines, although in cases the 33KV lines can also be pylon mounted. The 33KV lines will originate at the above mentioned switching station and supply power around the Paurasava to smaller switching stations at key locations around the Paurasava where they will be down-sized to 11KV. These, in turn, will supply power to more localized electricity sub-stations. The pole mounted lines can be located within principle road corridors (primary and district distributors). Pylon mounted lines should be allocated their own reserve. Tertiary networks; at the localized sub-stations, the 11KV power will be down-sized for distribution to individual premises. Power leaving these sub-stations is usually carried by 415V pole mounted lines. These can be accommodated within road corridors.

Telephone: An additional telephone exchange is unnecessary for the Paurasava. If required, it will need a medium size plot (on 0.84 acres of land), unless it also has to accommodate a transmission / reception tower, in which case it will require a fairly large plot. Medium sized plot will be needed for local exchange, central to its catchment area. Street exchange may be located on small plot in road corridor.

Telephone exchange lines can be either overhead, pole mounted or underground using newer Optical Fiber Cables. Both of these are carried to localized exchanges and then onto small roadside exchanges. From these connections are carried on poles to individual premises. All networks can be accommodated within road reserves.

Gas supply: In the Paurasava, gas supply is not provisioned. If, in future (within 10 years), gas is being supplied by the government to the Paurasava, some necessary steps should be considered by the authority. They are, in case of gas manifold station, may be located

on small to medium sized plot (on 0.84 acres of land) on the main ring, at the fringe of the Paurasava. Upazila regulator station may be located on small plots throughout the Paurasava. These will be located at the break-off point on the main line, where smaller diameter spurs extend into the area that the gas will serve.

When gas supply will be available in the Paurasava, all gas will be supplied by varying diameter underground pipes. These can be accommodated in road reserves.

13.4 Regulations to Address the Proposals

Local Government (Paurasava) Act, 2009 (Ordinance No. XLXVIII of 2009) was enacted in 6th October 2009. According to the 2nd Schedule, Sl. No. 10, the Paurasava may provide supply of wholesome water sufficient for public and private purposes. Frame and execute water supply scheme for the construction and maintenance of such works for storage and distribution of water. In case of private sources of water supply, it is said that, all private sources of water supply within the Paurasava shall be subject to control, regulation and inspection by the Paurasava. No new well, water pump or any other source of water for drinking purposes shall be dug, constructed or provided except with the sanction of the Paurasava.

The regulations, as discussed above, will be needed for provisioning of drinking water supply both Paurasava and private sources in the Paurasava.

The sewerage facilities may be provided by the Paurasava and Directorate of Public Health Engineering (DPHE). According to the 2nd Schedule, Sl. No. 12, of the Local Government (Paurasava) Act, 2009, Paurasava may provide an adequate system of public drains and all such drains shall be constructed, maintained, kept, cleared and emptied with due regard to the health and convenience of the public. All private drains shall be subject to control, regulation and inspection by the Paurasava.

Public Health (Emergency Provisions) Ordinance, 1944 (Ordinance No. XXI of 1944) was enacted in 20th May 1944. According to the section 2(e) "public health services" and "public health establishment" include respectively sanitary, water-supply, vaccination, sewage disposal, drainage and conservancy services and establishment maintained for the purposes of such services, and any other service or establishment of a local authority which the Government may by notification in the Official Gazette declare to be a public health service or public health establishment for any purpose of this Ordinance.

Based on the regulation, the Directorate of Public Health Engineering (DPHE) is performing activities for drinking water supply. If DPHE likes to render their service according to the water supply network as presented in this plan, the regulation will be the safeguard for them.

East Pakistan Water and Power Development Authority Rules, 1965 (No. 4-1(E) was prepared and notified in 12th July 1965. The Power Development Board (PDB) is

empowered for power generation under the guidance of Electricity Act, 1910. At present, PDB and Rural Electrification Board (under the Rural Electrification Board Ordinance, 1977) is performing the role relevant with the electrification of the Paurasava. The existing authorities will be needed for electrification of the Paurasava according to the guidelines presented in the plan.

Telegraph and Telephone Board Ordinance, 1975 (Ordinance No. XLVII of 1975) was enacted in 30th August 1975. A Telegraph and Telephone Board (T&T Board) was composed through this Ordinance. Section 6(1) of the Ordinance has prescribed the functions of the Board and said, it shall be the function of the Board to provide efficient telegraph and telephone services and to do all acts and things necessary for the development of telegraphs and telephones. In the Paurasava, at present, a T & T Board is performing the functions prescribed in the section 6(1). T & T Board is the sole authority for performing the same and it will be continued in future also. But, the Mobile telephone system generates a revolution in the society. Most of the people are depended on the Mobile phone system. The plan does not consider this system.

13.5 Implementation, Monitoring and Evaluation of the Urban Services Plan

Implementation through Multi-Sectoral Investment Programme: Major infrastructure development works such as primary roads, water supply, drainage, etc., will largely be controlled by Government. Public works requires efficient co-ordination through the Multi-Sectoral Investment Programme (MSIP).

Objective of a Multi-Sectoral Investment Programme (MSIP) will match a list of the development projects with the funding stream necessary to implement them. There are two basic activities that would determine the contents of MSIP. One activity would be to prioritize and schedule the investment projects of all public agencies so they will collectively help to achieve the development goals and objectives of the Urban Services Plan. Second activity would be to analyze the source and availability of fund for the prioritized list of development projects.

Implementation through Action Plans and Projects: Action Plans and Projects will be the implementation plans to solve problems at the local level. Action plans will take a direct approach toward plan implementation with a minimum of research, reports or elaborate planning methods. These projects will be easily identifiable and will require minimum resource.

Implementation through Development Control: Landuse zoning is one of several methods of plan implementation to be considered. In all cases where some form of development, landuse control may be applied; careful consideration requires the following ideologies:

- the purpose to be achieved by the development controls;

- where controls should be applied;
- what aspect of development needs to be controlled;
- what type of development controls are required;
- what degree or level of development control is required;
- who will be affected by the required control;
- who will be affected by the controls and in what manner;
- when the controls should be applied;
- what will be the likely impact of the controls;
- how and by whom will the controls be administered and enforced.

Development control as an instrument of plan implementation may be selectively applied within the Urban Services Plans. Development controls would also be varied in intensity and detail to suit the particular circumstances. It is important that they should be clear and easily understood by all parties concerned. Since the entire Paurasava Master Plan 'package' has become statutory, development controls associated with its component plans would also be statutory.

Implementation by Facilitating Private Investment: Another approach that would be taken by government toward plan implementation will be to guide and facilitate investments made by the private sector. Government can achieve this with relative ease and at very low cost by setting up a legal and operational framework, coupled with suitable incentives, to facilitate land consolidation, plot boundary readjustment, efficient lay out of plots and provision of local infrastructure by the private sector. The benefits of this approach would be:

- increased efficiency of the urban land market would make more private land available to urban households;
- would pass much of the development costs for local infrastructure to the private sector and land market mechanisms;
- would increase in land for development without large cash outlays by government to purchase land for development schemes; and
- would keep provision of land for community facilities virtually no cost to government.

Plan Monitoring

The Urban Services Plan would simply be tools for guiding and encouraging the growth and development of an urban area in a preferred manner. In a rapidly changing urban environment, the Urban Services Plan would require to keep up to date. If this is not done, within a few years it will be obsolete. Therefore, it is imperative that the requirement for regular updating of the Urban Services Plan be made a legal requirement.

Map 13.1: Proposed utility services

For implementation of the various programme components of the Urban Services Plan appropriate administrative measures will have to be undertaken. This will essentially include project preparation and monitoring of their execution and evaluation. For carrying out all these activities appropriate institutional measures are also be needed.

Evaluation

Monitoring and evaluation of on going and implemented projects is essential to keep the future course of action on the right track. An on going project should be regularly monitored and handicaps identified to enable taking appropriate measures at the right time

Post implementation evaluation is also needed to take appropriate measures correcting past errors-from project preparation to implementation.

The top level supervision has to be done by a high level supervisory committee headed by the Paurasava Mayor, representatives of the service giving agencies and Local Government Ministry. Other members of the committee will be local Ward Councilors, local community leader/social workers and the Town Planner of the Paurasava. The committee will supervise implementation works regularly and issue necessary instructions to expedite the works of implementation.

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

There are several patches of land in the Paurasava area where planned development can be achieved through use of different land development techniques. One of those techniques is Land Readjustment Technique, may be practiced for the development of Ward as a Ward Action Plan. The plan prepared for designated areas in conforming to the land development techniques is known as Action Area Plan.

It is also expected that following successful implementation of the Ward Action Plan in one side, management would be more efficient in handling projects and in another people residing in unplanned areas would feel the benefit of such Action Plan ensuring more effective community participation.

14.1.2 Content and Form of Ward Action Plan

The report has been divided in to five main parts. These are preceded by introductory chapters which explain the approach of the report and provide background with the linkage of Structure Plan and Urban Area Plan. Part two of the report identifies strategies and policies prescribed in the Structure Plan and Urban Area Plan and their uses for the preparation of Ward Action Plan. The chapter also covers prioritization in case of development needs and Ward-wise Action Plan for next five years. Ward-wise Action Plan is being presented in the next part of the report. Proposal, priority tasks and financial involvement with the infrastructural development as a priority basis are the outcome of this part. Implementation guidelines are the key issues of part four. Comparative Advantage of Master Plan and proposals for mitigation of identified issues are the components of last part of this report.

14.1.3 Linkage with the Structure and Urban Area Plan

The Ward Action Plan for the Paurasava has been prepared on the basis of following principles relevant with the Structure Plan and Urban Area Plan:

- Environment friendly sustainable development of the area.
- Town functions to develop as per major landuse zones.
- Effective drainage system through minimum hindrance to Flood Flow zones.
- Safe residential areas at proximity to place of work or major communication routes.

- Smooth and effective functioning of industries, specially agro-based industries.
- Safe yet faster connectivity.
- Develop to serve the surrounding hinterlands.

14.1.4 Approach and Methodology

For the preparation of Ward Action Plan the planning area has been sub-divided into Nine Planning Zones according to the individual Ward. Immediate necessary action will be required for Ward Action Plan and this is the key outcome of Ward Action Plan. Where, what type of action will be required and how the action will be performed prescribed in the plan.

Pro-people Urban Planning

The Ward Action Planning approach utilizes in the Paurasava Master Plan concentrating mainly on the building of infrastructure and roads to facilitate the movements of vehicles. In this scenario, Paurasava society would become steadily more privatized with private homes, offices and commercial activities, while all-important public component of urban life is likely to slowly disappear.

The landuse and transport interaction for a modern city should be directed toward “Planning for people, not for vehicles, roads or buildings”. Given the problems of alienation, crime, fear of strangers and the breakdown of civic life, it is increasingly important to make cities inviting so that people can meet their fellow citizens face-to-face and experience human contact with those unknown to and different from them directly through their senses. Public life in high quality public spaces is an important part of a democratic society and full life.

Evidence-based vs. Arbitrary Planning Approach

In the era of globalization, where information on any number of issues and about any number of places is readily accessible, there is no need for localities to continue making the same mistakes as they did when operating in an information and experience vacuum. While urban planning is of course a complicated process, it is also true that some universals exist in terms of what works and what does not. The experiences of urban areas adopting commercial-based and people-based approaches make clear the effects of either method, and many guides are now available on implementing planning approaches that are good for the natural environment and for urban dwellers.

Given the widespread availability of such information, it is highly regrettable that important landuse and transport policy-decisions should adopt either any knowledge-based or scientific analysis. Instead, arbitrary or so-called “common sense” approaches should not be utilized which may favour the rich, including bureaucrats and developers with little concern for the betterment of society overall.

Although, it is a demanding task to represent the complex dynamics of urban landuse changes that are consistent with observable data, significant progress has been made in recent years in the country in forecasting and evaluating landuse change on the basis of dynamic and causal relationships between such factors as transport and landuse, and built environment and socio-economic processes.

With the advance of the knowledge-base and technology-base, detailed and extensive urban form and function data is becoming increasingly available, with great potential to provide new insights for sustainable urban planning which preserves the eco-system and maintains or even increases social equity.

Yet no attempt was made in the preparation of Upazila Master Plan / Landuse Plan (in 1980s) to conduct any analytical or empirical analysis using data related to interactions between the built environment, transport, landuse and other socio-economic processes.

Again, in Paurasava Master Plan, the Geographic Information System (GIS)-based technology is mainly used for mapping and visual displays, which are limited to static displays of past and current data sets. That is, the displays only portray the current state of the system, with neither the reasons given for its condition nor possible alternate futures provided. As a result, policymakers and planners are now facing tremendous difficulties, lacking as they do any insight into future urban growth and the potential impacts of various models.

Hypothetical Planning Approach under Upazila Master Plan/Landuse Plan, no comprehensive data collection exercise was undertaken to estimate landuse requirements for the Paurasava. As a result, all the landuse proposals of that plan were hypothetical in nature, providing no insight into how the actual landuse demand for various purposes will meet in future.

Yet it is not logical to develop a Ward Action Plan, which represents the lowest tier of the planning hierarchy, without providing precise landuse allocations for different functional purposes.

Furthermore, in the Paurasava Plan, a significant portion of existing open space and agriculture land have been allocated for private developers required as per the 2031 population projection. This excess land for property developers is likely not only to create landuse speculation but also indiscipline in future landuse development. More importantly, the preservation of land for open space and agriculture is vital for the health and viability of the Paurasava and its inhabitants.

14.2 Derivation of Ward Action Plan

14.2.1 Revisit Structure Plan

All the studies carried out at varying point of time converged to the same conclusion that the vital contribution of the Paurasava areas are bounded by Arialkha and Palardi River as

main flood flow zone allowing excess flood water to pass over it during rainy season, must not be obstructed by any development. Despite this unanimous expert cautions, the area will experience a tremendous development pressure. The Consultant has tried to work out an effective strategy to address the later with acceptably low obstruction to the flood water to pass through. The strategies are as follows under some basic heads:

Drainage

Non-continuous smaller rural settlements above flood level surrounded by ample low lying areas (agriculture, sub-flood flow, main flood flow, etc.) allowing uninterrupted flow of water to pass through.

- Minimize obstruction of flood water as is practicable.
- Appropriate connectivity by roads having sufficient openings to ensure needful flow of water across them as well as uninterrupted traditional water-based connectivity by keeping appropriate navigation clearance at the bridges. This would help to maintain the biodiversity of the area and contribute to sustainable environment in turn.

Residential Development

- Residential Landuse Zone is based on the potentiality, trend and opportunity.
- Adaptation of neighbourhood concept for new residential developments and for need assessment of community facilities.
- Prohibition of through traffic and heavy vehicles within the neighbourhoods.
- Provide adequate safe and easy to move footpaths.
- Ensure community facilities and services of appropriate scale at neighbourhood level.

Industrial Development

- Ensure provision of central effluent treatment plant in case of industrial clusters.
- Ensure own treatment plant in case of individual facilities.
- Prohibit high hazard industries within the residential area.
- Relocate industries from predominantly residential zones in phases.
- Provide essential support facilities for effective functioning of the industries.

Mixed-Use Development

- Relocate noxious and heavy industries [red category as per DoE] to Heavy Industrial Area within as soon as practicable.
- Ensure adequate utility services to ensure uninterrupted production.
- Allow the red industries to maintain their status under strict abiding conditions until shifting.
- Ensure adequate safety and security of the people especially of the families residing in such mixed-areas.
- Provide sufficient quantity of wide, easy to use and safe footpaths.

- Provide Zebra Crossing at road crossings to ease the lives of major portion of low-income workers likely to traverse on foot to reach their likely abode in the busy area.

Transport and Communication

- Provide safe, adequate and comfortable pedestrian ways.
- Provide appropriate and effective public transport routes with sufficient number of quality public transport to carry passenger.
- Grade separation of National and Regional Highways from the local roads, latter being at grade and other two above grades.

Flood Flow Zones

- Strictly preserve the riverfront area as per the area demarcated by the Water Development Board.
- Promote agricultural and passive recreational use of the area during dry season.

Non-urban Areas

- Promote traditional waterways (if any) in the low-lying areas by constructing submerged road for dry season connectivity.
- Strictly preserve agriculture land from conversion into non-agricultural use.
- Promote rural characteristics in the isolated homesteads keeping mandatory buffer to make way for the flood water intrusion.

Water body and Open Spaces

- Strictly protect canal networks providing the missing links.
- Make provision for open spaces and water body at the neighbourhood level.
- Strictly protect the river fronts and open it for the dwellers as a passive recreation.
- Make town-scale open space with easy accessibility especially for people of densely populated areas with meager scope for open space.

Amenities and Community Facilities

- Consider neighbourhood concept of residential development for estimating community facilities and amenities requirement.
- Prohibit construction of religious structure unless built on its own land.
- Relocate unauthorized religious structures from road Right of Way to safeguard greater interest of the people specially the Paurasava dwellers.
- Close/relocate existing schools with highly inadequate class rooms, play field and essential facilities and gradually replace with standard considered in the Urban Area Plan.
- Evacuate unauthorized structures and uses from road's Right of Way to safeguard greater interest of the people specially the Paurasava dwellers.

Solid Waste Management

- No more conventional disposal through dumping.

- Solid Waste Processing to ensure recycling.
- Conversion of traditional solid waste in to fertilizer.
- Door to door collection instead of road side bin disposal.
- Disposal of hospital and other hazardous waste in the proposed disposal site.

Water Supply

- Harness surface water source instead of ground water.
- Explore possibility of processing Palardi River water.
- Continuous monitoring of tubewell water to check arsenic contamination.
- Create scope of rain water harvesting.

Electricity

- Priority for supplying electricity will be given to industry and irrigation pumps.
- Gradually coverage of the whole Paurasava with the increase of power generation.
- Gradually electricity network will be concealed through underground system.
- Explore the possibility of using renewable energy source in order to minimize cost of distribution network.
- Introduce solar energy in every establishment.

Environmental Management

- Grouping of hazardous industries.
- Establishment of Common Effluent Treatment Plant.
- Adoption of neighbourhood concepts for new residential development.
- Generate waste water treatment plant.

Supporting the Surrounding Hinterland

- Easy accessibility from the surrounding hinterlands especially growth centers.
- Ensure facilities such as cold storage, wholesale/retail market facilities for needful commodities (fertilizer, insecticide, agro-machineries, etc.) and shopping centers of regional standards to support population living in the surrounding hinterlands.

Conservation of Monument and Heritage

- Identify and record all historical sites and monuments.
- Conserve and restore with standard procedure all historical sites and monuments.
- Evict illegal occupants of the historical sites.

Gas Supply

- Explore possibility of use of gas in cylinder for domestic purposes.

14.2.2 Prioritization

The prioritization of project proposals in Ward-wise Action Plan is being prepared on the basis of urgency for development depending on the needs of people and the town's requirement for infrastructure development.

14.3 Ward-wise Action Plan for Next Five Years

The Ward Action Plan is prepared for each of the nine 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 livable environment.

14.3.1 Action Plan for Ward No. 01

Demography

Action Plan for Ward No. 1 consists of the mouza named Mulpara, Nabagram and Premtala. It is situated on the northwestern part of the Paurasava. Ward No. 2 is on the north, Palong River on the west, Ward No. 9 on the south and Ward No. 6 on the eastern part of this Ward. Four east-west and five north-south local roads serve this Ward. This area is characterized by agriculture development, administrative establishments, commercial activities and rural homesteads. There are linear developments of rural homesteads along the local roads.

Table 14.1: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|--------------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 3096 | 3375 | 3679 | 4010 | 4371 |
| Area (acre) | 312.91 | 312.91 | 312.91 | 312.91 | 312.91 |
| Density/acre | 10 | 11 | 12 | 13 | 14 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 3096 (2011) and it will be 3375 in the year 2016, 3679 in 2021, 4010 in 2026 and 4371 in 2031. Density of population is 10 persons per acre and it will be 14 persons per acre in the year 2031.

Proposals and Plans for Ward No. 01

Landuse Proposal

Ward No. 1 is important for LGED Office, Paurasava Office Upazila Chairman Office, Police station, educational institutions and agriculture land. Total planning area of the Ward is 312.91 acres. In the total planning area, 62.4 acres land is under agriculture use, 2.52 acres for commercial, 11.49 acres for government services, 15.57 acres for educational facility, 33.48 acres water body and 84.66 acres for urban residential use.

Table 14.2: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------|-------------|-------|
| Agricultural Zone | 62.41 | 19.94 |
| Circulation Network | 22.62 | 7.23 |
| Commercial Zone | 2.52 | 0.80 |

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Community Facilities | 1.76 | 0.56 |
| Education & Research Zone | 15.57 | 4.98 |
| General Industrial Zone | 18.06 | 5.77 |
| Government Office | 11.49 | 3.67 |
| Health Services | 1.15 | 0.37 |
| Heavy Industrial Zone | 32.73 | 10.46 |
| Mixed Use Zone | 5.39 | 1.72 |
| Open Space | 10.34 | 3.30 |
| Rural Settlement | 7.48 | 2.39 |
| Transportation Facilities | 3.26 | 1.04 |
| Urban Residential Zone | 84.66 | 27.05 |
| Utility Services | 0.00 | 0.00 |
| Water Body | 33.48 | 10.70 |
| Total | 312.90 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, industrial use, mixed-use, recreational facility, government service, health service, open space and rural settlement are new adjustment. Mostly, agriculture land will be used for those purposes and about 7 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 12.16 km. (7.70 acres) roads are in the Ward No. 1. Among total length, 7.89 km. road is pucca, 1.98 km. semi-pucca and 2.29 km katcha. In the plan, one 60 feet width road, three 40 feet width roads and six 30 feet width connecting roads are being proposed in the plan for the Ward No. 1. Total length of the proposed road is 7355 meter (7.3 km.).

Table 14.3: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RA2 | 80 | Primary | Widening Road | 1079.31 | 1st Phasing |
| RS3 | 40 | Secondary | Widening Road | 263.40 | 1st Phasing |
| RS4 | 40 | Secondary | Widening Road | 266.24 | 1st Phasing |
| RT6 | 30 | Tertiary | Widening Road | 395.05 | 3rd Phasing |
| RT9 | 30 | Tertiary | Widening Road | 589.35 | 2nd Phasing |
| RA11 | 20 | Access | Widening Road | 669.58 | 3rd Phasing |
| RA12 | 20 | Access | Widening Road | 299.10 | 3rd Phasing |
| RS13 | 40 | Secondary | New Road | 239.54 | 2nd Phasing |
| RA25 | 20 | Access | Widening Road | 448.38 | 3rd Phasing |
| RA27 | 20 | Access | Widening Road | 385.87 | 3rd Phasing |
| RA28 | 20 | Access | Widening Road | 131.71 | 3rd Phasing |
| RA29 | 20 | Access | Widening Road | 152.26 | 3rd Phasing |
| RS32 | 40 | Secondary | Widening Road | 253.36 | 3rd Phasing |
| RT36 | 30 | Tertiary | Widening Road | 722.50 | 3rd Phasing |
| RT42 | 30 | Tertiary | New Road | 537.47 | 2nd Phasing |
| RT1 | 30 | Tertiary | New Road | 500.07 | 1st Phasing |
| RS1 | 40 | Secondary | Widening Road | 422.28 | 1st Phasing |
| | | | Total | 7355.46 | |

Proposed Drain and Water Supply Line

At present, 0.55 km. pucca drain is in this Ward. One secondary, three tertiary and six access drains have been proposed along the 60 feet, 40 feet, 30 feet and 20 feet width

roads. Total length of those drains is 20 km. About 20 km. water supply line is being proposed for this Ward.

Map 14.1: Landuse Plan for Ward No 01

Map 14. 2: Proposed Road and Drainage for Ward No 01

Development Proposal

In the landuse plan, a Shishu park on 1.13 acres of land, market on 0.21 acres of land and an auditorium on 0.67 acres of land are being proposed. All the facilities are located in the mouza named Naria. Detail is presented in the following table.

Table 14.4: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-----------------------------|--------------------|----------|-------------|------------------|-----------------------|-------|
| Proposed Market | Commercial | 1 | Naria_99_01 | 295, 301 | 1 st Phase | 0.21 |
| Proposed Ward Center 01 | Community Facility | 1 | Naria_99_01 | 319, 322-23, 630 | 1 st Phase | 0.31 |
| Proposed Central Mosque | Community Facility | 1 | Naria_99_01 | 78,636 | 2 nd Phase | 0.31 |
| Proposed University | Education | 1 | Naria_99_01 | 417-31 | 3 rd Phase | 9.21 |
| Proposed Hospital/Clinic 02 | Health | 1 | Naria_99_01 | 373-75 | 2 nd Phase | 2.03 |
| Proposed Shishu Park | Open Space | 1 | Naria_99_01 | 295, 300-305 | 2 nd Phase | 1.13 |
| Proposed Auditorium | Open Space | 1 | Naria_99_01 | 303-305, 310 | 3 rd Phase | 0.67 |
| Proposed Bus Terminal | Transport | 1 | Naria_99_01 | 416 | 1 st Phase | 1.64 |
| Proposed Truck Terminal | Transport | 1 | Naria_99_01 | 416 | 3 rd Phase | 1.63 |
| Proposed Housing Estate | Urban Residential | 1 | Naria_99_01 | 380-81 | 3 rd Phase | 0.74 |

14.3.2 Action Plan for Ward No. 02

Demography

Action Plan for Ward No. 2 consists of three mouzas named Baroipara, Boishakhi Para and Nikaripara. It is situated on the northwestern part of the Paurasava. Palong River is on the north and west, Ward No. 1 and 6 on the south, Ward No. 3 and 4 on the eastern part of this Ward. Three east-west and four north-south local roads serve the area. This area is characterized by rural homesteads, commercial development, socio-economic activities and agriculture land.

Table 14.5: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|-----------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 2187 | 2383 | 2598 | 2832 | 3086 |
| Area (acre) | 170.51 | 170.51 | 170.51 | 170.51 | 170.51 |
| Density/acre | 13 | 14 | 15 | 17 | 18 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 2187 (2011) and it will be 2383 in the year 2016, 2598 in 2021, 2832 in 2026 and 3086 in 2031. Density of population is 13 persons per acre in the year 2011 and it will be 18 persons per acre in the year 2031.

Proposals and Plans for Ward No. 02

Landuse Proposal

Ward No. 2 is important for educational institutions, 2 light industries, commercial establishments and vast agriculture land. Total planning area of the Ward is 170.51 acres. In the total area, agriculture use is 0.32 acres, urban residential 87.8 acres, commercial 13.9 acres and water body 26.7 acres. Other use is negligible.

Table 14.6: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Agricultural Zone | 0.32 | 0.19 |
| Circulation Network | 14.16 | 8.30 |
| Commercial Zone | 13.90 | 8.15 |
| Community Facilities | 1.44 | 0.84 |
| Education & Research Zone | 2.18 | 1.28 |
| General Industrial Zone | 0.03 | 0.02 |
| Government Office | 0.26 | 0.15 |
| Health Services | 0.00 | 0.00 |
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 7.73 | 4.53 |
| Open Space | 15.54 | 9.11 |
| Rural Settlement | 0.05 | 0.03 |
| Transportation Facilities | 0.28 | 0.16 |
| Urban Residential Zone | 87.82 | 51.49 |
| Utility Services | 0.11 | 0.07 |
| Water Body | 26.77 | 15.69 |
| Total | 170.57 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, mixed-use, government service, open space, transport and communication and rural settlement are new adjustment. Mostly, agriculture land will be used for those purposes and about 30 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 7.20 km. (5.13 acres) roads are in the Ward No. 2. Among total length, 5.03 km. road is pucca, 1.46 km. semi-pucca and 0.72 km katcha. In the plan, One 60 feet width road, two 40 feet width roads and six 30 feet width roads are being proposed for the Ward No. 2. Total length of the proposed road is 4172 meter (4.1 km.).

Table 14.7: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RA2 | 80 | Primary | Widening Road | 1217.15 | 1st Phasing |
| RS3 | 40 | Secondary | Widening Road | 192.71 | 1st Phasing |
| RT5 | 30 | Tertiary | Widening Road | 272.76 | 3rd Phasing |
| RT7 | 30 | Tertiary | Widening Road | 247.17 | 3rd Phasing |
| RT8 | 30 | Tertiary | Widening Road | 419.65 | 3rd Phasing |
| RT20 | 30 | Tertiary | New Road | 357.59 | 3rd Phasing |
| RT21 | 30 | Tertiary | Widening Road | 259.92 | 3rd Phasing |
| RT22 | 30 | Tertiary | Widening Road | 36.79 | 3rd Phasing |
| RS1 | 40 | Secondary | Widening Road | 1168.32 | 1st Phasing |
| | | | Total | 4172.06 | |

Map 14. 3: Landuse Plan for Ward No 02

Map 14.4: Proposed Road and Drainage for Ward No 02

Proposed Drain and Water Supply Line

At present, 0.96 km. pucca drain is in this Ward. One secondary, two tertiary and six access drains have been proposed along the 60 feet, 40 feet and 30 feet width roads. Total length of those drains is 12 km. About 12 km. water supply line is being proposed for this Ward.

Development Proposal

A bus stand on 0.21 acres of land, Shosan Ghat on 0.04 acres of land and Ward Centre on 0.25 acres of land are being proposed for this Ward. Proposed dumping ground on 0.56 acres of land is being located outside the Paurasava. Detail is presented in the following table.

Table 14.8: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|--------------------|----------|-------------|-----------|-----------------------|-------|
| Proposed Shosan Ghat | Community Facility | 2 | Naria_99_01 | 65 | 1 st Phase | 0.04 |
| Proposed Graveyard 03 | Community Facility | 2 | Naria_99_01 | 76,79,649 | 1 st Phase | 0.56 |
| Proposed Ward Center 02 | Community Facility | 2 | Naria_99_02 | 1153 | 3 rd Phase | 0.25 |
| Proposed Clinic | Health | 2 | Naria_99_02 | 1007-9 | 1 st Phase | 1.13 |
| Proposed Bus Stand | Transport | 2 | Naria_99_02 | 1161 | 1 st Phase | 0.21 |

14.3.3 Action Plan for Ward No. 03

Demography

Action Plan for Ward No. 3 consists of one mouza named Dhalipara, Khalifapara and Sayalpara. The Ward is situated on the middle of the northern part of the Paurasava. Ward No. 2 and 4 is on the north, Ward No. 6 on the south and west and Ward No. 4 and 5 on the eastern part of the Paurasava. One east-west and one north-south local roads serve the area. This area is characterized by rural homestead and agriculture land.

Table 14.9: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|--------------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 2707 | 2951 | 3216 | 3506 | 3821 |
| Area (acre) | 138.28 | 138.28 | 138.28 | 138.28 | 138.28 |
| Density/acre | 20 | 21 | 23 | 25 | 28 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 2707 (2011) and it will be 2951 in the year 2016, 3216 in 2021, 3506 in 2026 and 3821 in 2031. Density of population is 20 persons per acre and it will be 28 persons per acre in 2031.

Proposals and Plans for Ward No. 03

Landuse Proposal

Ward No. 3 is important for poultry farm and low-level agriculture land. Total planning area of the Ward is 138.28 acres. In the total area, agriculture use is 23.5 acres, commercial 0.08 acres, water body 14.89 acres and urban residential 83.21 acres.

Table 14.10: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Agricultural Zone | 23.54 | 17.02 |
| Circulation Network | 7.56 | 5.46 |
| Commercial Zone | 0.08 | 0.05 |
| Community Facilities | 1.15 | 0.83 |
| Education & Research Zone | 0.65 | 0.47 |
| General Industrial Zone | 0.00 | 0.00 |
| Government Office | 1.48 | 1.07 |
| Health Services | 0.00 | 0.00 |
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 5.33 | 3.85 |
| Open Space | 0.38 | 0.27 |
| Rural Settlement | 0.00 | 0.00 |
| Transportation Facilities | 0.04 | 0.03 |
| Urban Residential Zone | 83.21 | 60.17 |
| Utility Services | 0.00 | 0.00 |
| Water Body | 14.89 | 10.77 |
| Total | 138.30 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, educational facility, community service, mixed-use and open space are new adjustment. Mostly, agriculture land will be used for those purposes and about 14 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 4.17 km. (2.68 acres) roads are in the Ward No. 3. Among total length, 2.05 km. road is pucca, 0.53 km. semi-pucca and 1.60 km katcha. In the plan, two 40 feet width roads and four 30 feet width roads are being proposed for the Ward No. 3. Total length of the proposed road is 2770.4 meter (2.8 km.).

Table 14.11: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RS3 | 40 | Secondary | Widening Road | 596.87 | 1st Phasing |
| RT9 | 30 | Tertiary | Widening Road | 276.81 | 2nd Phasing |
| RS10 | 40 | Secondary | Widening Road | 714.03 | 2nd Phasing |
| RT21 | 30 | Tertiary | Widening Road | 256.28 | 3rd Phasing |
| RT23 | 30 | Tertiary | Widening Road | 91.17 | 2nd Phasing |
| RS24 | 40 | Secondary | Widening Road | 354.80 | 3rd Phasing |
| RT26 | 30 | Tertiary | Widening Road | 480.46 | 1st Phasing |
| | | | Total | 2770.41 | |

Source: Based on Physical feature survey, 2010.

Proposed Drain and Water Supply Line

At present, no drain is in this Ward. Two tertiary and four access drains have been proposed along the 40 feet and 30 feet width roads. Total length of those drains is 8 km. About 8 km. water supply line is being proposed for this Ward.

Map 14.5: Landuse Plan for Ward No 03

Map 14.6: Proposed Road and Drainage for Ward No 03

Development Proposal

Two graveyards on 0.47 and 0.48 acres of land and a Ward Centre on 0.53 acres of land are being proposed for this Ward. Both the services are located in the mouza named Lonsinha and Naria. Detail is presented in the following table.

Table 14.12: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|--------------------|----------|-----------------|----------|-----------------------|-------|
| Proposed Graveyard 02 | Community Facility | 3 | Lonshinha_65_01 | 561 | 3 rd Phase | 0.47 |
| Proposed Graveyard 04 | Community Facility | 3 | Lonshinha_65_01 | 562 | 3 rd Phase | 0.48 |
| Proposed Ward Center 03 | Community Facility | 3 | Naria_99_02 | 1579 | 2 nd Phase | 0.53 |

14.3.4 Action Plan for Ward No. 04

Demography

Action Plan for Ward No. 4 consists of one mouza named Banshitala and Char Naria. It is situated on the northeastern part of the Paurasava. The Palong River is on the north and east, Ward No. 3 and 5 on the south, Ward No. 2 on the western part of this Ward. One east-west and one north-south local roads serve the area. This area is characterized by beel areas, agriculture land and rural homesteads.

Table 14.13: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|--------------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 2739 | 2985 | 3254 | 3547 | 3866 |
| Area (acre) | 204.04 | 204.04 | 204.04 | 204.04 | 204.04 |
| Density/acre | 13 | 15 | 16 | 17 | 19 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 2739 (2011) and it will be 2985 in the year 2016, 3254 in 2021, 3547 in 2026 and 3866 in 2031. Density of population is 13 persons per acre and it will be 19 persons per acre in the year 2031.

Proposals and Plans for Ward No. 04

Land use Proposal

Ward No. 4 is important for agriculture land and rural homesteads. Total planning area of the Ward is 204 acres. In the total area, agriculture use is 55.5 acres and urban residential 82.25 acres. Areas under commercial and water body are 0.09 acres and 19.28 acres respectively.

Table 14.14: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|-------|
| Agricultural Zone | 55.50 | 27.19 |
| Circulation Network | 16.17 | 7.92 |
| Commercial Zone | 0.09 | 0.04 |
| Community Facilities | 0.72 | 0.35 |
| Education & Research Zone | 7.75 | 3.80 |
| General Industrial Zone | 0.00 | 0.00 |
| Government Office | 0.00 | 0.00 |
| Health Services | 6.16 | 3.02 |

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 3.38 | 1.66 |
| Open Space | 12.84 | 6.29 |
| Rural Settlement | 0.00 | 0.00 |
| Transportation Facilities | 0.00 | 0.00 |
| Urban Residential Zone | 82.25 | 40.29 |
| Utility Services | 0.00 | 0.00 |
| Water Body | 19.28 | 9.44 |
| Total | 204.13 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, mixed-use and open space is new adjustment. Mostly, agriculture land will be used for those purposes and about 10 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 6.01 km. (4.20 acres) roads are in the Ward No. 4. Among total length, 3.37 km. road is pucca, 1.38 km. semi-pucca and 1.26 km katcha. In the plan, two 60 feet width roads, four 40 feet width roads and three 30 feet width roads are being proposed for the Ward No. 4. Total length of the proposed road is 4385.1 meter (4.4 km.).

Table 14.15: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RA2 | 80 | Primary | Widening Road | 1297.57 | 1st Phasing |
| RS10 | 40 | Secondary | Widening Road | 422.92 | 2nd Phasing |
| RS19 | 40 | Secondary | Widening Road | 792.80 | 2nd Phasing |
| RT21 | 30 | Tertiary | Widening Road | 67.59 | 3rd Phasing |
| RT22 | 30 | Tertiary | Widening Road | 323.49 | 3rd Phasing |
| RT26 | 30 | Tertiary | Widening Road | 512.01 | 1st Phasing |
| RT33 | 30 | Tertiary | New Road | 257.51 | 3rd Phasing |
| RT34 | 30 | Tertiary | New Road | 531.91 | 3rd Phasing |
| RS1 | 40 | Secondary | Widening Road | 179.32 | 1st Phasing |
| | | | Total | 4385.11 | |

Proposed Drain and Water Supply Line

At present, 0.10 km. drain is in this Ward. Two secondary, four tertiary and three access drains have been proposed along the 60 feet, 40 feet and 30 feet width roads. Total length of those drains is 15 km. About 15 km. water supply line is being proposed for this Ward.

Development Proposal

A high school, a college, a hospital, a park and a Ward Centre on 0.55 acres of land is being proposed for this Ward. Detail is presented in the following table. Except this, existing services should be developed to make it useable.

Map 14. 7: Landuse Plan for Ward No 04

Map 14.8: Proposed Road and Drainage for Ward No 04

Table 14.16: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|------------------------------|--------------------|----------|-------------|-----------------------------|-----------------------|-------|
| Proposed Ward Center 04 | Community Facility | 4 | Naria_99_02 | 1729 | 1 st Phase | 0.55 |
| Proposed High School | Education | 4 | Naria_99_02 | 2405-07,2418 | 3 rd Phase | 2.6 |
| Proposed College 02 | Education | 4 | | 628-29,634, 2412, 2414,2415 | 3 rd Phase | 4.63 |
| Proposed Hospital/ Clinic 01 | Health | 4 | Naria_99_02 | 2136-53 | 1 st Phase | 6.16 |
| Proposed Park 02 | Open Space | 4 | Naria_99_02 | 1675-89 | 2 nd Phase | 4.01 |

14.3.5 Action Plan for Ward No. 05

Demography

Action Plan for Ward No. 5 consists of one mouza named Bitik Kuri, Dewankandi, Haidarkandi and Kalukati. The Ward is situated on the northeastern part of the Paurasava. Ward No. 4 is on the north, Ward No. 7 on the south, Ward No. 3 and 6 on the west and a canal of Palong River on the eastern part of the Ward. Four east-west and one north-south local roads serve the area. This area is characterized by agriculture land and rural homesteads.

Table 14.17: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|-----------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 2089 | 2277 | 2481 | 2705 | 2948 |
| Area (acre) | 177.39 | 177.39 | 177.39 | 177.39 | 177.39 |
| Density/acre | 12 | 13 | 14 | 15 | 17 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 2089 (2011) and it will be 2277 in the year 2016, 2481 in 2021, 2705 in 2026 and 2948 in 2031. Density of population is 12 persons per acre and it will be 17 persons per acre in 2031.

Proposals and Plans for Ward No. 05

Land use Proposal

Ward No. 5 is important for Upazila health complex, rural homesteads and agriculture land. Total planning area of the Ward is 177.4 acres. In the total area, agriculture use is 46.5 acres and urban residential 93.8 acres. Areas under commercial, educational, community service are negligible. Area under water body is 21.35 acres.

Table 14.18: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|-------|
| Agricultural Zone | 46.57 | 26.25 |
| Circulation Network | 8.92 | 5.03 |
| Commercial Zone | 0.09 | 0.05 |
| Community Facilities | 1.08 | 0.61 |
| Education & Research Zone | 0.35 | 0.20 |
| General Industrial Zone | 0.00 | 0.00 |
| Government Office | 0.00 | 0.00 |
| Health Services | 0.62 | 0.35 |

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 1.57 | 0.88 |
| Open Space | 1.60 | 0.90 |
| Rural Settlement | 1.43 | 0.80 |
| Transportation Facilities | 0.00 | 0.00 |
| Urban Residential Zone | 93.86 | 52.90 |
| Utility Services | 0.00 | 0.00 |
| Water Body | 21.35 | 12.03 |
| Total | 177.43 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, health service, community facility, open space and rural settlement are new adjustment. Mostly, agriculture land will be used for those purposes and about 11 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 6.18 km. (4.17 acres) roads are in the Ward No. 5. Among total length, 4.47 km. road is pucca, 1.21 km. semi-pucca and 0.50 km katcha. In the plan, two 40 feet width roads and one 30 feet width road are being proposed for the Ward No. 5. Total length of the proposed road is 2605.6 meter (2.61 km.).

Table 14.19: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RS19 | 40 | Secondary | Widening Road | 901.16 | 2nd Phasing |
| RS24 | 40 | Secondary | Widening Road | 838.61 | 3rd Phasing |
| RT33 | 30 | Tertiary | New Road | 276.67 | 3rd Phasing |
| RS40 | 40 | Secondary | New Road | 600.07 | 1st Phasing |
| | | | Total | 2616.50 | |

Proposed Drain and Water Supply Line

At present, no drain is in this Ward. Two tertiary and one access drains have been proposed along the 40 feet and 30 feet width roads. Total length of those drains is 8 km. About 8 km. water supply line is being proposed for this Ward.

Development Proposal

A zoo is being proposed in this Ward. Existing services should be developed to make it useable.

Table 14.20: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------|--------------------|----------|----------------|-----------------|-----------------------|-------|
| Proposed Zoo | Community Facility | 5 | Kalukati_98_00 | 28,32-3, 112-12 | 1 st Phase | 1.78 |

Map 14.9: Landuse Plan for Ward No 05

Map 14.10: Proposed Road and Drainage for Ward No 05

14.3.6 Action Plan for Ward No. 06

Demography

Action Plan for Ward No. 6 consists of three mouzas named Bismillahpara (Ali Para), Gopal Para (Dewan Para) and Paik Para. It is situated on the middle of the Paurasava. Ward No. 2 is on the north, Ward No. 7 on the south, Ward No. 3 and 5 on the east and Ward No. 1 and 7 on the western part of this Ward. Four east-west and two north-south local roads serve the area. This area is characterized by fish farming, agriculture development and rural homesteads.

Table 14.21: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|--------------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 2480 | 2704 | 2947 | 3212 | 3501 |
| Area (acre) | 280.19 | 280.19 | 280.19 | 280.19 | 280.19 |
| Density/acre | 9 | 10 | 11 | 11 | 12 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 2480 (2011) and it will be 2704 in the year 2016, 2947 in 2021, 3212 in 2026 and 3501 in 2031. Density of population is 9 persons per acre and it will be 12 persons per acre in 2031.

Proposals and Plans for Ward No. 06

Land use Proposal

Ward No. 6 is important for 3 light industries, primary schools, madrasahs, hospital, agriculture land and rural homesteads. Total planning area of the Ward is 280 acres. In the total area, agriculture use is 94.59 acres and urban residential 106.4 acres. Area under commercial use is 0.09 acres; community services 1.31 acres and water body 45.9 acres.

Table 14.22: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Agricultural Zone | 94.59 | 33.76 |
| Circulation Network | 14.84 | 5.30 |
| Commercial Zone | 0.09 | 0.03 |
| Community Facilities | 1.31 | 0.47 |
| Education & Research Zone | 0.72 | 0.26 |
| General Industrial Zone | 1.44 | 0.52 |
| Government Office | 4.06 | 1.45 |
| Health Services | 1.41 | 0.50 |
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 2.73 | 0.97 |
| Open Space | 6.61 | 2.36 |
| Rural Settlement | 0.00 | 0.00 |
| Transportation Facilities | 0.00 | 0.00 |
| Urban Residential Zone | 106.38 | 37.97 |
| Utility Services | 0.00 | 0.00 |
| Water Body | 45.99 | 16.42 |
| Total | 280.17 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, industrial use, mixed-use, health service, open space and rural settlement are new adjustment. Mostly, agriculture land will be used for those purposes and about 15 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 8.29 km. (5.33 acres) roads are in the Ward No. 6. Among total length, 4.57 km. road is pucca, 2.06 km. semi-pucca and 1.66 km katcha. In the plan, two 40 feet width roads and four 30 feet width roads are being proposed for the Ward No. 6. Total length of the proposed road is 6215.8 meter (6.2 km.).

Table 14.23: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RS3 | 40 | Secondary | Widening Road | 962.44 | 1st Phasing |
| RS4 | 40 | Secondary | Widening Road | 1231.25 | 1st Phasing |
| RT9 | 30 | Tertiary | Widening Road | 478.89 | 2nd Phasing |
| RS10 | 40 | Secondary | Widening Road | 151.28 | 2nd Phasing |
| RS13 | 40 | Secondary | New Road | 1031.48 | 2nd Phasing |
| RT23 | 30 | Tertiary | Widening Road | 464.68 | 2nd Phasing |
| RA35 | 20 | Access | Widening Road | 521.16 | 3rd Phasing |
| RT39 | 30 | Tertiary | New Road | 321.64 | 1st Phasing |
| RA41 | 20 | Access | Widening Road | 521.94 | 3rd Phasing |
| RS47 | 40 | Secondary | Widening Road | 531.07 | 3rd Phasing |
| | | | Total | 6215.84 | |

Proposed Drain and Water Supply Line

At present, 0.04 km. drain is in this Ward. Two tertiary and four access drains have been proposed along the 40 feet and 30 feet width roads. Total length of those drains is 18 km. About 18 km. water supply line is being proposed for this Ward.

Development Proposal

A Ward Centre on 0.57 acres of land and graveyard on 0.36 acres of land are being proposed for this Ward. Both the services are located in the Naria mouza. Detail is presented in the following table. Except these, existing services should be developed to make it useable.

Table 14.24: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|--------------------|----------|-----------------|----------------|-----------------------|-------|
| Proposed Graveyard 01 | Community Facility | 6 | Naria_99_02 | 1423-25 | 1 st Phase | 0.36 |
| Proposed Ward Center 06 | Community Facility | 6 | Naria_99_02 | 1440 | 3 rd Phase | 0.57 |
| Proposed Park 03 | Open Space | 6 | Lonshinha_65_01 | 484-90, 502-08 | 3 rd Phase | 6.5 |

Map 14. 11: Landuse Plan for Ward No 06

Map 14. 12: Proposed Road and Drainage for Ward No 06

14.3.7 Action Plan for Ward No. 07

Demography

Action Plan for Ward No. 7 consists of one mouza named Dighir par, Hantir Bhita and Lonsingha. It is situated on the southeastern part of the Paurasava. Ward No. 1, 5 and 6 is on the north, Ward No. 8 on the south, Ward No. 8 and 9 on the west and Palong River on the eastern part of this Ward. Seven east-west and eight north-south local roads serve the area. This area is characterized by rural homesteads, beel areas, fish farming and agriculture land.

Table 14.25: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|--------------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 3159 | 3443 | 3753 | 4091 | 4459 |
| Area (acre) | 469.31 | 469.31 | 469.31 | 469.31 | 469.31 |
| Density/acre | 7 | 7 | 8 | 9 | 10 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 3159 (2011) and it will be 3443 in the year 2016, 3753 in 2021, 4091 in 2026 and 4459 in 2031. Density of population is 7 persons per acre and it will be 10 persons per acre in the year 2031.

Proposals and Plans for Ward No. 07

Land use Proposal

Ward No. 7 is important for educational institutions, religious establishments, one light industry and rural homesteads. Total planning area of the Ward is 469 acres. In the total area, agriculture use is 197.2 acres; urban residential 152 acres, educational facilities 8.6 acres, community services 1.33 acres and water body 76.6 acres. Other uses are negligible.

Table 14.26: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Agricultural Zone | 197.22 | 42.00 |
| Circulation Network | 20.83 | 4.44 |
| Commercial Zone | 0.22 | 0.05 |
| Community Facilities | 1.33 | 0.28 |
| Education & Research Zone | 8.60 | 1.83 |
| General Industrial Zone | 0.15 | 0.03 |
| Government Office | 0.08 | 0.02 |
| Health Services | 0.00 | 0.00 |
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 0.00 | 0.00 |
| Open Space | 12.33 | 2.63 |
| Rural Settlement | 0.00 | 0.00 |
| Transportation Facilities | 0.00 | 0.00 |
| Urban Residential Zone | 152.09 | 32.39 |
| Utility Services | 0.09 | 0.02 |
| Water Body | 76.61 | 16.31 |
| Total | 469.56 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, educational facility, recreational facility and rural settlement are new adjustment. Mostly, agriculture land will be used for those purposes and about 30 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 12.47 km. (7.13 acres) roads are in the Ward No. 7. Among total length, 7.39 km. road is pucca, 2.18 km. semi-pucca and 2.90 km katcha. In the plan, three 40 feet width roads and two 30 feet width roads are being proposed for the Ward No. 7. Total length of the proposed road is 8650 meter (8.6 km.).

Table 14.27: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RS3 | 40 | Secondary | Widening Road | 407.14 | 1st Phasing |
| RS4 | 40 | Secondary | Widening Road | 1461.64 | 1st Phasing |
| RS13 | 40 | Secondary | New Road | 287.61 | 2nd Phasing |
| RS14 | 40 | Secondary | Widening Road | 255.92 | 3rd Phasing |
| RS16 | 40 | Secondary | Widening Road | 599.51 | 1st Phasing |
| RA18 | 20 | Access | New Road | 213.82 | 1st Phasing |
| RT39 | 30 | Tertiary | New Road | 974.76 | 1st Phasing |
| RS40 | 40 | Secondary | New Road | 1314.85 | 1st Phasing |
| RA41 | 20 | Access | Widening Road | 8.73 | 3rd Phasing |
| RA48 | 20 | Access | New Road | 269.01 | 3rd Phasing |
| RT49 | 30 | Tertiary | Widening Road | 193.95 | 2nd Phasing |
| RA50 | 20 | Access | Widening Road | 122.46 | 3rd Phasing |
| RA51 | 20 | Access | Widening Road | 234.13 | 3rd Phasing |
| RT53 | 30 | Tertiary | New Road | 1178.50 | 2nd Phasing |
| RA54 | 20 | Access | Widening Road | 476.29 | 3rd Phasing |
| RA55 | 20 | Access | New Road | 652.60 | 3rd Phasing |
| | | | Total | 8650.91 | |

Proposed Drain and Water Supply Line

At present, no drain is in this Ward. Three tertiary and two access drains have been proposed along the 40 feet and 30 feet width roads. Total length of those drains is 25 km. About 25 km. water supply line is being proposed for this Ward.

Development Proposal

A Ward center office on 0.20 acres of land, college on 4.15 acres of land and library on 0.81 acres of are being proposed for this Ward. Those services are located in the mouza named Lonshinha. Detail is presented in the following table.

Table 14.28: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|--------------------|----------|-----------------|-----------|-----------------------|-------|
| Proposed Ward Center 07 | Community Facility | 7 | Lonshinha_65_03 | 2003 | 1 st Phase | 0.2 |
| Proposed Library | Education | 7 | Lonshinha_65_03 | 2424 | 2 nd Phase | 0.81 |
| Proposed College 01 | Education | 7 | Lonshinha_65_02 | 1297-1308 | 1 st Phase | 4.157 |
| Proposed Water Pump 02 | Utility | 7 | Lonshinha_65_03 | 2072 | 3 rd Phase | 0.037 |

Map 14.13: Landuse Plan for Ward No 07

Map 14.14: Proposed Road and Drainage for Ward No 07

14.3.8 Action Plan for Ward No. 08

Demography

Action Plan for Ward No. 8 consists of the mouzas named Bilasherpar, Lonsingha, Kashinath and Sarasar. It is situated on the southwestern part of the Paurasava. Ward No. 7 on the east, Ward No. 9 on the north, Bhedarganj Upazila on the south and Jajira Upazila on the western part of this Ward. Five east-west and six north-south local roads serve the area. This area is characterized by agriculture land and rural homesteads.

Table 14.29: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|--------------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 2373 | 2587 | 2819 | 3073 | 3350 |
| Area (acre) | 336.51 | 336.51 | 336.51 | 336.51 | 336.51 |
| Density/acre | 7 | 8 | 8 | 9 | 10 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 2373 (2011) and it will be 2587 in the year 2016, 2819 in 2021, 3073 in 2026 and 3350 in 2031. Density of population is 7 persons per acre and it will be 10 persons per acre in the year 2031.

Proposals and Plans for Ward No. 08

Land use Proposal

Ward No. 8 is important for vast agriculture land and rural settlements. Total planning area of the Ward is 336 acres. In the total area, agriculture use is 147.5 acres; urban residential 109.3 acres and water body 33.9 acres. Other uses are negligible.

Table 14.30: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Agricultural Zone | 147.46 | 43.86 |
| Circulation Network | 15.45 | 4.59 |
| Commercial Zone | 4.62 | 1.37 |
| Community Facilities | 1.14 | 0.34 |
| Education & Research Zone | 0.55 | 0.16 |
| General Industrial Zone | 0.00 | 0.00 |
| Government Office | 0.00 | 0.00 |
| Health Services | 4.99 | 1.48 |
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 0.00 | 0.00 |
| Open Space | 0.77 | 0.23 |
| Rural Settlement | 17.32 | 5.15 |
| Transportation Facilities | 0.00 | 0.00 |
| Urban Residential Zone | 109.32 | 32.52 |
| Utility Services | 0.61 | 0.18 |
| Water Body | 33.98 | 10.11 |
| Total | 336.21 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, community facility and rural settlement are new adjustment. Mostly, agriculture land will be used for those purposes and about 33 acres agriculture land is being devoted.

Proposed Circulation Network

At present, 10.43 km. (6.26 acres) roads are in the Ward No. 8. Among total length, 3.61 km. road is pucca, 2.79 km. semi-pucca and 4.04 km katcha. In the plan, three 40 feet width roads and three 30 feet width roads are being proposed for the Ward No. 8. Total length of the proposed road is 5818.9 meter (5.8 km.).

Table 14.31: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RS4 | 40 | Secondary | Widening Road | 150.96 | 1st Phasing |
| RS14 | 40 | Secondary | Widening Road | 440.92 | 3rd Phasing |
| RS16 | 40 | Secondary | Widening Road | 1434.36 | 1st Phasing |
| RT17 | 30 | Tertiary | Widening Road | 1474.65 | 3rd Phasing |
| RA30 | 20 | Access | New Road | 333.50 | 3rd Phasing |
| RA31 | 20 | Access | New Road | 466.86 | 3rd Phasing |
| RT49 | 30 | Tertiary | Widening Road | 408.97 | 2nd Phasing |
| RA50 | 20 | Access | Widening Road | 299.64 | 3rd Phasing |
| RA51 | 20 | Access | Widening Road | 341.60 | 3rd Phasing |
| RT52 | 30 | Tertiary | Widening Road | 467.46 | 2nd Phasing |
| | | | Total | 5818.91 | |

Proposed Drain and Water Supply Line

At present, no drain is in this Ward. Three tertiary and three access drains have been proposed along the 40 feet and 30 feet width roads. Total length of those drains is 18 km. About 18 km. water supply line is being proposed for this Ward.

Development Proposal

A surface water treatment plant on 0.61 acres of land and a Ward Centre on 0.18 acres of land are being proposed for this Ward. Both the services are located in the mouza named Lonshinha. Detail is presented in the following table. Existing services should be developed to make it useable.

Table 14.32: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-----------------------------|--------------------|----------|-----------------|------------------|-----------------------|-------|
| Proposed Ward Center 08 | Community Facility | 8 | Lonshinha_65_02 | 1768 | 3 rd Phase | 0.18 |
| Proposed Hospital/Clinic 03 | Health | 8 | Lonshinha_65_02 | 1156-72 | 3 rd Phase | 3.49 |
| Proposed Park 01 | Open Space | 8 | Lonshinha_65_02 | 141,314, 151,417 | 1 st Phase | 0.76 |
| Water Treatment Plant | Utility | 8 | Lonshinha_65_02 | 1911 | 2 nd Phase | 0.61 |

Map 14. 15: Landuse Plan for Ward No 08

Map 14. 16: Proposed Road and Drainage for Ward No 08

14.3.9 Action Plan for Ward No. 09

Demography

Action Plan for Ward No. 9 consists of four mouzas named Barun Para (Sadar Para), Khalsi Para, Mangalshiddi (Satghariakandi) and Sarenga para. It is situated on the southwestern part of the Paurasava. Ward No. 1 is on the north, Ward No. 8 on the south, Palong River on the west and Ward No. 7 on the eastern part of this Ward. Seven east-west and four north-south local roads serve the area. This area is characterized by agriculture land, fish farming and rural homesteads.

Table 14.33: Population, area and density

| Type | Population 2011 | Projected population | | | |
|--------------|--------------------|----------------------|--------|--------|--------|
| | | 2016 | 2021 | 2026 | 2031 |
| Population | 2839 | 3095 | 3373 | 3677 | 4008 |
| Area (acre) | 342.48 | 342.48 | 342.48 | 342.48 | 342.48 |
| Density/acre | 8 | 9 | 10 | 11 | 12 |

Source: BBS 2011 and Physical feature survey, 2010.

Present population of the Ward is 2839 (2011) and it will be 3095 in the year 2016, 3373 in 2021, 3677 in 2026 and 4008 in 2031. Density of population is 8 persons per acre and it will be 12 persons per acre in the year 2031.

Proposals and Plans for Ward No. 09

Land use Proposal

Ward No. 9 is important for vast agriculture land and rural homesteads. Total planning area of the Ward is 342 acres. In the total area, agriculture use is 138.9 acres; urban residential 108.9 acres, commercial 0.18 acres, educational facility 1.42 acres and water body 22.37 acres.

Table 14.34: Proposed landuse

| Landuse Type | Area (acre) | % |
|---------------------------|-------------|--------|
| Agricultural Zone | 138.96 | 42.47 |
| Circulation Network | 20.61 | 5.84 |
| Commercial Zone | 0.18 | 0.05 |
| Community Facilities | 1.88 | 0.53 |
| Education & Research Zone | 1.42 | 0.40 |
| General Industrial Zone | 18.56 | 5.26 |
| Government Office | 0.05 | 0.01 |
| Health Services | 0.00 | 0.00 |
| Heavy Industrial Zone | 0.00 | 0.00 |
| Mixed Use Zone | 0.54 | 0.15 |
| Open Space | 10.36 | 2.93 |
| Rural Settlement | 18.13 | 5.13 |
| Transportation Facilities | 0.04 | 0.01 |
| Urban Residential Zone | 108.93 | 30.85 |
| Utility Services | 0.12 | 0.03 |
| Water Body | 22.37 | 6.33 |
| Total | 342.13 | 100.00 |

Source: Based on Landuse survey, 2010.

In the proposal, except road, drainage and water supply line, mixed-use, community facility and rural settlement are new adjustment. Only 1 acre water body will be used for those purposes. No agriculture land will be used for those purposes. Rearrangement procedure among the uses has been followed in the plan.

Proposed Circulation Network

At present, 9 km. (6.14 acres) roads are in the Ward No. 9. Among total length, 4.93 km. road is pucca, 0.26 km. semi-pucca and 3.82 km katcha. In the plan, one 60 feet width road, six 30 feet width roads and two 20 feet width roads are being proposed for the Ward No. 9. Total length of the proposed road is 7943.5 meter (7.9 km.).

Table 14.35: Proposed road

| Road Id | Width (ft) | Road Type 01 | Road Type 02 | Length (m) | Phase |
|---------|------------|--------------|---------------|------------|-------------|
| RA2 | 80 | Primary | Widening Road | 1297.05 | 1st Phasing |
| RS13 | 40 | Secondary | New Road | 1006.50 | 2nd Phasing |
| RS14 | 40 | Secondary | Widening Road | 544.19 | 3rd Phasing |
| RT15 | 30 | Tertiary | Widening Road | 810.29 | 3rd Phasing |
| RA18 | 20 | Access | New Road | 1201.71 | 1st Phasing |
| RT36 | 30 | Tertiary | Widening Road | 1187.43 | 3rd Phasing |
| RT37 | 30 | Tertiary | Widening Road | 546.96 | 3rd Phasing |
| RT38 | 30 | Tertiary | Widening Road | 462.49 | 3rd Phasing |
| RA43 | 20 | Access | New Road | 590.56 | 2nd Phasing |
| RA48 | 20 | Access | New Road | 296.42 | 3rd Phasing |
| | | | Total | 7943.58 | |

Proposed Drain and Water Supply Line

At present, no drain is in this Ward. One secondary and four access drains have been proposed along the 60 feet and 30 feet width roads. Total length of those drains is 22 km. About 22 km. water supply line is being proposed for this Ward.

Development Proposal

A Ward Centre on 0.40 acres of land is being proposed. Detail is presented in the following table.

Table 14.36: Development Proposal

| Proposed facility | Landuse | Ward No. | Mouza Name | Plot No. | Phasing | Acres |
|-------------------------|--------------------|----------|------------------|-----------------|-----------------------|-------|
| Proposed Ward Center 09 | Community Facility | 9 | Lonshinha_65_01 | 335 | 1 st Phase | 0.4 |
| Proposed Eidgha | Community Facility | 9 | Lonshinha_65_01 | 45 | 3 rd Phase | 1.19 |
| Proposed Stadium | Open Space | 9 | Lonshinha_65_01 | 212-224, 238-48 | 3 rd Phase | 10.2 |
| Proposed Water Pump 01 | Utility | 9 | Lonshinha_65_05 | 4090 | 1 st Phase | 0.047 |
| Proposed Water Pump 03 | Utility | 9 | Lonshinha_65_01 | 36 | 1 st Phase | 0.028 |
| Proposed Dumping Ground | Utility | | Out Of Paurasava | | 3 rd Phase | 3.24 |

Map 14. 17: Landuse Plan for Ward No 09

Map 14.18: Proposed Road and Drainage for Ward No 09

14.4 Implementation Guidelines

Implementation of the Ward Action Plan should follow the development control procedures for determining planning applications by using simple and standard planning application procedures. A simple application will be assessed quickly against a given set of criteria, essentially consisting of the following:

- The proposed development confirms all respects mentioned in the policies of the Structure Plan and Urban Area Plan.

The usage identified in the application is being considered appropriate for inclusion in an area demarcated in the Ward Action Plan. An indicative list of uses considered appropriate is below:

- buildings are a maximum of four-storied;
- no single building or related group of buildings is 1000 sq. m. of gross floor area; and
- access and utility corridors are not impinged.

Provided that the planning application meets above criteria and the application will be approved and planning permission is given.

Planning applications that do not meet the above criteria or are considered marginal cases (to be known as an invalid simple application) will be subjected to a more detailed examination in considering standard procedure.

Following development and landuses are indicative of those appropriate in the Ward Action Plan:

- Residential development up to four-storied.
- Small-scale shops.
- Primary schools / kindergartens.
- Mosques (or other religious facilities) servicing a local area plus small graveyard if required.
- Recreational development.
- Local health facilities (clinics rather than hospital).
- Small-scale office (may be public or private) development.
- Workshops (small-scale workshops with operations only) in daylight hours and low traffic generators.
- Open space (playgrounds, parks, etc.)
- Access roads.
- Utilities; and
- Drainage channels.

When considering a standard planning application within areas zoned for Ward Action Plan, the Paurasava will need to undertake a two-stage process. First, before considering site specific issues, the Paurasava will need, on receipt of the planning application, to consider the wider context and determine issues relating to the overall area into which the application falls. The Paurasava will need to:

1. Determine the boundaries of the wider area. These will usually be formed by some distinctive natural or man-made feature, for example a khal, river or road which provides access into the area. Such areas will vary in shape and size.
2. Identify and assess the existing access and circulation arrangements of the area. Preferably, the area should be served by 10 meter access roads which run through the entire area providing access to all Wards. These access roads should be linked to local roads. If this is not the case and access roads of sufficient width, are not available, the Paurasava shall consider whether or not further development is appropriate. New development may result in increased vehicular congestion and increased demand for utility services, where this could be difficult to supply.
3. Identify the existing landuses within these boundaries. In Ward Action Plan, the predominant use will be residential but other uses will present in the vicinity of the application.

In these instances, the Paurasava will consider refusal of application or at least a delay until access and utility provision can be made. This may require acquisition of land.

4. Identify the need for community facilities (schools, clinics, religious facilities, open spaces, etc.) or plots for utility services. Do sufficient already exist or should more land be sought for increased provision to the existing population? In this latter instance, the Paurasava will again need to consider acquisition of land including the land, either in part or in full, under consideration for development.
5. Consider areas of high landscape quality in the locality which should be preserved and the potential impact of the proposed development on those areas.

If there is doubt in the mind of the Paurasava as to the answers to the above questions, the planning application will require a more detailed assessment.

Secondly, the Paurasava will need to consider issues relating to the individual site and application. These can only be determined once the overall context of the area has been established. The questions the Paurasava will need to ask are:

1. Can the proposed use of land be considered a “good neighbour”, defined in this situation as a use which can be carried out in any residential area without detriment to the amenities of the area by reason of noise, vibration, smell, fumes, smoke, soot, ash, dust or grit?

- Is the use likely to generate excessive volumes of traffic which either cannot be accommodated on the existing road system or which are likely to disturb, its neighbours?
 - Will the working hours of the use (if non-residential) cause a disturbance to residential neighbours (with working late in to the evening or night or 24-hours operations likely to cause a nuisance and therefore not being permitted)?
 - If yes to any of the above, the application should be rejected and directed to a more suitable location.
2. Is the use in conformity with the surrounding uses or with those that are compatible with a site in a predominantly residential area?
 3. Does the proposed boundary of the application impinge upon a road corridor, utility reserve or drainage channel reserve? If it does, it should be relocated outside such a reserve, even if this constitutes a reduction in the overall size of the plot. If excessive land will be lost as a result, implying that the development can no longer proceed, the application will need to be rejected.
 4. Does the application provide for adequate site access from, preferably as minimum, a 6 meter access road? Does it have sufficient on-site or off-site parking facilities to cater for the potential demand? If it does not, the plans should be amended or the application refused.
 5. Will the development destroy landscape unique to the location? If it does, its design will need to be altered to protect the landscape, or the application will need to be refused.
 6. Is the scale of development proposed in keeping with its neighbours? If too large, it should be reduced. Does it impinge up on the privacy of others? If it does, the design / layout / size should be changed. If it can not be appropriately modified, it should be refused.
 7. Will the proposed development negatively impact upon utility provision in the area i.e. will it overload the system for some reason (like high electricity demand or high water consumption)? Will pollution from the proposed activities cause a problem in the neighbourhood? If this is likely to occur, the application should be refused.

If the application is for a major development, have the utility authorities being contacted to give their assessment and approval for the infrastructure works that will be required?

Given the existing situation in some of the Ward Action Plan, where for example, access is already poor or there is insufficient space available to provide adequate infrastructure, the Paurasava will aim to ensure that its decision will not make the situation worse.

The Paurasava will need to process each application within one month, at the end of which time they will either need to:

- approve the application unconditionally;

- approve the application subject to a number of conditions; or
- refuse the application.

14.5 Concluding Remarks

14.5.1 Introduction

The Master Plan is prepared for managing and promoting development over medium terms following the broad guidelines set by the longer term Structure Plan. It shows the structure of sub-system in space over the medium term and identifies broad programs of direct action especially related to infrastructural development, institutional issues as well as broad financing strategies. The plan also outlines more specific Ward-wise development policies to guide development over the medium terms. One major objective of preparing Master Plan is the consolidation of development activities by various agencies in areas that have strongest potential for growth in the medium term and can accommodate anticipated volume of growth. Other purpose of preparing Master Plan is to facilitate the development control function. It shows the broad land use zones on a more detailed scale of maps as derived from Structure Plan. The plan provides details of land use zoning and building controls, the development control function becomes easier to implement with a Master Plan. It also shows land reservations required for essential uses and major infrastructure development.

14.5.2 Comparative Advantage of Master Plan

Comparative advantages of Master Plan rather than Ward Action Plan are:

- The term Master Plan deserves wider sense than the term Ward Action Plan. Policies and strategies are being prescribed in the Master Plan based on the existing trend of development and growth potentiality. The Ward Action Plan only emphasizes on those components immediate action is being necessary.
- The Master Plan is for the Paurasava as a whole but the Ward Action Plan is only for individual Ward. All studies relevant and guided by the ToR is being followed for the preparation of Master Plan at first and based on those studies and findings the Ward Action Plan is being designed.
- The Ward Action Plan is mostly relevant with the implementation criteria; it is called the implementation of Master Plan. The micro-component which is going to be implemented according to the Ward Action Plan is guided by the Master Plan. Therefore, any problem arises during the implementation phase of Ward Action Plan will be resolved through the guideline prescribed in the Master Plan.

14.5.3 Addressing Proposals for Mitigation of Identified Issues

- For improvement, construction and re-construction of local roads, bridge and culvert and box culvert, a close coordination among the authorities named Paurasava, LGED, PDB, REB and WDB will be maintained. This coordination is necessary from the preparation of budget to implementation of the component.

- In plan implementation phase, people's participation will be encouraged. The process as prescribed in the Structure Plan will be initiated for this purpose.
- A buffer will be needed for every important development especially for housing area, stadium and Bus terminal.

In preparing the proposed construction program priorities have been assigned to the works mostly in the various drainage areas taking the following factors into account:

- the severity of flooding in terms of depth, duration and frequency;
- the views of Paurasava officials on the relative needs of different areas;
- The engineering relationship of the proposed phase of construction to the preceding and subsequent phases;
- the estimated time required to execute the proposed works having regard to the capacity and capability of contractors and the availability of materials;
- the estimated amount of the capital investment required.

In general, aim should be to implement the Master Plan at a continuous steady rate throughout the 20 years period and based upon the above considerations, the works have been grouped broadly into four main stages:

- The first stage accords priority to improve the Traffic Management and alleviation of flooding in the central area of the Paurasava.
- The second stage in general covers less densely developed areas with the improvement of transport services.
- The third stage covers drainage congestion areas for improvement.
- The fourth stage will be the rain water harvesting for supplying drinking water to the Paurasava dwellers when scarcity will be generated.

14.5.4 Conclusion

To ensure that the procedures are being followed, the Paurasava will need to monitor the situation. This monitoring is required to ensure that:

- no illegal development is taking place i.e. no-one is attempting to develop without submitting an application; and
- approved developments are built in accordance with the approved plans.
- development will take places according to the Master Plan.

ANNEXURE A: Paurashava Gazette

ANNEXURE B: Proposed Land Use Categories and Permitted Use

a. Urban Residential Land Use

Land Use Permitted

The following uses in the tables are proposed to be applicable for this zone only.

Table B.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 |

| Permitted Urban Residential Uses |
|---|
| 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 B.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 |

| Conditionally Permitted Urban Residential Uses |
|---|
| 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 B.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 |
| 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 B.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 B.5: Land Use Permitted

| Permitted Commercial Activity |
|--|
| Accounting, Auditing or Bookkeeping Services |
| Billboards, Advertisements & Advertising Structure |

| Permitted Commercial Activity |
|--|
| 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) |
| 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 |

| Permitted Commercial Activity |
|---|
| 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 B.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 |
| 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 B.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 Farming |
| 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. B.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 B.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 |
| 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 |

| Permitted uses in Mixed Use Zone |
|--|
| 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 |
| 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 B.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 |
| 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 |

| Conditionally permitted uses in Mixed Use Zone |
|--|
| 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 B.13: Land Use Permitted

| Permitted uses under Education & Research Zone |
|---|
| Addiction Treatment Center |
| 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 |

| Permitted uses under Education & Research Zone |
|---|
| 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 B.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 |

| Conditionally permitted uses under Education and Research Zone |
|---|
| 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 B.15: Land Use Permitted

| Permitted uses under Government Office Zone |
|--|
| Accounting, Auditing or Bookkeeping Services |
| Billboards, Advertisements & Advertising Structure |
| Confectionery Shop |
| 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 |

| Permitted uses under Government Office Zone |
|--|
| 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 B.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 |
| 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 B.17: Land Use Permitted

| Permitted uses under Agricultural Zone |
|---|
| Food Grain Cultivation |
| Vegetable Cultivation |
| Cash Crop Cultivation |
| Horticulture |
| Arboriculture |
| Dairy Farming |
| Deep Tube Well |
| Shallow Tube Well |
| Irrigation Facilities (Irrigation Canal, Culvert, Flood Wall etc) |
| Temporary Structure (Agricultural) |
| Animal Shelter |
| Duckery |
| Aquatic Recreation Facility (Without 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 B.18: 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 B.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 |
| Zoo |
| Roadside Parking |
| Social Forestry |
| Memorial Structure |

Source: Compiled by the Consultants

Landuse Conditionally Permitted

Table B.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 B.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 B.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 perm

**ANNEXURE C:
Resolution of Final Consultation Meeting and Attendance List.**

ANNEXURE D:

List of proposed new roads

| Road Id | Width (ft) | Road Type | Length (m) | Phase |
|-------------|------------|-----------|------------|-------------|
| RS13 | 40 | Secondary | 2744.2 | 2nd Phasing |
| RS40 | 40 | Secondary | 2280.2 | 1st Phasing |
| Total | | | 5024.4 | |
| RT20 | 30 | Tertiary | 361.6 | 3rd Phasing |
| RT33 | 30 | Tertiary | 536.1 | 3rd Phasing |
| RT34 | 30 | Tertiary | 531.9 | 3rd Phasing |
| RT39 | 30 | Tertiary | 1431.8 | 1st Phasing |
| RT42 | 30 | Tertiary | 632.2 | 2nd Phasing |
| RT53 | 30 | Tertiary | 1423.0 | 2nd Phasing |
| RT1 | 30 | Tertiary | 500.1 | 1st Phasing |
| Total | | | 5416.6 | |
| RA18 | 20 | Access | 1420.1 | 1st Phasing |
| RA30 | 20 | Access | 391.9 | 3rd Phasing |
| RA31 | 20 | Access | 537.3 | 3rd Phasing |
| RA43 | 20 | Access | 864.4 | 2nd Phasing |
| RA48 | 20 | Access | 565.4 | 3rd Phasing |
| RA55 | 20 | Access | 652.6 | 3rd Phasing |
| Total | | | 4431.8 | |
| Gross Total | | | 14872.7 | |

List of proposed Widening roads

| Road Id | Width (ft) | Road Type | Length (m) | Phase |
|---------|------------|-----------|------------|-------------|
| RA2 | 80 | Primary | 6081.409 | 1st Phasing |
| Total | | | 6081.409 | |
| RS3 | 40 | Secondary | 3255.615 | 1st Phasing |
| RS4 | 40 | Secondary | 3414.765 | 1st Phasing |
| RS10 | 40 | Secondary | 1288.220 | 2nd Phasing |
| RS14 | 40 | Secondary | 1241.024 | 3rd Phasing |
| RS16 | 40 | Secondary | 2644.249 | 1st Phasing |
| RS19 | 40 | Secondary | 1924.888 | 2nd Phasing |
| RS24 | 40 | Secondary | 1193.403 | 3rd Phasing |
| RS32 | 40 | Secondary | 869.475 | 3rd Phasing |
| RS47 | 40 | Secondary | 531.067 | 3rd Phasing |
| RS1 | 40 | Secondary | 2093.395 | 1st Phasing |
| RT5 | 30 | Tertiary | 501.565 | 3rd Phasing |
| RT6 | 30 | Tertiary | 395.046 | 3rd Phasing |
| RT7 | 30 | Tertiary | 247.172 | 3rd Phasing |
| RT8 | 30 | Tertiary | 419.652 | 3rd Phasing |
| RT9 | 30 | Tertiary | 1345.053 | 2nd Phasing |
| RT15 | 30 | Tertiary | 810.285 | 3rd Phasing |
| RT17 | 30 | Tertiary | 1743.951 | 3rd Phasing |
| RT21 | 30 | Tertiary | 583.791 | 3rd Phasing |
| RT22 | 30 | Tertiary | 360.275 | 3rd Phasing |
| RT23 | 30 | Tertiary | 555.855 | 2nd Phasing |
| RT26 | 30 | Tertiary | 1276.210 | 1st Phasing |
| RT36 | 30 | Tertiary | 2157.774 | 3rd Phasing |
| RT37 | 30 | Tertiary | 546.955 | 3rd Phasing |
| RT38 | 30 | Tertiary | 462.489 | 3rd Phasing |
| RT49 | 30 | Tertiary | 602.920 | 2nd Phasing |
| RT52 | 30 | Tertiary | 634.582 | 2nd Phasing |
| Total | | | 31099.676 | |
| RA11 | 20 | Access | 669.582 | 3rd Phasing |
| RA12 | 20 | Access | 299.101 | 3rd Phasing |

| Road Id | Width (ft) | Road Type | Length (m) | Phase |
|-------------|------------|-----------|------------|-------------|
| RA25 | 20 | Access | 448.384 | 3rd Phasing |
| RA27 | 20 | Access | 385.870 | 3rd Phasing |
| RA28 | 20 | Access | 131.708 | 3rd Phasing |
| RA29 | 20 | Access | 152.262 | 3rd Phasing |
| RA35 | 20 | Access | 521.160 | 3rd Phasing |
| RA41 | 20 | Access | 530.670 | 3rd Phasing |
| RA50 | 20 | Access | 422.094 | 3rd Phasing |
| RA51 | 20 | Access | 575.735 | 3rd Phasing |
| RA54 | 20 | Access | 476.290 | 3rd Phasing |
| Total | | | 4612.856 | |
| Gross Total | | | 41793.900 | |

ANNEXURE E: Details of Drainage Network Proposal

| Drain_Id | Drain_Type | Width (m) | Length (m) | Phase |
|----------|------------|-------------------|------------|-----------|
| PD02 | Primary | Above 3m | 2133.49 | 2nd Phase |
| PD03 | Primary | Above 3m | 2004.07 | 2nd Phase |
| PD01 | Primary | Above 3m | 1605.44 | 1st Phase |
| PD04 | Primary | Above 3m | 2874.47 | 1st Phase |
| Total | | | 8617.48 | |
| PS08 | Secondary | Within 1.5m to 3m | 1354.85 | 2nd Phase |
| PS05 | Secondary | Within 1.5m to 3m | 2967.64 | 3rd Phase |
| PS06 | Secondary | Within 1.5m to 3m | 1268.61 | 1st Phase |
| PS07 | Secondary | Within 1.5m to 3m | 427.12 | 1st Phase |
| Total | | | 6018.23 | |
| TD55 | Tertiary | Less 1.5m | 601.39 | 1st Phase |
| TD46 | Tertiary | Less 1.5m | 478.46 | 3rd Phase |
| TD41 | Tertiary | Less 1.5m | 574.36 | 3rd Phase |
| TD34 | Tertiary | Less 1.5m | 916.65 | 3rd Phase |
| TD31 | Tertiary | Less 1.5m | 9.60 | 3rd Phase |
| TD29 | Tertiary | Less 1.5m | 858.45 | 3rd Phase |
| TD09 | Tertiary | Less 1.5m | 94.09 | 1st Phase |
| TD10 | Tertiary | Less 1.5m | 522.63 | 3rd Phase |
| TD11 | Tertiary | Less 1.5m | 583.52 | 2nd Phase |
| TD12 | Tertiary | Less 1.5m | 121.43 | 1st Phase |
| TD13 | Tertiary | Less 1.5m | 199.03 | 3rd Phase |
| TD14 | Tertiary | Less 1.5m | 147.70 | 1st Phase |
| TD15 | Tertiary | Less 1.5m | 6.63 | 2nd Phase |
| TD16 | Tertiary | Less 1.5m | 140.70 | 3rd Phase |
| TD17 | Tertiary | Less 1.5m | 295.19 | 1st Phase |
| TD18 | Tertiary | Less 1.5m | 236.36 | 3rd Phase |
| TD19 | Tertiary | Less 1.5m | 6.10 | 2nd Phase |
| TD20 | Tertiary | Less 1.5m | 479.44 | 3rd Phase |
| TD21 | Tertiary | Less 1.5m | 603.63 | 1st Phase |
| TD22 | Tertiary | Less 1.5m | 1607.36 | 3rd Phase |
| TD23 | Tertiary | Less 1.5m | 533.09 | 3rd Phase |
| TD24 | Tertiary | Less 1.5m | 534.50 | 1st Phase |
| TD25 | Tertiary | Less 1.5m | 658.81 | 2nd Phase |
| TD26 | Tertiary | Less 1.5m | 346.38 | 3rd Phase |
| TD27 | Tertiary | Less 1.5m | 982.51 | 1st Phase |
| TD28 | Tertiary | Less 1.5m | 468.83 | 2nd Phase |
| TD56 | Tertiary | Less 1.5m | 532.29 | 2nd Phase |
| TD30 | Tertiary | Less 1.5m | 307.06 | 1st Phase |
| TD32 | Tertiary | Less 1.5m | 539.06 | 3rd Phase |
| TD33 | Tertiary | Less 1.5m | 354.42 | 1st Phase |
| TD35 | Tertiary | Less 1.5m | 936.20 | 2nd Phase |
| TD36 | Tertiary | Less 1.5m | 566.66 | 3rd Phase |
| TD37 | Tertiary | Less 1.5m | 464.29 | 1st Phase |
| TD38 | Tertiary | Less 1.5m | 506.47 | 2nd Phase |
| TD39 | Tertiary | Less 1.5m | 1072.67 | 3rd Phase |
| TD40 | Tertiary | Less 1.5m | 422.81 | 1st Phase |
| TD42 | Tertiary | Less 1.5m | 490.53 | 2nd Phase |
| TD43 | Tertiary | Less 1.5m | 466.81 | 3rd Phase |
| TD44 | Tertiary | Less 1.5m | 303.45 | 1st Phase |
| TD45 | Tertiary | Less 1.5m | 560.42 | 2nd Phase |
| TD47 | Tertiary | Less 1.5m | 506.14 | 1st Phase |

| Drain_Id | Drain_Type | Width (m) | Length (m) | Phase |
|-------------|------------|-----------|------------|-----------|
| TD48 | Tertiary | Less 1.5m | 542.50 | 3rd Phase |
| TD49 | Tertiary | Less 1.5m | 1202.67 | 2nd Phase |
| TD50 | Tertiary | Less 1.5m | 1326.19 | 1st Phase |
| TD51 | Tertiary | Less 1.5m | 153.45 | 3rd Phase |
| TD52 | Tertiary | Less 1.5m | 184.37 | 2nd Phase |
| TD53 | Tertiary | Less 1.5m | 453.41 | 1st Phase |
| TD54 | Tertiary | Less 1.5m | 581.55 | 2nd Phase |
| Total | | | 24480.25 | |
| Gross Total | | | 39115.96 | |

ANNEXURE F: Mouza Schedule of Development Proposal

| Proposed facility | Landuse | Ward No | Mouza Name | Plot No. | Phasing | Acres |
|-----------------------------|--------------------|---------|------------------|-------------------------------|-----------------------|-------|
| Proposed Market | Commercial | 01 | Naria_99_01 | 295, 301 | 1 st Phase | 0.21 |
| Total | 0.21 | | | | | |
| Proposed Shosan Ghat | Community Facility | 02 | Naria_99_01 | 65 | 1 st Phase | 0.04 |
| Proposed Graveyard 01 | Community Facility | 06 | Naria_99_02 | 1423-25 | 1 st Phase | 0.36 |
| Proposed Graveyard 02 | Community Facility | 03 | Lonshinha_65_01 | 561 | 3 rd Phase | 0.47 |
| Proposed Graveyard 03 | Community Facility | 02 | Naria_99_01 | 76,79,649 | 1 st Phase | 0.56 |
| Proposed Graveyard 04 | Community Facility | 03 | Lonshinha_65_01 | 562 | 3 rd Phase | 0.48 |
| Proposed Ward Center 01 | Community Facility | 01 | Naria_99_01 | 319,322-23,630 | 1 st Phase | 0.31 |
| Proposed Ward Center 02 | Community Facility | 02 | Naria_99_02 | 1153 | 3 rd Phase | 0.25 |
| Proposed Ward Center 03 | Community Facility | 03 | Naria_99_02 | 1579 | 2 nd Phase | 0.53 |
| Proposed Ward Center 04 | Community Facility | 04 | Naria_99_02 | 1729 | 1 st Phase | 0.55 |
| Proposed Ward Center 06 | Community Facility | 06 | Naria_99_02 | 1440 | 3 rd Phase | 0.57 |
| Proposed Ward Center 07 | Community Facility | 07 | Lonshinha_65_03 | 2003 | 1 st Phase | 0.20 |
| Proposed Ward Center 08 | Community Facility | 08 | Lonshinha_65_02 | 1768 | 3 rd Phase | 0.18 |
| Proposed Ward Center 09 | Community Facility | 09 | Lonshinha_65_01 | 335 | 1 st Phase | 0.40 |
| Proposed Eidgha | Community Facility | 09 | Lonshinha_65_01 | 45 | 3 rd Phase | 1.19 |
| Proposed Central Mosque | Community Facility | 01 | Naria_99_01 | 78,636 | 2 nd Phase | 0.31 |
| Proposed Zoo | Community Facility | 05 | Kalukati_98_00 | 28,32-3,112-12 | 1 st Phase | 1.78 |
| Total | 8.18 | | | | | |
| Proposed Library | Education | 07 | Lonshinha_65_03 | 2424 | 2 nd Phase | 0.81 |
| Proposed University | Education | 01 | Naria_99_01 | 417-31 | 3 rd Phase | 9.21 |
| Proposed High School | Education | 04 | Naria_99_02 | 2405-07,2418 | 3 rd Phase | 2.6 |
| Proposed College 01 | Education | 07 | Lonshinha_65_02 | 1297-1308 | 1 st Phase | 4.157 |
| Proposed College 02 | Education | 04 | | 628-29,634, 2412,2414,2415 | 3 rd Phase | 4.63 |
| Total | 21.407 | | | | | |
| Proposed Hospital/Clinic 01 | Health | 04 | Naria_99_02 | 2136-53 | 1 st Phase | 6.16 |
| Proposed Hospital/Clinic 02 | Health | 01 | Naria_99_01 | 373-75 | 2 nd Phase | 2.03 |
| Proposed Hospital/Clinic 03 | Health | 08 | Lonshinha_65_02 | 1156-72 | 3 rd Phase | 3.49 |
| Proposed Clinic | Health | 02 | Naria_99_02 | 1007-9 | 1 st Phase | 1.13 |
| Total | 12.81 | | | | | |
| Proposed Shishu Park | Open Space | 01 | Naria_99_01 | 295, 300-305 | 2 nd Phase | 1.13 |
| Proposed Auditorium | Open Space | 01 | Naria_99_01 | 303-305, 310 | 3 rd Phase | 0.67 |
| Proposed Park 01 | Open Space | 08 | Lonshinha_65_02 | 1413,1415, 1417 | 1 st Phase | 0.76 |
| Proposed Park 02 | Open Space | 04 | Naria_99_02 | 1675-89 | 2 nd Phase | 4.01 |
| Proposed Park 03 | Open Space | 06 | Lonshinha_65_01 | 484-90,502-08 | 3 rd Phase | 6.50 |
| Proposed Stadium | Open Space | 09 | Lonshinha_65_01 | 212-224,238-48 | 3 rd Phase | 10.2 |
| Total | 15.51 | | | | | |
| Proposed Bus Stand | Transport | 02 | Naria_99_02 | 1161 | 1 st Phase | 0.21 |
| Proposed Bus Terminal | Transport | 01 | Naria_99_01 | 416 | 1 st Phase | 1.64 |
| Proposed Truck Terminal | Transport | 01 | Naria_99_01 | 416 | 3 rd Phase | 1.63 |
| Total | 3.48 | | | | | |
| Proposed Housing Estate | Urban Residential | 01 | Naria_99_01 | 380-81 | 3 rd Phase | 0.74 |
| Total | 4.22 | | | | | |
| Proposed Dumping Ground | Utility | | Out Of Paurasava | | 3 rd Phase | 3.24 |
| Water Treatment Plant | Utility | 08 | Lonshinha_65_02 | 1911 | 2 nd Phase | 0.61 |
| Proposed Water Pump 01 | Utility | 09 | Lonshinha_65_05 | 4090 | 1 st Phase | 0.047 |
| Proposed Water Pump 02 | Utility | 07 | Lonshinha_65_03 | 2072 | 3 rd Phase | 0.037 |
| Proposed Water Pump 03 | Utility | 09 | Lonshinha_65_01 | 36 | 1 st Phase | 0.028 |
| Total | 3.96 | | | | | |
| Gross Total | 72.63 | | | | | |

ANNEXURE G: Mouza Schedule of Proposed Water Retention Pond

| Id no | Mouza Name | Plot No | Id no | Mouza Name | Plot No |
|-------|-----------------|---------|-------|-----------------|---------|
| PW2 | Lonshinha_65_03 | 2234 | | Lonshinha_65_05 | 3170 |
| PW3 | Lonshinha_65_02 | 1879 | | Naria_99_01 | 3170 |
| PW5 | Lonshinha_65_02 | 1846 | | Lonshinha_65_01 | 3405 |
| PW7 | Lonshinha_65_02 | 1849 | | Lonshinha_65_01 | 3405 |
| PW8 | Lonshinha_65_02 | 1806 | | Lonshinha_65_01 | 3405 |
| PW9 | Lonshinha_65_02 | 1805 | | Lonshinha_65_04 | 3405 |
| PW11 | Lonshinha_65_02 | 1791 | | Naria_99_01 | 3405 |
| | Lonshinha_65_02 | 1791 | PW46 | Lonshinha_65_02 | 1411 |
| PW15 | Lonshinha_65_02 | 1702 | PW47 | Lonshinha_65_02 | 1278 |
| | Lonshinha_65_03 | 1702 | PW48 | Lonshinha_65_02 | 1274 |
| | Lonshinha_65_03 | 1702 | PW52 | Lonshinha_65_02 | 1403 |
| PW16 | Lonshinha_65_02 | 1701 | PW55 | Lonshinha_65_02 | 1287 |
| PW17 | Lonshinha_65_02 | 1703 | PW57 | Lonshinha_65_02 | 1292 |
| PW19 | Lonshinha_65_02 | 1219 | PW59 | Lonshinha_65_02 | 1219 |
| | Lonshinha_65_02 | 1219 | | Lonshinha_65_02 | 1219 |
| | Lonshinha_65_02 | 1219 | PW60 | Lonshinha_65_02 | 1239 |
| | Lonshinha_65_02 | 1219 | PW61 | Lonshinha_65_02 | 1310 |
| | Lonshinha_65_02 | 1219 | | Lonshinha_65_03 | 1310 |
| | Lonshinha_65_02 | 1219 | PW62 | Lonshinha_65_02 | 1311 |
| | Lonshinha_65_02 | 1219 | PW63 | Lonshinha_65_02 | 1244 |
| | Lonshinha_65_02 | 1219 | PW64 | Lonshinha_65_02 | 1207 |
| PW20 | Lonshinha_65_02 | 1692 | PW66 | Lonshinha_65_02 | 1226 |
| PW21 | Lonshinha_65_02 | 1681 | PW67 | Lonshinha_65_02 | 1215 |
| PW22 | Lonshinha_65_02 | 1684 | PW68 | Lonshinha_65_02 | 1192 |
| PW23 | Lonshinha_65_02 | 1772 | PW69 | Lonshinha_65_01 | 373 |
| PW25 | Lonshinha_65_02 | 1572 | PW70 | Lonshinha_65_02 | 1222 |
| PW26 | Lonshinha_65_02 | 1143 | PW71 | Lonshinha_65_01 | 1219 |
| PW27 | Lonshinha_65_02 | 1015 | | Lonshinha_65_02 | 1219 |
| PW29 | Lonshinha_65_05 | 4138 | | Lonshinha_65_02 | 1219 |
| PW31 | Lonshinha_65_05 | 4136 | PW75 | Lonshinha_65_02 | 1063 |
| | Lonshinha_65_05 | 4136 | PW79 | Lonshinha_65_02 | 1381 |
| PW32 | Lonshinha_65_02 | 1440 | PW83 | Lonshinha_65_02 | 1283 |
| PW34 | Lonshinha_65_02 | 1423 | PW84 | Lonshinha_65_02 | 1391 |
| PW36 | Lonshinha_65_02 | 1109 | PW85 | Lonshinha_65_02 | 1384 |
| PW37 | Lonshinha_65_02 | 1462 | PW87 | Lonshinha_65_02 | 1348 |
| PW39 | Lonshinha_65_02 | 1101 | PW88 | Lonshinha_65_02 | 1301 |
| | Lonshinha_65_02 | 1101 | PW90 | Lonshinha_65_02 | 1389 |
| | Lonshinha_65_02 | 1101 | PW92 | Lonshinha_65_02 | 1374 |
| | Lonshinha_65_02 | 1101 | PW93 | Lonshinha_65_02 | 1690 |
| | Lonshinha_65_02 | 1101 | PW94 | Lonshinha_65_02 | 1368 |
| | Lonshinha_65_05 | 1101 | PW95 | Lonshinha_65_02 | 1187 |
| PW40 | Lonshinha_65_02 | 1085 | PW96 | Lonshinha_65_01 | 365 |
| PW42 | Lonshinha_65_01 | 3312 | PW97 | Lonshinha_65_02 | 2067 |
| | Lonshinha_65_04 | 3312 | PW99 | Lonshinha_65_02 | 1259 |
| | Lonshinha_65_05 | 3312 | PW100 | Lonshinha_65_02 | 1189 |
| | Lonshinha_65_05 | 3312 | PW102 | Lonshinha_65_02 | 1142 |
| PW43 | Lonshinha_65_05 | 4084 | PW103 | Lonshinha_65_02 | 1268 |
| PW45 | Lonshinha_65_04 | 3170 | PW104 | Lonshinha_65_02 | 1136 |
| PW45 | Lonshinha_65_04 | 3170 | PW106 | Lonshinha_65_02 | 1101 |
| | Lonshinha_65_05 | 3170 | PW107 | Lonshinha_65_01 | 343 |
| | Lonshinha_65_05 | 3170 | PW108 | Kalukati_98_00 | 293 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| PW113 | Kalukati_98_00 | 357 |
| PW114 | Kalukati_98_00 | 359 |
| PW115 | Lonshinha_65_03 | 2244 |
| PW118 | Lonshinha_65_03 | 2642 |
| PW119 | Lonshinha_65_03 | 2640 |
| PW120 | Lonshinha_65_03 | 2657 |
| PW121 | Lonshinha_65_03 | 2446 |
| PW122 | Lonshinha_65_03 | 2295 |
| | Lonshinha_65_03 | 2295 |
| | Lonshinha_65_03 | 2295 |
| PW123 | Lonshinha_65_03 | 2295 |
| PW124 | Lonshinha_65_03 | 2738 |
| PW125 | Lonshinha_65_03 | 2175 |
| PW126 | Lonshinha_65_03 | 2169 |
| PW127 | Lonshinha_65_03 | 2170 |
| PW128 | Lonshinha_65_03 | 2145 |
| PW130 | Lonshinha_65_03 | 2149 |
| PW131 | Lonshinha_65_03 | 2295 |
| | Lonshinha_65_03 | 2295 |
| | Lonshinha_65_03 | 2295 |
| | Lonshinha_65_03 | 2295 |
| PW132 | Lonshinha_65_03 | 2132 |
| PW133 | Lonshinha_65_03 | 2119 |
| PW134 | Lonshinha_65_03 | 2120 |
| PW135 | Lonshinha_65_03 | 2122 |
| PW136 | Lonshinha_65_03 | 2102 |
| PW138 | Lonshinha_65_03 | 2108 |
| PW141 | Lonshinha_65_03 | 2076 |
| PW142 | Lonshinha_65_03 | 2041 |
| PW143 | Lonshinha_65_03 | 2066 |
| PW144 | Lonshinha_65_03 | 2836 |
| PW145 | Lonshinha_65_03 | 2309 |
| PW146 | Lonshinha_65_03 | 2831 |
| PW150 | Lonshinha_65_01 | 3405 |
| PW151 | Lonshinha_65_01 | 3405 |
| | Naria_99_02 | 3405 |
| | Naria_99_02 | 3405 |
| PW152 | Naria_99_01 | 613 |
| PW153 | Lonshinha_65_01 | 490 |
| PW155 | Lonshinha_65_03 | 2453 |
| PW156 | Lonshinha_65_03 | 2452 |
| PW157 | Lonshinha_65_03 | 910 |
| PW158 | Lonshinha_65_03 | 2488 |
| PW159 | Naria_99_01 | 306 |
| PW161 | Naria_99_01 | 313 |
| PW162 | Naria_99_02 | 1294 |
| PW163 | Naria_99_02 | 1307 |
| PW164 | Naria_99_01 | 313 |
| PW165 | Naria_99_01 | 99999 |
| PW166 | Naria_99_01 | 314 |
| PW167 | Naria_99_01 | 318 |
| PW168 | Naria_99_01 | 326 |
| PW169 | Naria_99_01 | 339 |
| PW170 | Naria_99_01 | 337 |
| PW171 | Naria_99_01 | 99999 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| PW172 | Naria_99_01 | 568 |
| PW175 | Naria_99_01 | 349 |
| PW176 | Naria_99_01 | 350 |
| PW177 | Naria_99_01 | 341 |
| PW178 | Naria_99_01 | 369 |
| PW180 | Naria_99_01 | 600 |
| PW181 | Naria_99_01 | 601 |
| | Naria_99_01 | 601 |
| | Naria_99_01 | 601 |
| | Naria_99_02 | 601 |
| | Naria_99_02 | 601 |
| PW182 | Naria_99_01 | 358 |
| PW184 | Naria_99_01 | 1317 |
| PW185 | Naria_99_02 | 1329 |
| PW186 | Naria_99_01 | 605 |
| PW187 | Naria_99_01 | 1317 |
| PW188 | Naria_99_02 | 1388 |
| PW189 | Naria_99_02 | 1323 |
| PW190 | Naria_99_01 | 320 |
| PW191 | Naria_99_01 | 611 |
| PW192 | Naria_99_02 | 99999 |
| PW193 | Naria_99_02 | 99999 |
| PW194 | Naria_99_02 | 1339 |
| PW195 | Naria_99_02 | 1356 |
| PW196 | Lonshinha_65_01 | 625 |
| | Naria_99_01 | 625 |
| PW198 | Lonshinha_65_03 | 2117 |
| PW199 | Lonshinha_65_03 | 2127 |
| PW202 | Lonshinha_65_03 | 2424 |
| PW205 | Lonshinha_65_03 | 2401 |
| PW206 | Lonshinha_65_03 | 2381 |
| PW208 | Lonshinha_65_03 | 2376 |
| PW209 | Lonshinha_65_03 | 2059 |
| PW210 | Lonshinha_65_03 | 2376 |
| PW212 | Lonshinha_65_03 | 2087 |
| PW213 | Lonshinha_65_03 | 2090 |
| PW215 | Lonshinha_65_03 | 2343 |
| PW216 | Lonshinha_65_03 | 2341 |
| PW218 | Lonshinha_65_03 | 2351 |
| PW219 | Lonshinha_65_03 | 2338 |
| PW221 | Lonshinha_65_03 | 2101 |
| PW222 | Lonshinha_65_03 | 2126 |
| PW223 | Lonshinha_65_03 | 2374 |
| PW225 | Lonshinha_65_03 | 2825 |
| PW227 | Lonshinha_65_03 | 2440 |
| PW228 | Lonshinha_65_03 | 2603 |
| PW230 | Lonshinha_65_03 | 2462 |
| | Lonshinha_65_01 | 2464 |
| | Lonshinha_65_01 | 2464 |
| | Lonshinha_65_01 | 2464 |
| | Lonshinha_65_03 | 2464 |
| | Lonshinha_65_03 | 2464 |
| PW231 | Lonshinha_65_03 | 2491 |
| PW234 | Kalukati_98_00 | 2496 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| PW235 | Kalukati_98_00 | 275 |
| PW237 | Kalukati_98_00 | 218 |
| PW238 | Kalukati_98_00 | 255 |
| | Lonshinha_65_03 | 255 |
| PW239 | Kalukati_98_00 | 253 |
| | Lonshinha_65_01 | 253 |
| PW240 | Kalukati_98_00 | 252 |
| PW241 | Lonshinha_65_03 | 2486 |
| PW246 | Lonshinha_65_01 | 45 |
| PW250 | Lonshinha_65_01 | 448 |
| PW253 | Lonshinha_65_01 | 418 |
| PW255 | Lonshinha_65_01 | 413 |
| PW256 | Lonshinha_65_01 | 3405 |
| | Lonshinha_65_01 | 3405 |
| PW257 | Lonshinha_65_01 | 402 |
| PW258 | Lonshinha_65_01 | 391 |
| PW259 | Lonshinha_65_01 | 395 |
| PW260 | Lonshinha_65_01 | 421 |
| PW261 | Lonshinha_65_01 | 387 |
| PW262 | Lonshinha_65_01 | 376 |
| PW263 | Lonshinha_65_01 | 367 |
| PW265 | Naria_99_01 | 1095 |
| | Naria_99_02 | 1095 |
| PW267 | Naria_99_01 | 65 |
| PW268 | Naria_99_01 | 306 |
| PW269 | Naria_99_02 | 1097 |
| PW270 | Naria_99_02 | 1093 |
| PW273 | Naria_99_02 | 1120 |
| PW274 | Naria_99_01 | 200 |
| PW276 | Naria_99_01 | 133 |
| PW278 | Naria_99_01 | 652 |
| PW280 | Naria_99_02 | 1291 |
| PW282 | Naria_99_01 | 261 |
| PW283 | Naria_99_01 | 304 |
| PW284 | Naria_99_01 | 296 |
| PW285 | Naria_99_01 | 300 |
| PW286 | Naria_99_01 | 272 |
| PW288 | Naria_99_02 | 99999 |
| PW291 | Naria_99_02 | 1261 |
| PW292 | Naria_99_02 | 99999 |
| PW293 | Naria_99_02 | 1143 |
| PW294 | Naria_99_02 | 1256 |
| PW295 | Naria_99_02 | 99999 |
| PW296 | Naria_99_02 | 1247 |
| PW298 | Naria_99_02 | 1203 |
| PW300 | Naria_99_02 | 1538 |
| PW301 | Naria_99_02 | 1554 |
| PW302 | Naria_99_02 | 1557 |
| PW303 | Naria_99_02 | 1646 |
| PW304 | Naria_99_02 | 1595 |
| PW307 | Naria_99_02 | 1067 |
| PW308 | Naria_99_02 | 1090 |
| PW312 | Naria_99_02 | 1151 |
| PW313 | Naria_99_02 | 1088 |
| PW314 | Naria_99_02 | 1158 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| PW315 | Naria_99_02 | 1174 |
| PW317 | Naria_99_02 | 1251 |
| PW320 | Naria_99_02 | 1162 |
| PW321 | Naria_99_02 | 1042 |
| PW322 | Naria_99_02 | 1193 |
| PW324 | Naria_99_02 | 1708 |
| PW325 | Naria_99_02 | 1694 |
| PW327 | Naria_99_02 | 1004 |
| PW338 | Naria_99_02 | 2192 |
| PW339 | Naria_99_02 | 2343 |
| PW341 | Naria_99_02 | 2225 |
| PW342 | Naria_99_02 | 2322 |
| PW343 | Naria_99_02 | 1915 |
| PW346 | Naria_99_02 | 2161 |
| PW350 | Naria_99_02 | 1814 |
| PW351 | Naria_99_02 | 1832 |
| PW354 | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1187 |
| | Naria_99_02 | 1187 |
| | Naria_99_02 | 1187 |
| PW355 | Naria_99_02 | 1634 |
| PW357 | Naria_99_02 | 1689 |
| PW358 | Naria_99_02 | 1650 |
| PW361 | Naria_99_02 | 99999 |
| PW362 | Naria_99_02 | 1779 |
| PW366 | Naria_99_02 | 2062 |
| PW373 | Naria_99_01 | 391 |
| PW376 | Naria_99_01 | 402 |
| PW379 | Naria_99_01 | 73 |
| PW383 | Naria_99_01 | 631 |
| PW386 | Lonshinha_65_01 | 630 |
| PW388 | Lonshinha_65_01 | 627 |
| PW389 | Lonshinha_65_01 | 545 |
| PW390 | Lonshinha_65_01 | 0 |
| PW392 | Lonshinha_65_01 | 0 |
| PW393 | Lonshinha_65_01 | 560 |
| PW394 | Lonshinha_65_01 | 0 |
| PW396 | Naria_99_02 | 1532 |
| PW397 | Naria_99_02 | 1528 |
| PW399 | Naria_99_02 | 99999 |
| PW400 | Naria_99_02 | 1432 |
| PW401 | Naria_99_02 | 1416 |
| PW402 | Naria_99_02 | 1422 |
| PW403 | Naria_99_02 | 1270 |
| PW405 | Naria_99_02 | 1304 |
| PW407 | Naria_99_02 | 2529 |
| PW410 | Lonshinha_65_01 | 554 |
| PW412 | Naria_99_02 | 1465 |
| PW413 | Naria_99_02 | 1471 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| PW415 | Naria_99_02 | 1463 |
| PW416 | Naria_99_02 | 99999 |
| PW418 | Naria_99_02 | 99999 |
| PW419 | Lonshinha_65_01 | 0 |
| PW420 | Lonshinha_65_01 | 0 |
| PW421 | Lonshinha_65_01 | 1245 |
| PW422 | Kalukati_98_00 | 210 |
| PW423 | Kalukati_98_00 | 58 |
| PW427 | Naria_99_02 | 2575 |
| PW428 | Naria_99_02 | 52 |
| PW429 | Naria_99_02 | 2574 |
| PW430 | Naria_99_02 | 2573 |
| PW432 | Naria_99_02 | 2499 |
| PW433 | Naria_99_02 | 2571 |
| PW435 | Lonshinha_65_01 | 1245 |
| | Lonshinha_65_01 | 1245 |
| | Naria_99_02 | 1245 |
| | Naria_99_02 | 1245 |
| | Naria_99_02 | 1245 |
| | Naria_99_02 | 1245 |
| | Naria_99_02 | 1245 |
| | Naria_99_02 | 1809 |
| | Naria_99_02 | 1809 |
| | Naria_99_02 | 1809 |
| | Naria_99_02 | 1809 |
| | Naria_99_02 | 1809 |
| | Naria_99_02 | 1809 |
| | Naria_99_02 | 1809 |
| PW436 | Naria_99_02 | 2288 |
| PW437 | Kalukati_98_00 | 2442 |
| PW437 | Naria_99_02 | 2442 |
| PW438 | Kalukati_98_00 | 143 |
| PW439 | Kalukati_98_00 | 116 |
| PW442 | Kalukati_98_00 | 32 |
| PW446 | Kalukati_98_00 | 389 |
| PW450 | Kalukati_98_00 | 383 |
| PW454 | Kalukati_98_00 | 410 |
| PW458 | Kalukati_98_00 | 173 |
| PW462 | Kalukati_98_00 | 147 |
| PW463 | Kalukati_98_00 | 152 |
| | Kalukati_98_00 | 152 |
| | Kalukati_98_00 | 152 |
| | Kalukati_98_00 | 152 |
| | Kalukati_98_00 | 152 |
| PW464 | Kalukati_98_00 | 152 |
| | Kalukati_98_00 | 152 |
| PW465 | Kalukati_98_00 | 152 |
| PW466 | Lonshinha_65_04 | 3223 |
| PW469 | Lonshinha_65_01 | 304 |
| PW471 | Lonshinha_65_04 | 3220 |
| PW473 | Lonshinha_65_01 | 292 |
| PW474 | Lonshinha_65_01 | 313 |
| PW479 | Lonshinha_65_01 | 729 |
| PW480 | Lonshinha_65_01 | 726 |
| PW481 | Lonshinha_65_01 | 952 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| PW482 | Lonshinha_65_01 | 692 |
| PW483 | Lonshinha_65_01 | 731 |
| PW484 | Lonshinha_65_01 | 681 |
| PW486 | Lonshinha_65_01 | 848 |
| PW487 | Lonshinha_65_01 | 871 |
| PW489 | Lonshinha_65_01 | 839 |
| PW492 | Lonshinha_65_01 | 738 |
| PW493 | Lonshinha_65_01 | 737 |
| PW494 | Lonshinha_65_01 | 830 |
| PW495 | Lonshinha_65_01 | 825 |
| PW497 | Lonshinha_65_01 | 822 |
| PW498 | Lonshinha_65_01 | 877 |
| PW499 | Lonshinha_65_01 | 899 |
| PW500 | Lonshinha_65_01 | 928 |
| PW501 | Lonshinha_65_01 | 801 |
| PW502 | Lonshinha_65_01 | 807 |
| PW504 | Lonshinha_65_01 | 898 |
| PW505 | Lonshinha_65_01 | 816 |
| PW507 | Lonshinha_65_01 | 795 |
| PW509 | Lonshinha_65_01 | 809 |
| PW511 | Lonshinha_65_03 | 2413 |
| PW513 | Lonshinha_65_03 | 2016 |
| PW514 | Lonshinha_65_03 | 2046 |
| PW515 | Lonshinha_65_03 | 2043 |
| PW519 | Lonshinha_65_01 | 792 |
| PW521 | Lonshinha_65_01 | 787 |
| PW523 | Lonshinha_65_01 | 756 |
| PW524 | Lonshinha_65_01 | 750 |
| PW526 | Lonshinha_65_01 | 771 |
| PW530 | Lonshinha_65_01 | 758 |
| PW531 | Lonshinha_65_01 | 720 |
| PW533 | Lonshinha_65_01 | 939 |
| PW534 | Lonshinha_65_03 | 2017 |
| PW535 | Lonshinha_65_03 | 2384 |
| PW538 | Lonshinha_65_01 | 732 |
| PW539 | Mulpara_13_04 | 4243 |
| PW539 | Naria_99_01 | 4243 |
| PW540 | Lonshinha_65_01 | 3405 |
| PW541 | Lonshinha_65_01 | 929 |
| PW542 | Lonshinha_65_03 | 2024 |
| | Lonshinha_65_03 | 2034 |
| | Lonshinha_65_03 | 2402 |
| | Lonshinha_65_01 | 2415 |
| | Lonshinha_65_03 | 2415 |
| PW544 | Lonshinha_65_01 | 689 |
| PW545 | Lonshinha_65_01 | 734 |
| PW547 | Lonshinha_65_03 | 2509 |
| PW548 | Kalukati_98_00 | 478 |
| PW550 | Naria_99_01 | 99 |
| PW551 | Naria_99_01 | 306 |
| PW552 | Lonshinha_65_04 | 3058 |
| PW553 | Lonshinha_65_04 | 3052 |
| PW554 | Lonshinha_65_04 | 3069 |
| PW556 | Lonshinha_65_04 | 3121 |
| PW557 | Lonshinha_65_04 | 3115 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| PW563 | Lonshinha_65_03 | 2360 |
| PW564 | Kalukati_98_00 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| | Naria_99_02 | 1739 |
| PW45 | Lonshinha_65_01 | 3405 |
| PW150 | Lonshinha_65_01 | 3405 |
| PW45 | Lonshinha_65_04 | 3170 |
| | Lonshinha_65_04 | 3029 |
| PW142 | Lonshinha_65_03 | 2041 |
| PW542 | Lonshinha_65_03 | 2041 |
| PW237 | Kalukati_98_00 | 218 |
| | Kalukati_98_00 | 218 |
| PW354 | Naria_99_02 | 1739 |

| Id no | Mouza Name | Plot No |
|-------|-----------------|---------|
| | Naria_99_02 | 1761 |
| PW435 | Naria_99_02 | 85 |
| | Naria_99_02 | 1809 |
| PW539 | Naria_99_01 | 4243 |
| | Naria_99_01 | 124 |
| PW564 | Naria_99_02 | 1739 |
| | Naria_99_02 | 85 |
| PW31 | Lonshinha_65_05 | 1101 |
| | Lonshinha_65_05 | 4136 |
| PW39 | Lonshinha_65_05 | 1101 |
| | Lonshinha_65_05 | 4136 |
| PW96 | Lonshinha_65_01 | 365 |
| | Lonshinha_65_01 | 367 |
| PW263 | Lonshinha_65_01 | 365 |
| | Lonshinha_65_01 | 367 |