URBAN DEVELOPMENT DIRECTORATE (UDD)
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

DRAFT SURVEY REPORT

Package 1:

Establishment of BM Pillars, Physical Features, Land use and Topographical Survey under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco Tourism, (PKCP)"

CONSULTANTS

GEOMARK LTD.
House –33(1st Floor), Road –12,
Pisciculture Housing Society, Mohammadpur, Dhaka-1207

URBAN DEVELOPMENT DIRECTORATE (UDD)

Government of the People's Republic of Bangladesh

Draft Survey Report

on

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Submitted to

SHARIF MOHAMMAD TARIKUZZAMAN

Project Director, PKCP

Urban Development Directorate (UDD)

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Submitted by

GEOMARK LTD.
House –33(1st Floor), Road –12
Pisciculture Housing Society
Mohammadpur, Dhaka-1207
Tel: 8190464

Mobile: 01716291050

E-mail: geomarkbd@gmail.com,

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Chapter 1

1 Introduction

1.1 Background

Physical planning comprises of spatial arrangement relating to physical resources to achieve functional efficiency, public safety and aesthetic quality. Physical/structure planning is primarily concerned with good management and development of land. Strategic Planning provides the mechanism for making comprehensive decision about the use of land and resources. It is an approach that intertwines all segments related to social, economic, physical and environmental dimensions. Many countries, like third world countries have rapidly urbanized and developed in an unplanned manner. Many continue to do so in an unprecedented rate. This has generated the conversion of forest lands, agricultural lands, wetlands, and aquifer recharge areas to industrial and urban uses. This trend has enormous impacts on productive agricultural lands and ecological resources and ecosystems. Industrial and urban development has likewise led to the segregation of land uses, e.g. separation of residential houses, shopping centers, and employment centers. Such land use development patterns have impacts on energy and resource consumption, which have turned out to be unsustainable for humanity, i.e. emergence of global warming and climate change.

Impacts due to unplanned and unsustainable land use development patterns have increased the risks to natural hazards. Vegetation and forest clearance, soil erosion, saline soils and decreasing water tables resulting from unsustainable land uses have brought more droughts, flooding, and landslides. Locations of houses and infrastructures in hazard prone areas have led to unthinkable deaths as well as resource degradation. It could be seen that land reservations such as river deltas, wetlands, coastal marshes, and coastal reservations had been developed for human settlements, making people extensively exposed to natural disasters. It is this link between development and disasters, i.e. development increasing vulnerability, which is consideration of disaster risks has to systematically become part of land use planning. UN Habitat suggests that land use planning is perhaps the most fundamental tool for reducing disaster risk especially when accompanied by political support and resource commitment. It is essential that national governments recognize the vulnerability of populations with respect to the physical environment, especially with regard to land, water, and natural resources. The integration of DRR in the land use

planning process is vital in ensuring that development would reduce vulnerability to environmental and natural disasters.

For this reason, the follow dimensions have been introduced into land use planning for the first time in Bangladesh

- Geo-morphological structure
- PRA (participatory rapid appraisal)
- 3-D (Three Dynamics) GIS Survey
- Social dynamics of social Space
- Historical pattern of spatial Transformation

1.2 Regional Setting

Galachipa & Rangabali Upazila (Patuakhali district) area 925.1 sq. km., located in between 21°48' and 22°21' north latitudes and in between 90°15' and 90°37' east longitudes.

1.3 Objectives

The objective of the project is to optimize resources and activities for sustenance of marginal people. The activities and resources are very important to the economy and life of the people of Bangladesh whose living conditions are inextricably linked to the productivity and sustainability of the region. There is no long-term Holistic Development Plan for the Project area. Coastal zone needs to be integrated with the mainstream of development process of the country. So, an interdisciplinary development planning approach is urgent to optimize livelihood of the region. The Physical development planning problems, needing attention, are as follows:

I. To integrate ecology, economy and social resources with the mainstream of development process of the country
II. To frame policies for the best use of land and its control for the Galachipa & Rangabali Upazila.
III. To optimize environment for sustenance of people.
IV. Formulation of Policies and plans for mitigation of different types of hazards, minimizing the adverse impacts of climate change and recommend possible adaptation strategies for the region.
V. Formulation of Policies and plans for gradual nucleation of settlements with policies and plans for development of growth centers of the area.

VI. Formulation of a guideline for development of tourism in Galachipa & Rangabali Upazila, and also to accommodate future changes in existing land use pattern, socio-economic condition of the area and quality of life of the people.

1.4 Scope of Services and Activities

The scope of service and activities to prepare a land use development plan relating to the project

Package-1: Establishment of BM Pillars, Physical Features, Landuse and Topographical Survey under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco Tourism, (PKCP)" are prescribed in the following according to the ToR:

1.4.1 Scope of Services

Under the scope of service, the detailed task has been categorized into three broad categories a) Mouza Map Processing, editing and Printing b) Preparation of base map through satellite image and mouza map and c) Attribute data collection, database development and report preparation. Under broad categories the detail tasks have to be accomplished of this project are described below-

Mouza Map Collection

i. Collection of Mouza Maps

Available mouza base map shall be collected from PMO of UDD

ii. Base Maps and Demarcation of Study Area

Collected base map has been done using ArcGIS software. Afterward all Geo-referencing mouza sheets has been joined and Mouza map has been prepared using ArcGIS. The geo-referenced mouza maps has been prepared in original mouza scale. This map lay out has been submitted to Project Director (PD) in hard and soft format.

Study area has been demarcated by joint team, duly approved and signed by Project Director (PD) which has been considered as project area. While joining mouza maps, edge matching shall be performed in consultation with the PD.

iii. Preparation of GIS Map Layout

A standard map layout has been developed with consultation of Project Director (PD). Scale, Paper size and Grid for preparation of map lay out has been prepared as specified by the PD. Legend for features in the map has been selected from the available symbol palettes in ArcGIS has been used to develop a standard layout. BBS geo-code may be used for administrative unit.

b) Preparation of Base Map through Satellite image and Mouza Map

i. Map Projection Systems

The Maps has been projected in BTM coordinates. Survey Firm has been needed to collect the appropriate parameters and implement it during the map projections.

ii. Satellite Image Collection

Satellite image and data has been collected from UDD with necessary Georeferencing and ground trothing.

iii. Base Map Preparation

Base has been prepared using the data extracted from satellite image and mouza data.

c. Attribute Data Collection, Database Development and Report Preparation

i. Map Printing at Proper Scale

After completing the survey and all the GIS processing, the Maps has to be printed by the survey firm. Maps would be printed at the scale 1:990 with proper annotations, titles and legend. The color grading and symbols for the map layout should be in accordance with the standards of the Client.

ii. Attribute Data Base of the Digitized Mouza Map

We will submit all attribute data of all the features in the mouza map including individual plot number that would be generated from the spatial database.

iii. Survey Report

After completing all the surveys, a survey report including both spatial and attribute database has to be submitted by the Survey Firm along with its progress report.

iv. Institutional Arrangement

The client will form a committee to communicate, monitor and check the tasks accomplished by the Survey Firm.

v. Team Composition

The Survey Firm will form a highly qualified team to accomplish the tasks as specified in the ToR. Adequate personnel and technical capabilities for providing training on the above-mentioned tasks.

vi. Construction and Establishment of Bench Mark (BM)/Ground Control Point (GCP)

Pillars covering the project area including approximately 5 km. grid in rural area (pillar 10"X10", Base 3'X 3', height 5'). RCC pillars are to be constructed marking unique identification number Coordinate X, Y of these pillars along with Z value is to be marked on base map for future reference.

vii. Physical Feature Surveys

Physical feature survey will have to be conducted for the whole of project (rural or rural-urban fringe) area. Location and dimension (X, Y, Z value) of all existing structures including building type, height, floor type and use of each floor, year of construction/ age, collection of household population data, Ownership of the building and to transfer the data compatible to cohort population forecast, homestead boundary, homestead area, cropping pattern, cropping intensity, location of riser of gas of each household, location of well, tube well, pond, tap water etc., toilet with sewerage facility, safety tank and open drain etc. all water control structures including khal (natural and man-made), cross section of water bodies specially khal with one feet interval and existing routes/ roads, embankments, dykes, box culvert, sluice gate etc., vegetation cover, culmination between flood Plain and homestead, ground water harvesting devise, river ghat/ganj, railway station and railway line, all type of roads, location of all existing exposed light/electric, telephone posts and national electric grid/towers/transformer, gas, water, sewerage line etc.

viii. Topographic Survey

The Topographic database shall be obtained from geo-referenced 3-D (four band) image and further cross-checked and ground truthing by using RTK-GPS and Total Station to obtain and verify 3-D data (X, Y, Z value) on location and alignment of all data obtained from physical feature survey including roads, flood embankments and other drainage divides. Location and alignment of all drainage and irrigation channels/canals showing depth and direction of flow. Closed boundary/outline of homestead, water bodies, swamps, forest etc. junctions, spot heights or land levels at roughly 10/5 m intervals for the Plain area, 1 m hill area, appropriate interval for sea area and close interval as and when required such as dyke, embankment, roads, rail-roads, river bank, rail line etc.

ix. Other Surveys and Studies

a. Survey of Development Activities: Site plan, land acquisition plans of new development projects shall have to be collected and presented in the map of RF 1: 990.

b. Population Studies: The population statistic shall have to be collected from all possible sources, such as:

(a) Census. (b) Municipal Record,

Analysis of existing population should bring out the following characteristics—

(i) Male/Female ratio, (ii) Age-sex pyramid, (iii) Reasons for population growth/decline (Birth rates, Death rates, Immigration, emigration)/extension of Municipal boundary, etc and

(iv) General economic conditions of the people.

c. Road Surveys: In this survey detail of existing roads like type and condition of pavement, existing width and possibility for future extension should be studied and presented with appropriate explanatory notes. Road survey would include hierarchy, network and circulation pattern. Open space, relationships, etc.

d. Water Supply:

(a) Source and extend of existing supplies shall have to be recorded on maps and its future program of expansion should be shown side by side in different colours.

(b) The capacity and system of water supply and future program of expansion from municipality or public Health Engineering Department or any other appropriate agency.

e. Power Supply:

(a.) Capacity of the existing power supply sources and probable future expansion shall have to be presented in appropriate maps.

(b) Existing supply lines and the future probable lines should be presented on the same map side by side preferably in different colours.

f. Telephone Service:

(a) Types of Telephones Exchange and future program.

(b) Existing Communication lines and future probable expansion shall be shown side by side.

g. Growth of the Town: Historical background with graphic materials on the existing Municipal area along with proposal for future expansion should be collected and presented with detail information.

h. Shopping: Shops and Commercial establishments differentiated into wholesale and retail shopping should be recorded. Growth or decline of shopping during the last 10 years should be collected and presented with explanatory notes on the causes for growth or decline.

i. Municipal Budget: Municipal Budget for last five years should be collected and presented with explanatory notes on the capacity of Municipality with respect to their development activities.

j. Municipal Achievements: Maps and publications on the town itself in the form of books and book-lets, etc. should be collected and presented.

k. Disposal Services: The methods of collection and disposal of garbage should be surveyed and presented with comments. The graveyards, Cremation ground, etc. should, be surveyed and presented. The methods of sewage disposal should be surveyed and presented with comments with probable location of treatment plant.

l. Hydrology: Drainage network, drainage depth, width at 50-meter interval, flow diversion, water level, Drainage condition (Katha, Pacca, Semi-pacca) for both urban rural areas, covered/uncovered, type of drainage, die of pipe drain, Outlet, cross-section etc. Identification of Catchment & Sub catchment and delineation of Primary, Secondary and Tertiary drain, flow direction, general slope of drain etc.

m. Agriculture Survey: Total agriculture land, Soil Type, Cropping Pattern, Intensity, Seasonal Variation, Agriculture Land Coverage by Irrigation, Rate of agriculture land reduction etc.

The survey firm shall prepare report on the basis of output of the obtained surveyed and studied data showing a possible quality of existing and possible future pollution in the project area with tentative remedial measures and adaptation for Project area. All the collected environmental pollution and disaster related attribute and spatial data shall be linked with other spatial database by the survey firm. All Information should be transport to mouza map and GIS Database.

1.4.2 Scope of Activities

a. Visit to the PKCP Area

The survey firms' team leader and/ or other team members of the project need to pay visit to PKCP area mainly for two purposes:

- Firstly, to acquire a firsthand knowledge about the area, its problems and prospects, and
- Secondly, to make the people and the local stakeholders aware of the need for a disaster resilient land use plan

b. Determination of Study Area

- The survey team determine the study area (or the area has been covered under the current PKCP package), based on existing condition, local demand including potential for future development/expansion, capacity, disaster resilient capacity, external and other ancillary local factors/conditions in and around the center.

- Structure plan area conduct shall be the Paurashava and its adjacent (urban and rural) fringe area and has been prepared in consultation with the Paurashava and local stakeholders keeping in views the need over a period of 20 years Structure Plan (Strategic Level).

c. Surveys to Ascertain Existing Situation

- We will carry out detailed physical feature survey and studies of PKCP area according to approved format and shall also collect data from primary and secondary sources.
- The survey firms will responsible for all kind of survey report.
- Collect/obtain socio-economic and demographic information and data both from primary and secondary sources in the study area and also in the municipality and national urbanization as well.
- Analyze collected data and information, find out possible area of intervention for the forecasted future population of two municipality (15-20 years), vis-à-vis assess their requirements for different services, physical and social infrastructure facilities, employment generation, housing, right of way and land requirements for various services and facilities like proposed roads, drains, playgrounds, recreation centers, other environmental and social infrastructure.
- In the Planning package, for development of the town, identify suitable location of respective zones/uses, circulation network, utility services, social services/facilities to be provided and their future requirements depending on the projected size of population and physical development patterns that will take place over time.

d. Assessment of Drainage System

- The Survey firms will identify the existing natural and man-made drainage system in the town and investigate the mechanisms of the drainage and local river system to assess the extent and flood damage amount and determine areas where flooding or poor drainage is most severe.
- The survey firms would be identified volume of water flow, water levels, duration of flood, sediment transport and river cross-section. The team also prepare erosion model for the area and identify flood flow area.
- The Consultant team has been studying the contour and topographic maps produced by the relevant agencies and also review any previous drainage Master Plan available for the Paurashava.

- In such exercise the Consultants will consider all relevant issues including discharge calculation for the 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.

e. Data Collection

- Assess and collect essential data relating to Paurashava map, master plan, and land use plan, regional and national high way development plans, accident statistics, fire hazard, number and type of vehicles registered in the Paurashava and road improvements on going and proposed.
- Assess additional data requirements, critical additional data not currently available has been collected through reconnaissance and traffic surveys. This will help estimate present traffic volume and forecast the future traffic growth and also identify travel pattern, areas of traffic conflicts and their underlying causes.

1.5 Other Activities

The following survey activities has been performed according to ToR

I. Physical Feature Survey Work with RTK GPS, Total Station & using 3D Image
II. Socio-economic Survey
III. Transport Survey
IV. Hydrological Study
V. Urban and Rural Economy Survey
VI. Other Study
    a. Recreational open Space
    b. Health Facilities
    c. Educational Facilities
    d. Pollution Study

VII. Preparation and Submission of Inception Report: Has scheduled to submit within one week of field visit

1.6 Understanding the Project

1.6.1 Project Objectives

The objectives of preparation of Strategic planning at PKCP area, laid down in the TOR are as follows:

a) Prepare a Mainstreaming DRR into Development Planning Processes at the Upazila Town

- The structure plan has been drawn the importance of mainstreaming DRR in development plans local levels as well as in the physical framework.
- The land use plan has been the guiding document for implementation by all concern.
- Analyze the risk that the area faces from natural and manmade hazards

b) Facilitate Public and Private Sectors Development (at Upazila Towns)

The structure plan should be taken under with cooperation from other development agencies.

- Ensure an environment so that other development agencies cooperate in the plan preparation process:
  i. Provide public services and facilities in a planned way.
  ii. Ensure participatory process for a congenial environment for implementation.

c) Prepare Multi-sector Investment Plan

- Identify area-based priority:
  i. Disaster risk reduction plan
  ii. Transportation and traffic management plan,
  iii. Other need specific plan as per requirements.

d) Provide Controls for Private Sector Development

- Ensure clarity and security with regard to future development

e) Provide Guide Lines for Development

- Consider the opportunity and constraints of future development (of district town).

f) Provide Planned Development

- Ensure sustainable environment.

1.6.2 Project Component

The terms of reference do not give a very clear view about the land use plan. As conceptualized from the TOR of the current master plan package, three components of hierarchical categories of plans will have to be prepared under the project, namely, Structure Plan, Urban Area Plan and Action Plan/Detail Area plans. Following are the details of each type.

1.6.2.1 Structure Plan

a. Concept and Aim of Structure Plan

The structure plan shall identify the order of magnitude and direction of anticipated urban growth in the regional context of PKCP area and define a broad set of policies deemed to be necessary to achieve the overall plan objectives. Structure Plan, in fact an indicative plan which is open-ended, providing a broad policy framework for area development and for action plans and development programs. It is a broad framework for major development and guideline subsequent lower-level plans viz structure plan and Ward Action Plans and/or Detailed Area Plans. The plan will guide the growth and changes for distribution and redistribution of population, activities and their relationship and the pattern of land use that the activities will give rise all together with a network of communication, circulation and utility services.

b. Components of Structure Plan

The Structure Plan, in the current planning package, will cover policy issues on aspects like, transport and communication, housing, open space and recreation, municipal services- water supply, drainage, solid waste, sanitation, environment, urban heritage, legal aspects of plan and development, institutional aspects, urban finance and development planning administration and management. It will also describe the scale of map, duration of the plan, and the procedure of its revision and amendments.

c. Style and Format of Structure Plan

The Structure Plan has been presented in the form of text in report, spatial translation of sectoral priorities for development trend, growth direction, identification of problem and location them on map. Policy issues translated into maps for visual understanding. The map will only show the broad future possible built-up area, restricted areas for development, areas for development potentials, major existing and proposed communication network and other existing major features and land marks. Structure Plan has been prepared for 20 years period. The structure plan would come up with spatial guideline for balanced development.

1.6.2.2 Urban area plan

a. Concept and Aim

Urban area Plan, in this planning package, will comprise the spatial translation of the Structure Plan policies and strategies in the form of development proposal in broad level. The aim of the urban area Plan has been to enable the concerned authority to undertake specific development projects in order to promote organized urban development and revitalize the urban living environment. The major objective of preparing this plan is the consolidation of development activities by various agencies in areas that have strongest potential for growth in the medium term and can accommodate the anticipated volume of growth. Other purpose of preparing urban area plan is to facilitate the development control function.

- Urban area plan proposal has been based on land use categories and map designation following structure plan policies and will indicate purpose and intent, permitted and conditional uses in the planning zones and occupancy classes.
- Land development techniques for realizing plan objectives.
- General development provisions with the purpose of establishing reasonable standards relating to land development, which are generally applicable to any use or site irrespective of the zoning category in which it is located.
- Preparation of coordinated multi-investment programs of drainage/flood protection, road transport and utility services in line with plan prioritized sequence of development.

b. Components of Urban area Plan

Urban area Plan, in current planning package, will cover almost all area level land use development and related aspects in broad level. These are

- Land-use Plan
- Transportation and Traffic Management Plan
- Drainage and Environmental Management Plan

c. Style and Format of Land Use Plan

The Land Use Plan has been the composite functional plan with spatial translation in but not limited to 1:1980 scale map in one sheet supported by necessary maps, charts etc. and

report. It shows the broad land use zones on a more detailed scale of maps as derived from Structure Plan. As the desired scale of the plan is the same as that of cadastral map, and the plan provides detailed land use zoning and building controls, the development control function becomes easier to implement PKCP area Land Use Plan. Such Land Use Plan also shows land reservations required for essential uses and major infrastructure development.

Basically, the Land Use Plan has been an interpretation of the Structure Plan over the 10 years. The coverage of the Land Use Plan has been for existing urban areas and their immediate surroundings with the purpose of providing development guidance in these areas where most of the urban development activities are expected to take place over the next 20 years. It will contain more details and specific plan as appropriate

C. Detail Area Plans

The Detail Area Plans has been prepared considering the following aspects:

- Existing Condition: Review of the existing situation of the with respect to land use, community facilities, public services, utilities, infrastructure etc.
- Problems and Opportunities: Discussion of problems which demands immediate intervention and scope of development
- Current Investment Program: Discussion of current investment program of various urban and rural area.

Project selection has been need based and at this stage it can just be imagined that they may include water supply, road and drainage improvement, improved sanitation, provision of social facilities, upgrading of slum settlements etc. The projects may also be non-physical in nature. Depending on type, the projects may be formulated by the PKCP area at local level, using public-private partnership arrangements with the NGOs, CBOs, and national agencies. Despite multiplicity of the development agencies involved, all their activities have to be incorporated in a single list so that an integrated approach to area level development can be pursued over a given period of time. For better performance, emphasize should be given for selection of the projects that could be implemented using available resources through Annual Development Program (ADP) rather than those requiring new resources and/ or institutional capacity for their implementation. In carrying out the tasks for identification of priority projects, certain critical criteria to be addressed are as follows:

- whether self-financing or not (i.e. resource mobilization)

- equity consideration
- acceptability to all parties concerned
- compatibility with other projects
- sustainability
- environmental impacts

The project area, experiencing haphazard and unplanned growth, requires a comprehensive development plan for balanced development. The development planning package with its three major components, first is Structure Plan, second is Urban Area Plan and third one is Action plan or detail area plan which can help guide the development authorities on development issues for a livable Paurashava and rural area at PKCP boundary, which is not only healthy and safer but also efficient and better.

1.7 Location and History of the Project area

1.8 Location and History of the Project area

1.8.1 The project location

The proposed project would be prepared on a regional development perspective considering the region as a part of whole of Galachipa & Rangabali Upazila and its 17 unions.

1.8.2 Galachipa Upazila:

Galachipa Upazila (Patuakhali district) area 925.1 km², located in between 21°48' and 22°21' north latitudes and in between 90°15' and 90°37' east longitudes. It is bounded by patuakhali sadar, bauphal and dashmina upazilas on the north, bay of bengal and rangabali upazila on the south, Dashmina and char fasson upazilas on the east,' amtali and kalapara upazilas on the west.

Population

Total 238681; male 119189, female 119492; Muslim 217588, Hindu 21050, Buddhist 11 and others 32. Indigenous community such as rakhain belongs to this Upazila. (BBS, 2011)

Water bodies Main rivers:

Tentulia, Galachipa;' Rabnabad Channel is notable.

Administration

Galachipa Thana was formed in 1873 and it was turned into an Upazila in 1983.

Main sources of income

Agriculture 68.18%, non-agricultural labourer 5.41%, industry 0.40%, commerce 11.53%, transport and communication 1.19%, service 4.22%, construction 1.23%, religious service 0.25%, rent and remittance 0.18% and others 7.41%. (BBS, 2011)

Main crops

Paddy, pulse, betel nut, peanut, chilli, vegetables.

Extinct or nearly extinct crops

Sesame, mustard, kaun, boro paddy, sakshar-kora paddy.

Main fruits

Mango, jackfruit, papaya.

Fisheries, dairies and poultries.

This Upazila has a number of fisheries, shrimps, dairies and poultries.

Communication facilities

Pucca road 46 km, semi-pucca road 20 km, mud road 1000 km. (Source: Banglapedia)

Extinct or nearly extinct traditional transport

Palanquin, bullock cart.

Noted manufactories

Rice mill, saw mill, ice factory, welding factory.

Cottage industries

Weaving, goldsmith, blacksmith, tailoring, wood work.

Hats, bazars and fairs Hats and bazars are 51, fair 1, most noted of which are Galachipa Bazar, Kalagachhia Hat, Ulania Hat, Baherchar Hat, Sutabaria Dayamayee Mela. (Source: Banglapedia)

Main exports

Paddy, fish, peanut, chilli, betel but.

Access to electricity

All the wards and unions of the Upazila are under rural electrification net-work. However, 5.19% (urban 41.05 and rural 2.49) of the dwelling households have access to electricity. (Source: Banglapedia)

Sources of drinking water

Tube-well 91.57%, pond 5.40%, tap 0.25%, and others 2.78%. (Source: Banglapedia)

Sanitation

13.16% (rural 9.69% and urban 69.84%) of dwelling households of the upazila use sanitary latrines and 74.92% (rural 78.74% and urban 24.14%) of dwelling households use non-sanitary latrines; 11.92% of households do not have latrine facilities. (Source: Banglapedia)

Health centres

Upazila health complex 1, satellite clinic 4, non-government health centre 1, family planning centre 10. (Source: Banglapedia)

Disaster

The devastating cyclones of 1584, 1960 and 1970 and the flood of 1876 caused huge loss of life and damages to settlements, livestock and other properties of the Upazila. (Source: Banglapedia)

NGO activities

ASA, SCI, CODEC, BRAC, Urban, SAP-Bangladesh, BAOPA, CEP BARD, CHDP.

Table 1-1: Galachipa Upazila Information

Upazila								
Municipality	Union	Mouza	Village	Population		Density (per sq km)	Literacy rate (%)	
				Urban	Rural		Urban	Rural
1	11	90	149	22301	216380	188	62.7	42.97

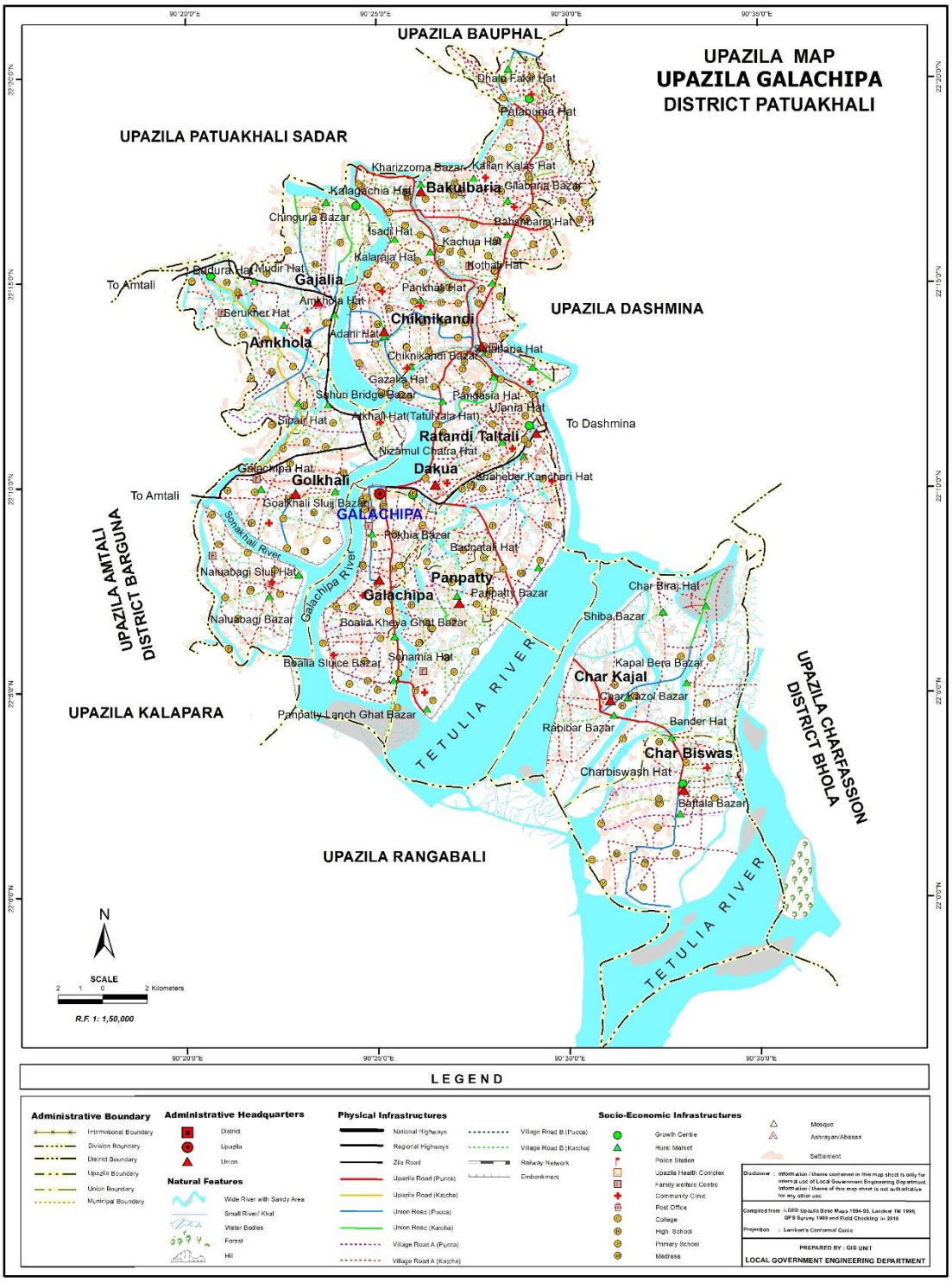
Municipality					
Area (sq km)	Ward	Mahalla	Population	Density (per sq km)	Literacy rate (%)
3.39	9	9	17373	5110	48.15

Upazila Town				
Area (sq km)	Mouza	Population	Density (per sq km)	Literacy rate (%)
5.13	2	4928	109	48.15

Union					
SL No	Name of union and GEO code	Area (acre)	Population		Literacy rate (%)
			Male	Female	
1	Amkhola 11	11673	14159	13973	38.78
2	Gazalia 69	-	2542	6815	45.98
3	Galachipa 67	11433	8098	7764	42.08
4	Golkhali 72	16730	14882	14844	38.17
5	Char Kajal 39	25159	11143	10214	28.82

6	Char Biswas 37	-	8892	8215	36.84
7	Chiknikandi 50	12188	7484	7522	50.52
8	Dakua 55	8017	9174	8699	46.72
9	Panpatty 78	7185	8781	8456	55.08
10	Bakulbaria 22	12792	13748	14079	43.58
11	Ratandi Taltali 94	7396	8455	8441	46.13

Source Bangladesh Population Census 2011, Bangladesh Bureau of Statistics.



Map 1-1: Galachipa Upazila Location Source: LGED

1.8.3 Rangabali Upazila:

Rangabali Upazila (Patuakhali District) area 470.1 km², located in between 21°46' and 22°05' north latitudes and in between 91°15' and 90°37' east longitudes. It is bounded by kalapara and galachipa upazilas on the north, Bay of Bengal on the south,

Total Population 86819; male 45235, female 41584; Muslim 66517, Hindu 19058, Christian 375, Buddhist 780 and others 89. Indigenous community such as rakhain belongs to this upazila. Water bodies Main Rivers: Agunmukha and Kajal; Rabanabad and Char Kalmi channels are notable. Administration Rangabali Upazila was formed on 14 march 2011 comprising part of Galachipa Upazila. Religious institutions Mosque 312, temple 20, pagoda 5. (BBS, 2011)

Literacy rate and educational institutions

Average literacy 38.23; male 53.3%, female 42.01%. Educational institutions: high school 5, primary school 15, madrasa 7. Noted educational institutions: Rangabali High School, Rangabali Saleha Junior High School. (BBS, 2011)

Cultural organisations Club 2, jatra party 2,' playground 32, women's organisation 1.

Tourist spots Sunrise and sunset can be viewed from Rabanabad Island.

Main sources of income Agriculture 48.18%, non-agricultural labourer 3.52%, commerce 17.15%, transport and communication 7.41%, service 9.33%, construction 1.91%, religious service 0.14%, rent and remittance 0.57% and others 11.79%. (Source: Banglapedia)

Ownership of agricultural land Landowner 53.25%, landless 46.75%. Main crops Paddy, wheat, potato, onion, pulse, vegetables. Extinct or nearly extinct crops Sesame, linseed, kaun. Main fruits Mango, jackfruit, papaya. Fisheries, dairies and poultries. This upazila has a number of fisheries, dairies and poultries. Extinct or nearly extinct traditional transport Palanquin, bullock cart, horse carriage. Noted manufactories Rice mill, cold storage, welding factory. Cottage industries weaving, blacksmith, potteries, wood work, embroidery. (Source: Banglapedia)

Hats, bazars and fairs Hats and bazars are 22, fairs 2, most noted of which are Chalitabunia Bazar, Koralia Bazar, Felabunia Bazar, Gohin Khali Bazar, Montaj Sluij Bazar, Baher Char Bazar, Katakhali Bazar, Takta Bunia Bazar, Neta Bazar, Tulatali L. Ghat Bazar, Pulghat Hat, Mollar Hat, Mowdubi Hat, Bestin Bazar and Char Naluar Hat. (Source: Banglapedia)

Main exports Paddy, fish.

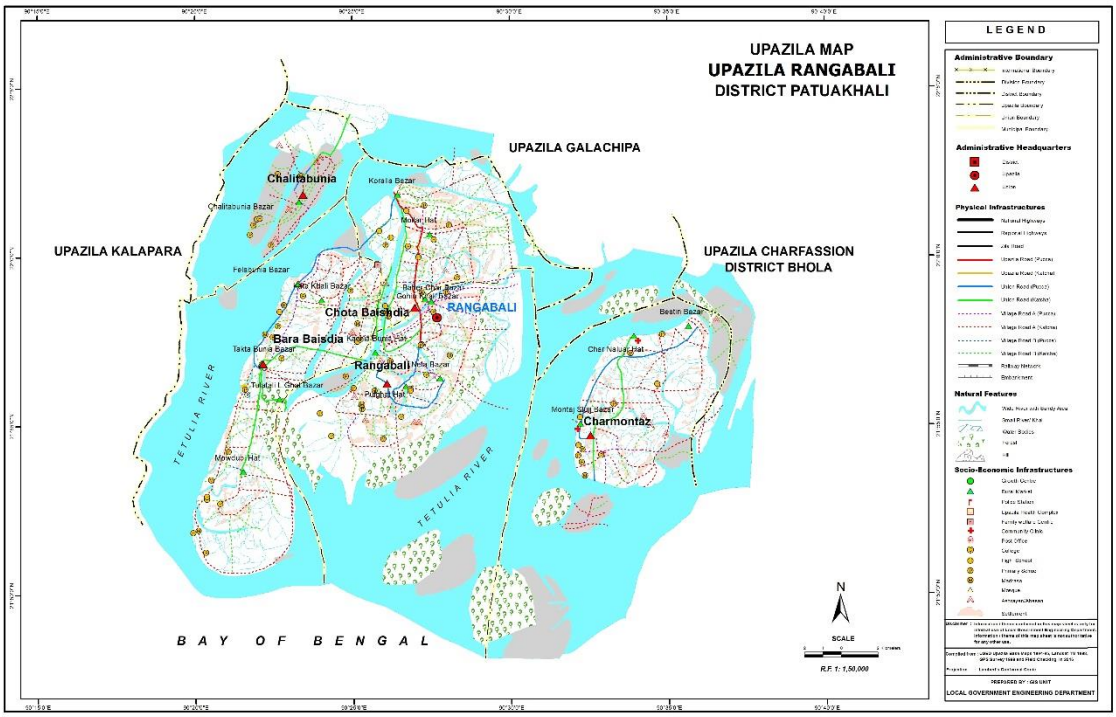
Access to electricity: all the unions of the upazila are under rural electrification net-work. However, 32.26% of the dwelling households have access to electricity. Sources of drinking water Tube-well 92.27%, tap 2.30%, pond 0.10% and others 5.33%. Sanitation 30.68% of dwelling households of the upazila use sanitary latrines and 33.95% of dwelling households use non-sanitary latrines; 35.37% of households do not have latrine facilities. Health centres Family welfare centre 1, community clinic 2, and clinic 3. Important NGOs are asa, brac, proshika, and caritas. (Source: Banglapedia)

Table 1-2: Rangabali Upazila Information

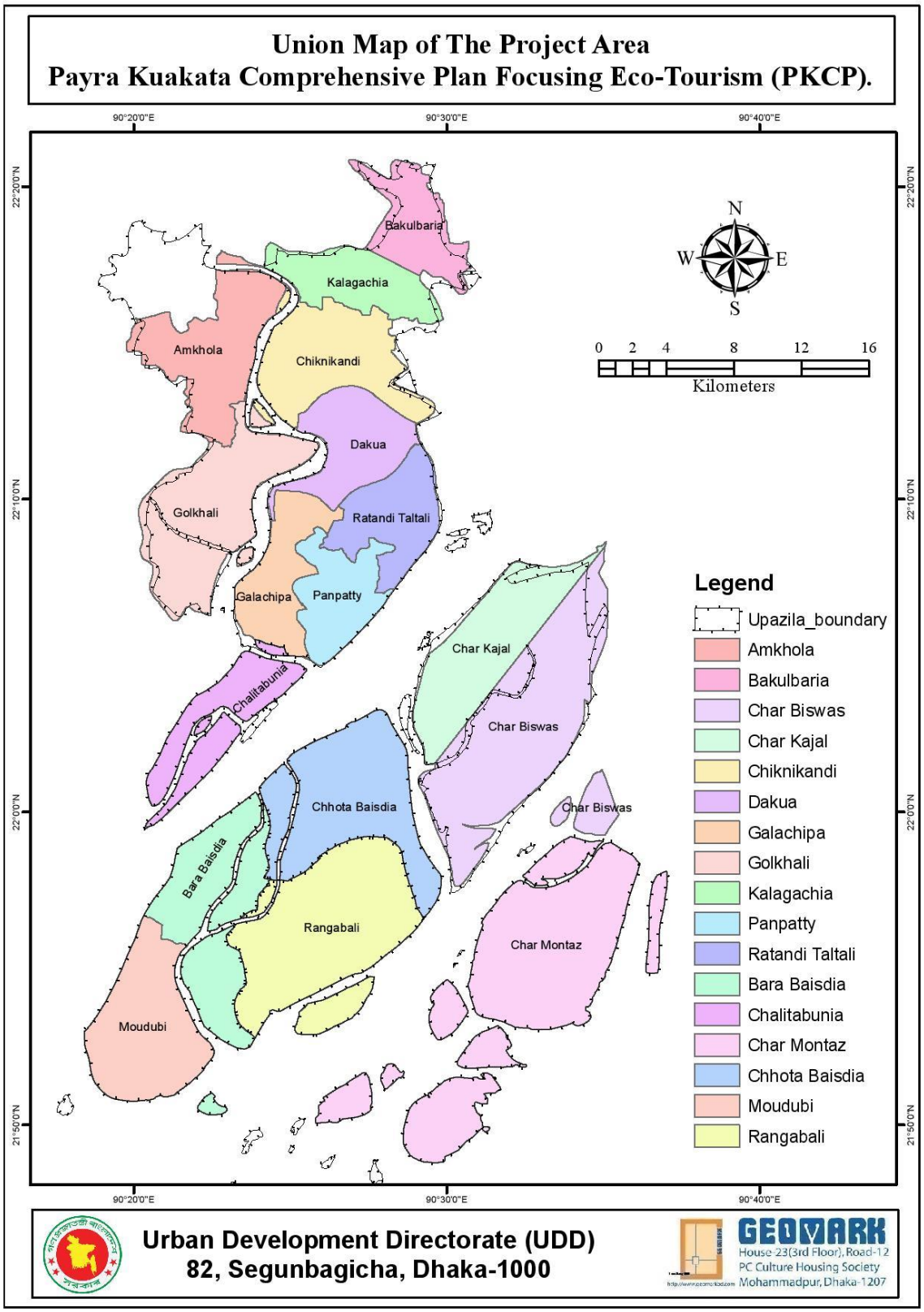
Upazila								
Municipality	Union	Mouza	Village	Population		Density (per sq km)	Literacy rate (%)	
				Urban	Rural		Urban	Rural
-	5	49	93	-	86819	257	-	38.23

Union					
Sl No	Name of union and GEO code	Area (acre)	Population		Literacy rate (%)
			Male	Female	
1	Char Montaz 34	46898	8049	6897	31.88
2	Chalitabunia 32	6758	3317	3027	34.78
3	Chhota Baisdia 44	13492	8945	8497	36.08
4	Bara Baisdia 27	23722	12163	10959	50.28
5	Rangabali 83	26843	12761	12204	38.14
6	Moudubi	10477	20039		

Source Bangladesh Population Census 2011, Bangladesh Bureau of Statistics & Jatiyo Tottho Batayon.



Map 1-2: Rangabali Upazila Location. Source: LGED



Map 1-3: Union Map of Package 1 Source: Geomark Ltd.

1.9 List of Unions/Municipalities of the Study Area

Galachipa & Rangabali Upazila is comprised of two municipalities and seventeen unions which covers an area of about 1268.34 sq. km.

Table 1-3 List of union/municipalities

SL	Municipality/Union	Name
GALACHIPA UPAZILA		
1.	Municipality	Galachipa Paurashava
2.	Union	Amkhola
3.	Union	Gazalia
4.	Union	Galachipa
5.	Union	Golkhali
6.	Union	Char Kajal
7.	Union	Char Biswas
8.	Union	Chiknikandi
9.	Union	Dakua
10.	Union	Panpatty
11.	Union	Bakulbaria
12.	Union	Ratandi Taltali
RANGABALI UPAZILA		
13.	Union	Char Montaz
14.	Union	Chalitabunia
15.	Union	Chhota Baisdia
16.	Union	Bara Baisdia
17.	Union	Rangabali
18.	Union	Moudubi

Chapter 2

2 Approach and Methodology

2.1 Introduction

The approach & methodology, and work task performed to accomplish the stated objectives and activities stated in the TOR and as summarized in Section 4 are presented in this chapter. However, before presenting the methodologies, in the light of TOR our understanding regarding the scope of work and the major steps of activities are discussed.

2.2 Methodology Flow Chart

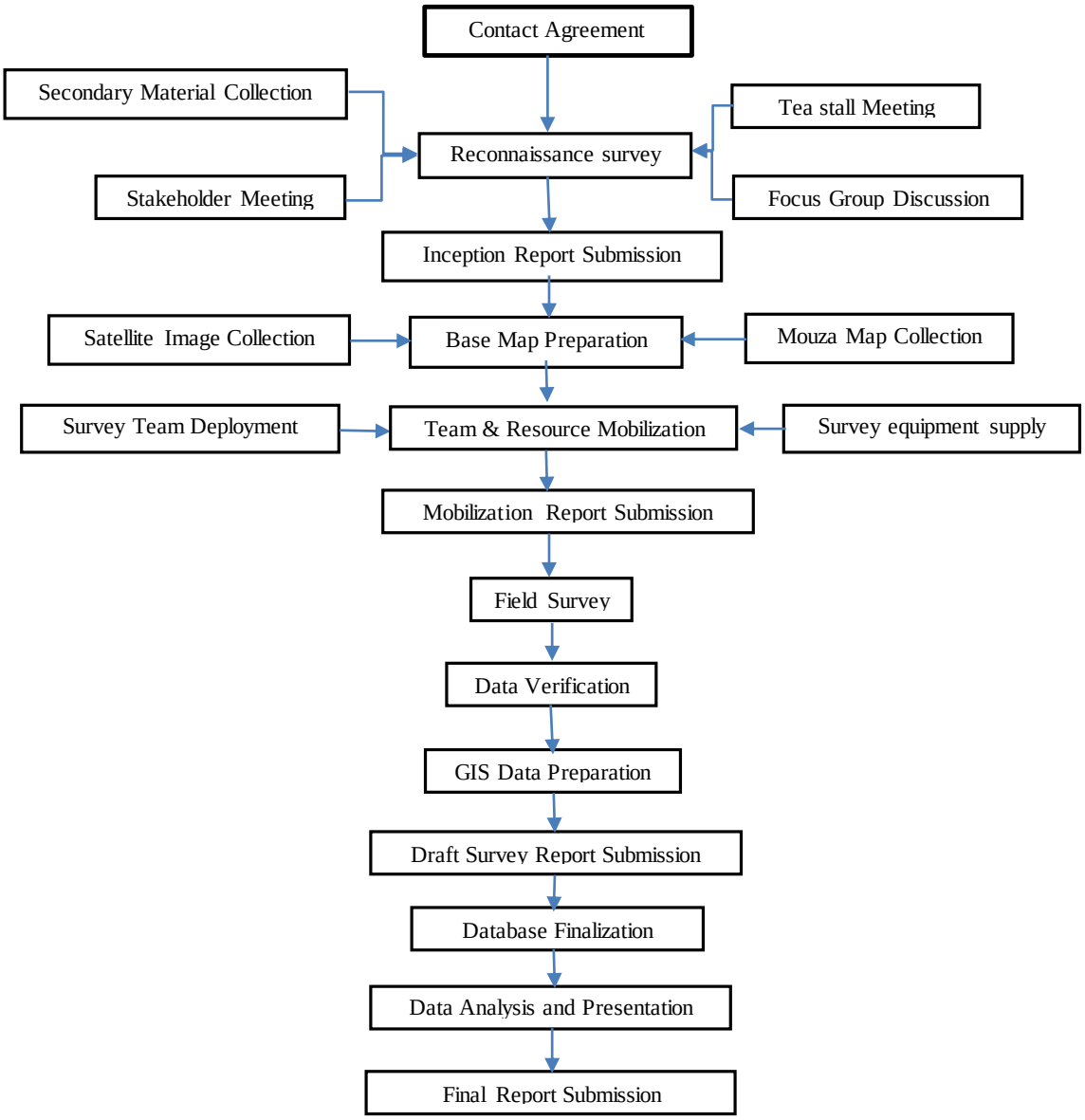


Figure 2-1Methodological flow Chart

2.2.1 Mobilization

In the initial stage of the project, a team of highly experienced professionals including Urban Planners, survey engineers, Statisticians and other relevant experts were assigned to perform the task. After in depth discussion and training, best qualified personals were assigned for specific tasks.

2.2.2 Discussion and meeting with project authority

The next step was to have detailed discussion with project authority for successfully completion of the project according to the ToR. The Survey Firm had in depth discussion with

*Project Director (PD)

*Project Manager (PM)

The survey firm also visited the Paurashava office and all union offices.

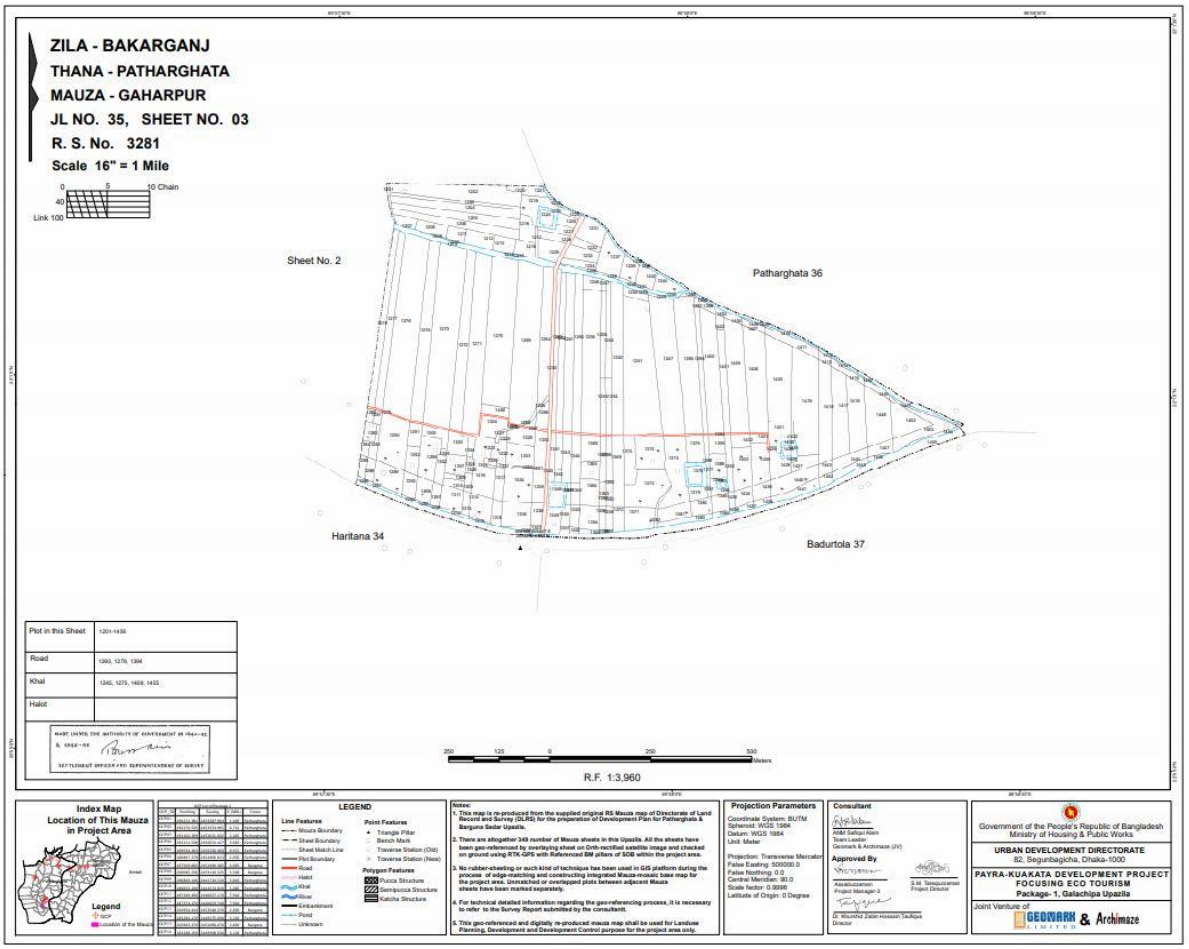
2.2.3 Collection of Documents

i. Collection and review of Database

For Map Preparation, basic data has been collected on Mauza maps, road network, river/khal network, population, holding numbers, social, economic and physical conditions in the project area etc. Most of this information has been collected from existing studies, plans and programs, government publications, public authorities, statistical digests, documentation of external agencies, as well as the records of DLR, respective authorities and other development agencies working in the area. Reference has been made to relevant national reports, plans etc.Major data gaps have been identified and been collected through sector studies/surveys.

ii. Mouza Map Collection

Mauza base map of RS/CS version has been collected covering the entire project area from the Urban Development Directorate (UDD). In this project, Mouza map was not collected or processed, it has been used as the Base map to locate the features on the spot and prepare the land use map.



Map 2-1 Sample of Mouza Map

iii. Satellite Image and 3D features

Satellite image and 3D features were collected covering the entire project area from the Urban Development Directorate (UDD). In this project, Satellite images were not collected or processed, it has been used in the Base map to locate the features on the spot and prepare the land use map.

Photo 2-1 Sample of Satellite Image

2.2.4 Reconnaissance survey

In conjunction with the data gathering, the survey firm has conducted reconnaissance survey of the entire project area to devalued particularly the space zoning with the respective layout considering the overall service levels. Stakeholder meeting, tea stall meeting and focus group discussing were performed as parts of reconnaissance survey.

2.2.5 Survey Plan

A highly qualified group of well-equipped and well-organized staffs were assigned for the field survey and GIS mapping tasks. The most modern survey equipment like Total Station, Digital level, and satellite-based survey equipment like RTK-GPS had been engaged for the field survey and data acquisition campaign. A quality Control team lead by a Quality Control Manager had been engaged. The quality control had been maintained in two stages, in the field and in the office.

i. Quality Control in the Field

- Use of satellite based advanced survey technique,
- Maintain & monitor daily log sheets and level books in the field,
- Daily checking of the field equipment before starting the work,

- Routine check and calibration of the survey equipment,
- Frequent field visit by the joint team comprising the senior staff of consultants and project officials of UDD, and
- Interaction with project officials in the field level

ii. Quality Control in the Office

- Daily review meeting with survey groups,
- Spatial and temporal Comparison of the survey data,
- Daily updating and processing data and Maps, and
- Frequent interaction and review meeting with project officials

In addition to those, progress as well as quality control of survey and data processing work has been reviewed in the progress meeting by the project authority.

2.2.6 Physical feature surveys

At the beginning of the Physical feature survey, a base map was prepared based on Mouza map and 3D features from satellite image to locate the features on the spot. All relevant data were collected using online survey platform "kobo collect". Step by step process was as follows;

2.2.6.1 Preparation Base Map

Preparation of base map for the project area was performed with following items of works:

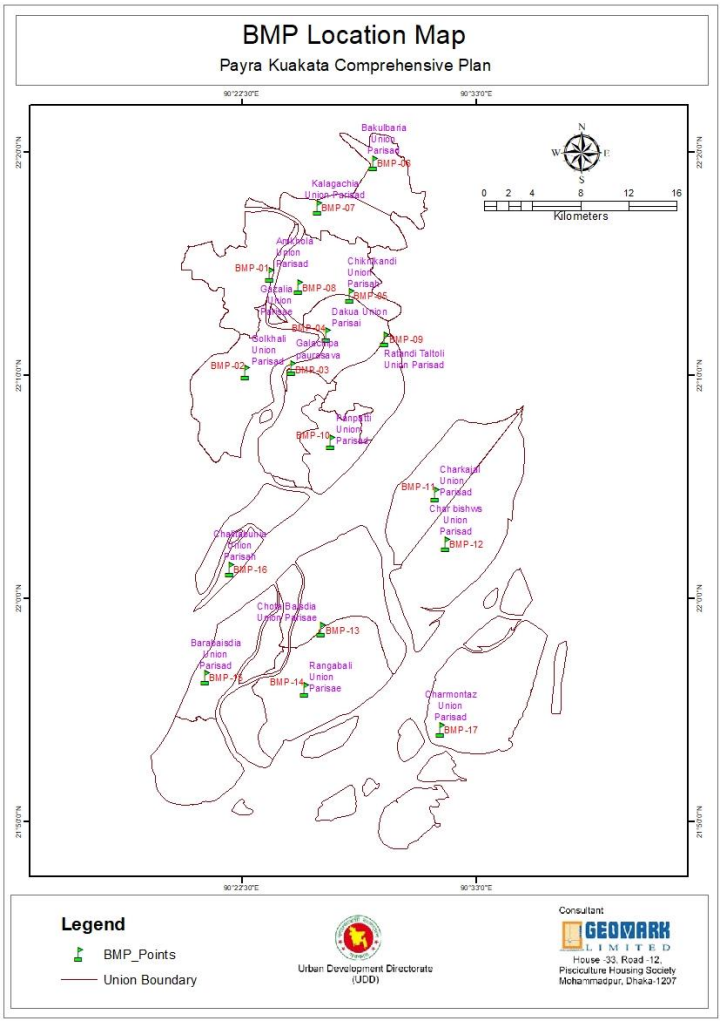
- Construction and Establishment of Bench Mark (BM)
- Preparation of base Map Layout

Construction and Establishment of Bench Mark (BM):

Pillars covering the project area including approximately 5 km. grid in rural area (pillar 10"x10", Base 3'x3', height 6'). RCC pillars were constructed marking unique identification number coordinate X, Y of these pillars along with Z value has been marked on base map for future reference. RTK GPS was used to measure the precise x, y, z coordinates of the BM Pillars.

Primary location Selection:

Primarily union headquarters of Galachipa and Rangabali Upazila were selected as the location for establishing BMP. The following Map is showing the Primary location (Union Headquarters) of BMP establishment.



Map 2-2 BMP Location Map

Permanent Site Selection:

Permanent site for the construction of BMP were selected through consultation with stakeholders, UP Chairman, Project Director and based on geographical condition. Photograph of established BMP is shown below.

Photo 2-2 BMP Construction

Installation of Permanent Bench Mark (BMP):

BM pillars named as BMP on the pillar side wall with numbers. At first, suitable location has been selected where surrounding was clear from obstacle within 15-degree vertical space to acquire satellite signal. After site selection, as per ToR, we constricted BMP at each selected site. BM Pillars has been constructed on site as Reinforced cement concrete (RCC) Structure as shown in the photograph below.

Photo 2-3 BMP RTK Measurement

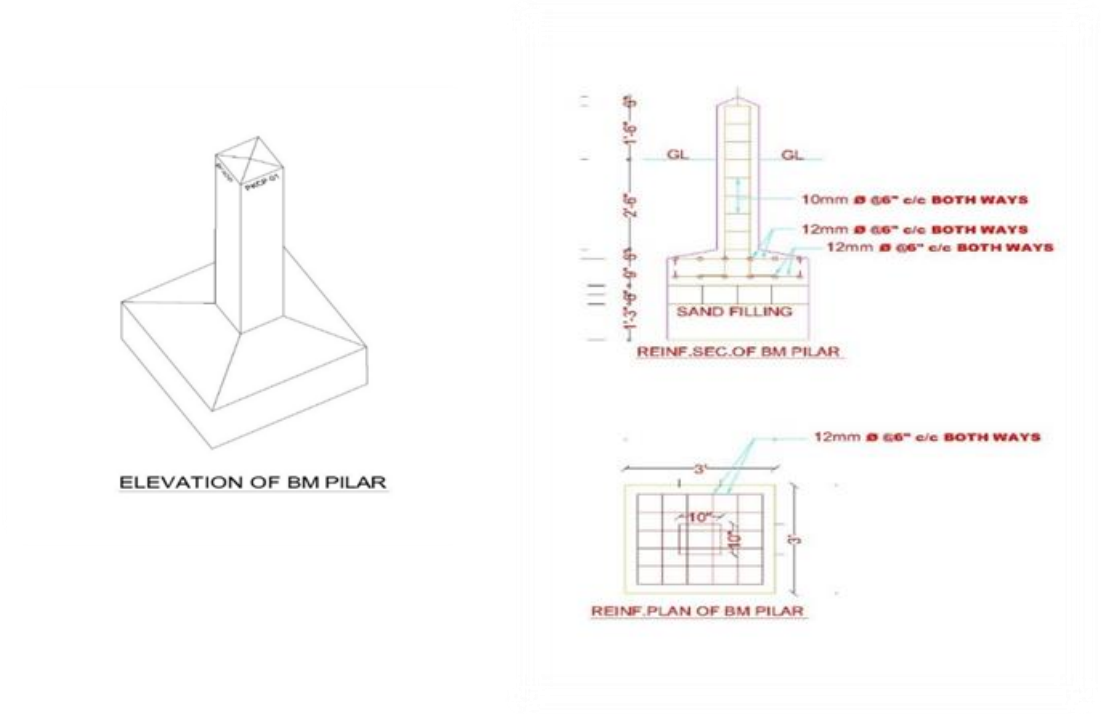


Figure 2-2: Detail design of BM Pillar

Photo 2-4: Field photo of RTK GPS BASE and Rover

Payra-Kuakata Comprehensive Plan Focusing on Eco Tourism

BM Pillar Information

BMP No	Northing	Easting	Height	Latitude	Longitude	Altitude	Detailed address
BMP-01	2461861.879	231604.779	2.5374	22° 14′29.2119″N	090° 23′45.6300″E	2.5374	Back side of Amkhola Union Parishad Bhaban
BMP-02	2453823.889	229598.168	2.3044	22° 10′06.9361″N	090° 22′40.4552″E	2.3044	Infront of Golkhali Union Parishad Bhaban
BMP-03	2454113.17	233104.05	3.0384	22° 10′18.2906″N	090° 24′42.5749″E	3.0384	West Side of Galachipa Paurasava Bhaban
BMP-04	2456804.637	235886.34	2.5444	22° 11′47.2732″N	090° 26′18.0449″E	2.5444	North side of Dakua Union Parishad Bhaban
BMP-05	2460037.348	237734.943	3.0984	22° 13′33.3202″N	090° 27′20.6484″E	3.0984	Infront of Chiknikandi Union Parishad Bhaban
BMP-06	2470967.472	239727.096	2.5684	22° 19′29.5411″N	090° 28′23.7899″E	2.5684	Infront of Bakulbaria Union Parishad Bhaban
BMP-07	2467385.793	235350.674	3.1254	22° 17′30.7675″N	090° 25′53.0862″E	3.1254	Infront of Kalagachia Union Parishad Bhaban
BMP-08	2460791.874	233757.325	2.1804	22° 13′55.6463″N	090° 25′01.3918″E	2.1804	South side of Gazalia Union Parishad Bhaban
BMP-09	2456376.209	240388.44	2.9634	22° 11′35.8041″N	090° 28′55.3741″E	2.9634	Infront of Ratandi Taltoli Union Parishad Bhaban
BMP-10	2447947.949	236070.408	1.6514	22° 06′59.6097″N	090° 26′29.6743″E	1.6514	Infront of Panpatti Union Parishad Bhaban
BMP-11	2443522.378	244021.019	2.7914	22° 04′40.0883″N	090° 31′09.4393″E	2.7914	Infront of Char kajal Union Parishad Bhaban
BMP-12	2439399.944	244785.87	1.9014	22° 02′26.5389″N	090° 31′38.4352″E	1.9014	Back side Char Biswash Union Parishad Bhaban
BMP-13	2432445.887	235079.191	2.4704	21° 58′35.3821″N	090° 26′04.2019″E	2.4704	Infront of Chota Baisdia Union Parishad Bhaban
BMP-14	2427543.053	233685.839	2.3204	21° 55′55.3204″N	090° 25′18.5388″E	2.3204	North side of Rangabali Union Parishad Bhaban
BMP-15	2428646.46	226030.153	3.2674	21° 56′26.9263″N	090° 20′51.2764″E	3.2674	South side of Bara Baisdia Union Parishad Bhaban
BMP-16	2437574.022	228067.734	2.7944	22° 01′18.1245″N	090° 21′56.8811″E	2.7944	South side of Chalitabunia Union Parishad Bhaban
BMP-17	2424056.036	244116.443	1.8294	21° 54′07.6011″N	090° 31′23.7579″E	1.8294	Infront of Charmontaz Union Parishad Bhaban

Reference BM Information

BMP No	Northing	Easting	Height	Latitude	Longitude	Altitude	Detailed address
BMP-5615	2455161.93	224085.17	2.3364	22°10'47.27457"N	90°19'27.31806"E	2.3364	South side of shahid Suhrawardy Secondary School Field

Preparation of base Map Layout

Using the georeferenced mouza map and 3D physical features from satellite image, base maps were prepared to locate and identify features in the ground. For the survey work, base maps were prepared in 1:1000 scale grids.

Photo 2-5 A sample of the survey grid

2.2.6.2 Conducting the Survey

Physical feature surveys provide the basis for understanding many planning problems. In a planning work such as Detailed Area Planning, precise locations and dimensions of physical features such as rivers, drainage channels, building, roads etc. are important. Thus, to know existing information about physical features of an area, physical feature survey is carried out.

From the physical feature map information such as access to the area, available roads in different conditions (such as metaled, non-metaled, katcha), right of way, location of natural barriers, structures, utility services, etc. were collected. These information aid in planning. Decision can be taken whether a new access is required, or if there is any scope for expansion/improvement of roads. If a new link road is proposed, it is going to interact with the existing structures and natural barriers. for examples a bridge may be required over a road.

The guidelines of Terms of Reference have been followed to prepare the Survey format which is enclosed annex 2 with the report.

Physical Features:

Table 2-1: Description of physical feature

Physical features		Illustrated
a.	River	Indicate alignment, direction of flow & width
b.	Khal	Indicate alignment, direction & width
c.	Drainage Channels	Natural and improved (with flow direction & width)
d.	Ponds/Tanks/Ditches	Indicate them
e.	Marshalands/Flood Prone Area	Land liable to flooding during monsoon
f.	Building / Structures	Pucca / semi pucca structures & storey
g.	Roads	Pucca/HBB/Kutcha, earth etc.
h.	Bus/Trucks Terminals	Indicate right of way and any areas that are covered by the electricity system.
i	Flood Works	Embankments, pumps stations, sluice gates length, width, condition of abutments and wing-walls.
j.	Bridge / Culverts	Indicate location, covered area, type of structure
k.	Utility Mains and Row	Electric, gas and telephone etc.
l.	Utility Substations	Electric, Water works, waste disposal and treatment, gas, telephone line etc.
m.	Deep Tube well Stations	R.C.C. DPHE and other deep tube well stations and output
n.	Mauza, Union/Ward, Thana and District Boundary	Administrative boundaries

The features identified above had been provided in the Base map. Names of settlements, village, rivers, khals, lakes, roads, markers, etc. were also indicated in the maps.

Physical Infrastructure:

Table 2-2: Physical infrastructure

Survey Item		Illustrated
a.	Physical Infrastructure	Type, width, length and name of road, road level above datum, slopes, borrow pit. - Identification of any bridge or culvert with their length & width.

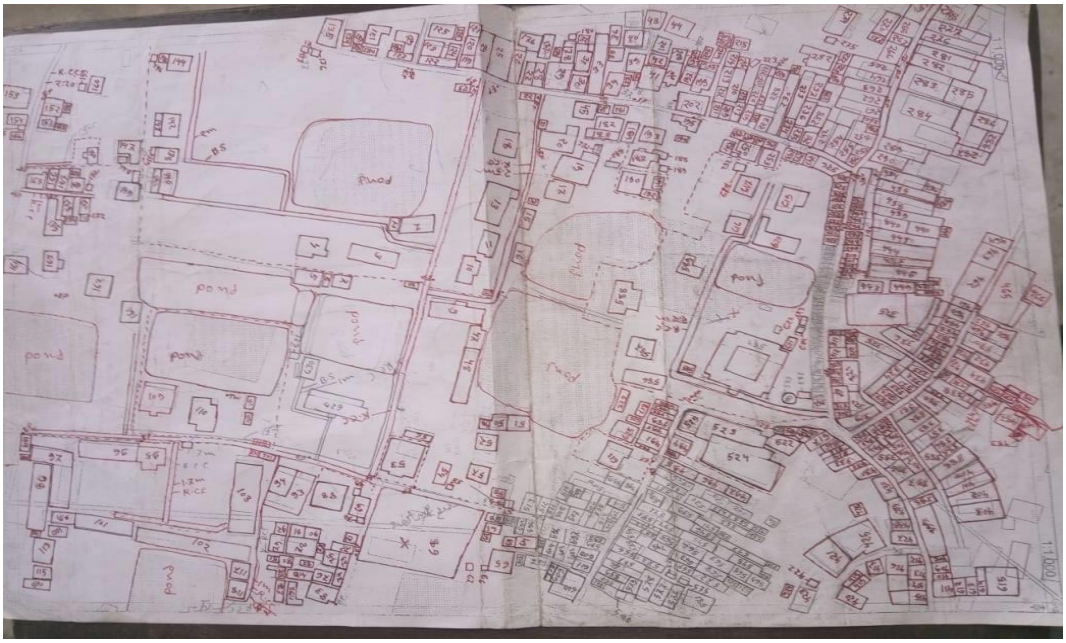
Survey Item		Illustrated
		- Identification of the water supply system, location of overhead water tank and its capacity, location of pumps for direct supply - Identification, location and capacity of electric substation, telephone exchange, gas substation etc. Treatment plant, waste disposal sites. - Identification, location of electricity, telephone, gas and other utility lines of different capacity.
b.	Other Items	- New items identified during the survey.

4.4.3.1 Attribute Data Collection and Field Verification:

Attribute data of the features has been collected from the field after producing base map. It has been a step-by-step procedure. Filed objects were identified on base map and attributes were collected using online app-based platform.

2.2.6.3 Missing features identification & Map Updating

Attribute data and missing map object collected from the field, has been incorporated into the features in this stage. To identify the messing features like structures under Trees which were not visible from stereo Satellite image, a number of strategies had been taken, first, we tried to locate it by GNSS, but if location was hard to reach satellite signal, we prefered to go with traverse Survey. But in some extreme scenario, if that was also not feasible due to the hardship of the terrain and other difficulties, we preferred to go for traditional manual measurement approach to ensure that we were not missing a single feature on the ground. So, for urban areas we applied Traverse station survey as it was more feasible for urban setup. For important landmarks and important features, we took measurement by GNSS to ensure maximum level of accuracy. As a lot of greenery and big trees were available in rural areas, surveying them all with Total Station had been too much time consuming. So, we preferably considered the use of traditional manual measurement technique for rural areas to locate and record missing and under trees structures. After field verification we updated our database and prepared land use and topology map.



Map 2-3: Update map with attribute data

2.2.6.4 Field Check

Field checking has been done by the following:

- Dimension and shape of the features
- Accuracy of feature's attributes

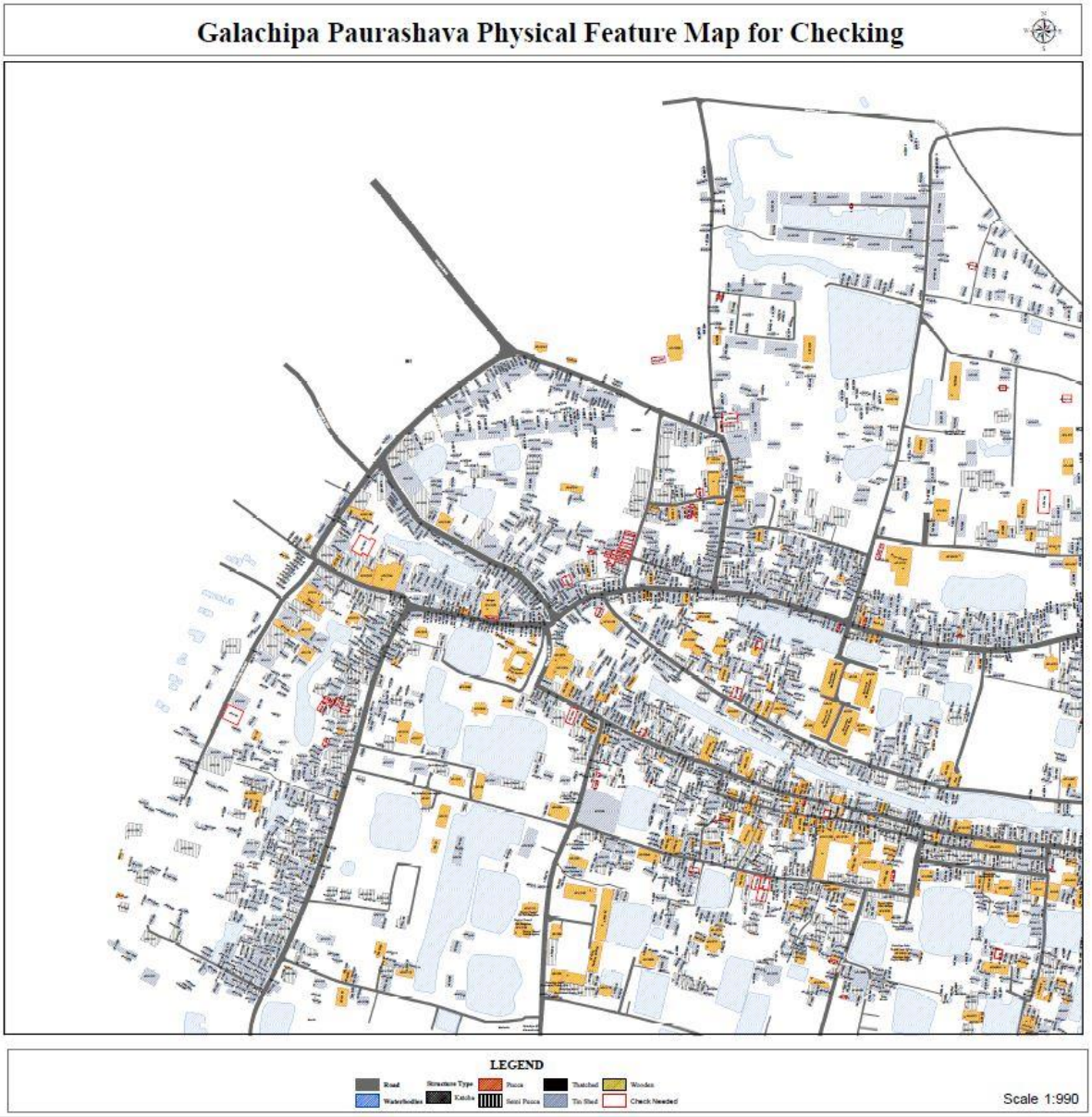


Photo 2-6 Checking Grid Sample

2.2.6.5 Data Delivery

Final map data has been produced and delivered to client for approval. For better understanding a table have been attached in the annexure a2.

Photo 2-7 Updated Map Sample

Table 2-3: List of variables and input types

Variables	**Data type**
Grid Name	text
Structure ID	integer
Photo: House	Jpeg
date	dd/MM/YYYY
time	HH:mm:ss
Location	x,y coordinates
Upazila / Paurasava	text
Union Name / Paurasava	text
Owner Name	text
Structure Name	text
Ward Number	integer
Holding Number	text
Structure Type	text
Roof Material	text
Wall Material	text
Floor Material	text
Structure Construction Year	integer
Floor Number	integer
Floor Wise Use	text
Structure Use	text
Household Number (Total Household)	integer
Physical Condition	text
Heavy Over	text
Foundation Type	text
Pounding Possibility	text
Soft Story	text
Short Column	text
Ground Set	text
Fuel Type	text
Electricity	text
Source of Drinking Water	text
Sludge Dumping Place	text
Sewerage Connection	text
Drain Connection	text
Photo (Structure ID with house)	Jpeg
Photo (Grid Sheet)	Jpeg
Surveyor Name	text
Surveyor Mobile Number	integer

Land use survey

Land use planning is basically concerned with the location, intensity and amount of land development required for various space-using functions of city life. As planning is concerned with the use and development of land, studies of the existing pattern of land use are fundamental to the subject. This has been done through land use surveys. Land use survey basically records the use of land by its functional activity such as residential, industrial or commercial. These are major land uses. As the scale of the map is enlarged, areas with these predominant uses may be further subdivided as required until the individual use of each building and plot of land can be shown. These techniques were applied in preparation of land use map.

Land use data has been cross checked by Stereo Satellite Image. Each survey feature has been recorded with individual ID or code. Later on, land use features have been identified and classified using the recorded code and separated in different layers during data processing stage, from where the category wise land use map can be drawn using the identification layers of each land uses features. The land use map has been prepared indicating the broad categories of land use indicated below:

Land Use Categories

Table 2-4: Land use categories

	Physical features	Illustrated
a.	***Residential***	Planned, unplanned, average density (high, middle and low).
b.	Commercial (Markets and Shops/Workshops)	Established markets with ancillary shop groups of shops including small workshops.
c.	Industrial (as classified by Acts and Rules)	Main activity, type of waste effluent.
d.	Institutional Educational Facilities, Health Facilities	Primary/secondary and other schools, clinics, hospitals, etc.
e.	Mixed Use	Mixed areas without a dominant land use (Residential + Commercial, Office + Residential, Commercial + Office, Residential + School).
f.	Agricultural	All types of agricultural uses.
g.	Recreation/Sports	Parks, play/sports grounds, indoor facilities, zoological garden, stadium.

h.	Religious/Cemetery	Mosques, temple, church, mazar and others.
i.	Graveyard, crematory, cemetery	Sites.
j.	Historic	Historic structures or sites.
k.	Borrow pits	Areas cut for fill material.
l.	Vacant	Vacant land with no apparent use.
m.	Disaster prone areas	Flood (Indicating the flood affected area in 1998), Earthquake and fault-line.
n.	Waste disposal	Dustbins and Dumping grounds and other informal point.
o.	Public gathering	Places of Public meeting, open-air cultural performance and religious gathering.
p.	Garden	Indicating bettle leaf, etc.
q.	Community Services	Community centre, public gathering space, Mosques, temple, church, mazar, Eidgah, Club, Health club, monument, Town hall, Opera, auditorium, association, pagoda etc.

2.2.7 GIS Mapping

Topographic mapping has been done by using Arc GIS based GIS software. All data has been provided both in soft (x, y, z) with and hard copy.

GIS data processing and mapping cover the following activities:

- Survey data processing,
- Development of GIS data base, and
- Development of Map layout and legend

As per ToR Geodetic reference, grid and vertical datum for GIS mapping is as below:

- Scale : As per TOR,
- Map size : As per TOR,
- No. of maps : As per TOR,
- Software : GIS (ArcView & ArcInfo),

- Plotting by : HP Plotter using GIS software,
- Geodetic reference : BTM (Bangladesh Transverse Mercator),
- Projection parameter : Scale factor : 0.9996,
  Central meridian : 90° E,
  False easting : 500,000m,
  False northing : -2,000,000m, and
  Latitude of origin : 0° (equator),
- Spheroid : Everest 1830,
  Semi-major axis a : 6,377,276.345m,
  Semi-minor axis b : 6,356,075.413m, and
  Inverse flattening 1/f : 3008017,
- Datum shifts from WGS84: Rotation x : 0.00,
  Rotation y : 0.00,
  Rotation z : 0.00,
  Translation x : -283.729m,
  Translation y : -735.942m,
  Translation z : -261.143m, and
  Scale : 0 ppm
- Reference vertical datum : m PWD (Public Works Department), Bangladesh

2.2.7.1 Development of GIS Database

All spatial information or data from different survey such as line and point features, structures dimensions etc. has been processed and stored under a comprehensive GIS database component. Geographic information System (GIS) software such as Arc has been used for data processing and preparing maps. Later on, digitized and geo-referenced mauza maps has been incorporated in the surveyed map.

2.2.7.2 Preparation of Coverage Description/Information Log-sheet

The log sheet has been maintained for all the developed coverage (created and updated in PC ArcGIS) where detailed description has been noted down with specific technical terminology of Arc/Info format. The log sheets have been supplied to the client during hand over data and maps. In the TOR, instruction and format of such log-sheet is mentioned as below:

2.2.7.3 Preparation of Map Layout and Legend

A standard map layout has been developed by consultation with concern project officials. Leading GIS software for map production ArcGIS 10.6 has been used to develop the standard layout for mapping. Legend for map features has been selected from the available symbol palettes in ArcGIS 10.6 and all the soft data has been supplied as PC ArcGIS Shapefile format. Proposed coverage description and legends (compatible to use in ArcGIS and other GIS software) are enclosed in the below table. Later on, this legend has been updated and finalized

as per suggestion by UDD. Base maps have been prepared on the enlarged map for the project area indicates following features:

Table 2-5: Shapefile description

Proposed Coverage Name	Feature Type	Coverage Type
✓ Mauza name and Boundary	Line	Shape/Coverage
✓ Ward no. and boundary	Line	Shape/Coverage
✓ Zone no. and boundary	Line and annotation	Shape/Coverage
✓ Paurashava boundary	Line	Shape/Coverage
✓ Thana name and boundary	Line	Shape/Coverage
✓ Mahalla name and bundary	Line and annotation	Shape/Coverage
✓ Plot boundary	Line/Polygon	Shape/Coverage
✓ Park and playground with name	Point/Polygon	Shape/Coverage
✓ Vacant land with name	Line/Polygon	Shape/Coverage
✓ Location of primary school with name	Point/Polygon	Shape/Coverage
✓ Location of high school with name	Point/Polygon	Shape/Coverage
✓ Location of college with name	Point/Polygon	Shape/Coverage
✓ University with name	Point/Polygon	Shape/Coverage
✓ Road with name	Line/Polygon	Shape/Coverage
✓ Railway line	Line	Shape/Coverage
✓ River, khal, pond and other water bodies with name	Line/Polygon	Shape/Coverage
✓ Bridge, under pass and over pass	Point	Shape/Coverage
✓ Road divider and road island	Line/Polygon	Shape/Coverage
✓ Footpath	Line/Polygon	Shape/Coverage
✓ Mosque	Point/Polygon	Shape/Coverage
✓ Mazar	Point/Polygon	Shape/Coverage
✓ Madrasa	Point/Polygon	Shape/Coverage
✓ Mandir	Point/Polygon	Shape/Coverage
✓ Temple	Point/Polygon	Shape/Coverage
✓ Graveyard	Point/Polygon	Shape/Coverage
✓ Hospital	Point/Polygon	Shape/Coverage
✓ Clinic	Point/Polygon	Shape/Coverage
✓ Health facilities	Point/Polygon	Shape/Coverage
✓ Community center	Point/Polygon	Shape/Coverage
✓ Slum with name	Point/Polygon	Shape/Coverage
✓ Plot wise land use	Polygon	Shape/Coverage
✓ important establishment with name	Point/Polygon	Shape/Coverage

2.2.8 Online Attribute collection

There are a wide range of data collection tools available online and a number of options. Most of these options provide both free and paid subscription plans with varying levels of features. At the beginning, we started to collect attribute data using Epicollect 5 app as agreed and approved by the project Director. But later on, the decision was changed to conduct rest of the survey using Kobo Toolbox. So, from then, we used Kobo Toolbox as the attribute data collection app.

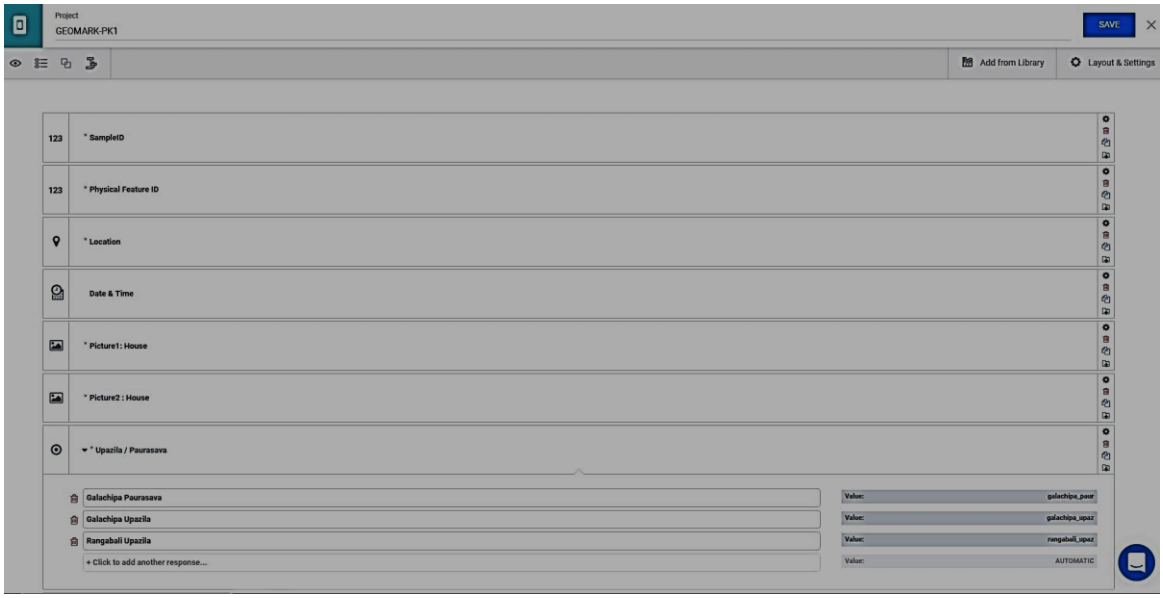


Photo 2-8 Variable design in Kobo Toolbox

2.2.9 Attribute variables Intermigration in Software and Presentation

The Attribute variables has been developed in Kobo Toolbox software to collect data with geographic location (longitude and latitude) and picture. Online data collection through Kobo Toolbox have been presented in the meeting of UDD in front of UDD director and Officials. A sample of taking information through Kobo Toolbox also have been shown in the meeting by collecting data from an official.

2.2.10 Data integration, Visualization and Processing

The field data has been collected by the Epicllect5 and kobo collect software on the basis of questionnaire has developed in the program. After collecting the data, it has been uploaded in the server for downloading. The data can be downloaded in .CSV format that can be visualized in online google map.

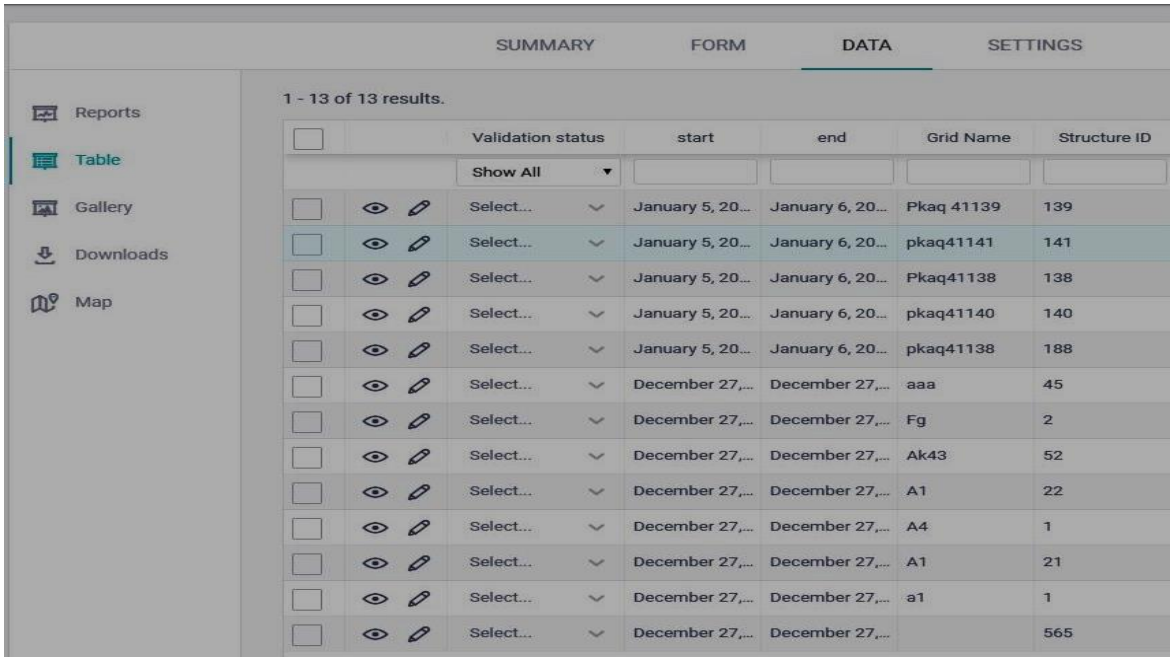


Photo 2-9: Snap view of uploaded data in Kobo Toolbox

Source: Kobo Toolbox

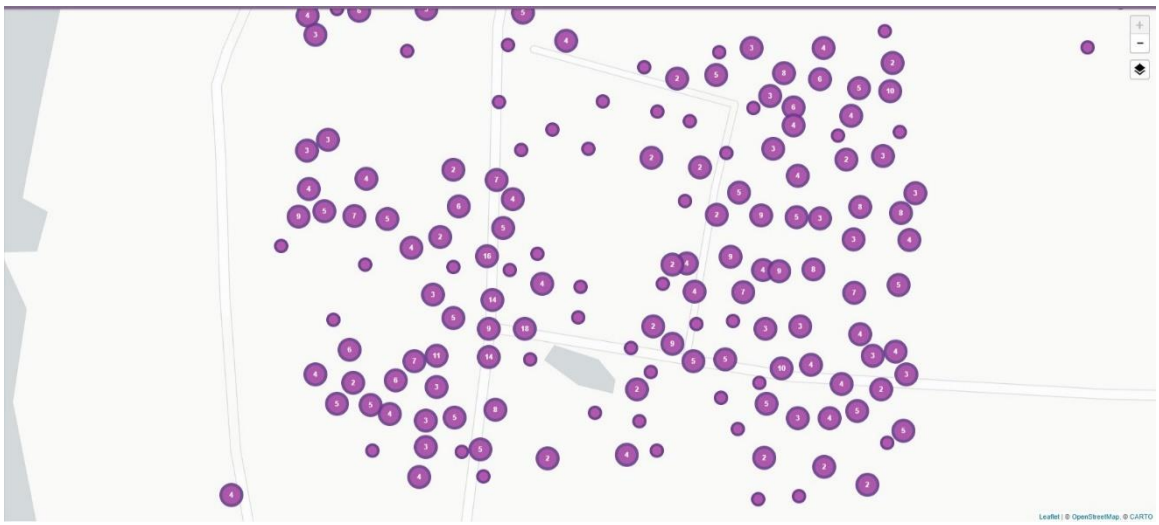


Photo 2-10: Snap view of data visualization in online map

Source: Kobo Toolbox

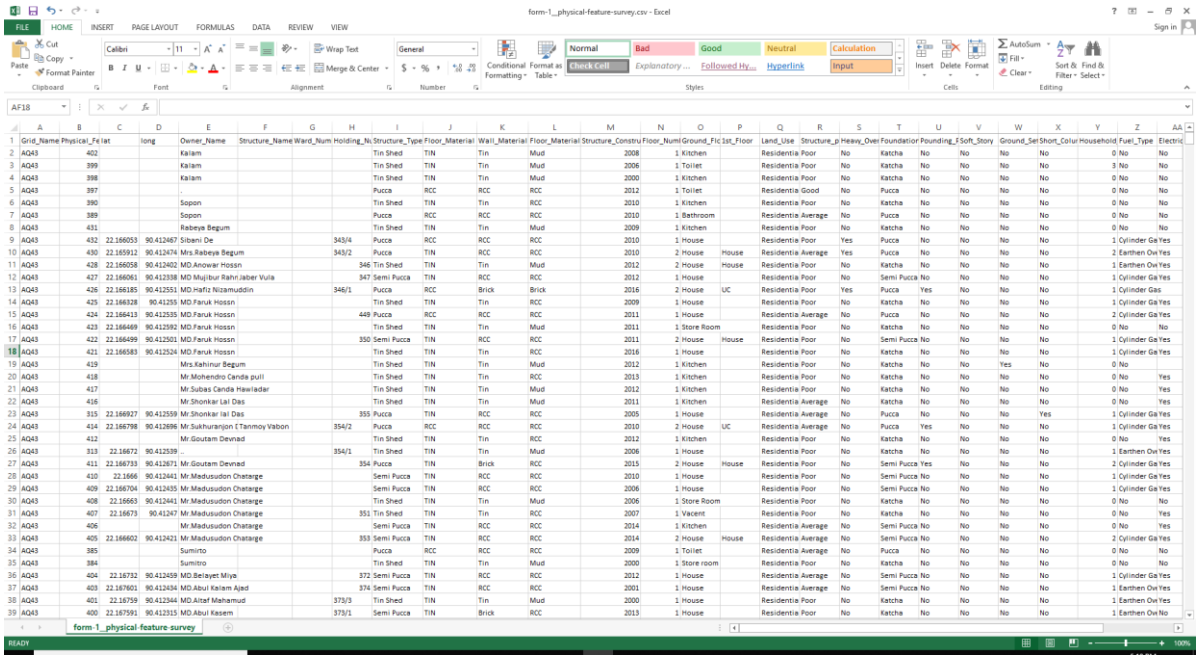


Photo 2-11: Snap view of data after downloading in .CSV format

Source: Kobo Toolbox

Chapter 3

3 Reconnaissance survey and activity

3.1 Overview

Reconnaissance survey has done to clarify the brief survey of the study area that can provide the assessment team with valuable information to help plan the field data collection. After a meeting between Project Director (PD) and Project manager (PM) with the consult have done reconnaissance survey. An official letter was issued for the Reconnaissance survey which have been included in the annexure of this report

A. Stake Holder meeting: Galachipa Paurashava

Photo 3-1: Meeting with Mayor at Galachipa Paurasava.

3.2 Team Member of the reconnaissance survey

1. ANM Safiqul Alam (Shaheen), Managing Director, Geomark Ltd.
2. Howlader Nazmul Huda, Planner
3. Imran Hossain, Surveyor
4. Md. Ariful Islam, Data and Documentation Officer

3.3 Meeting with Local Stakeholders

In the reconnaissance survey several meetings were held with the following stake holders

1. Assistant Engineer, Municipality
2. Assistant Engineer, Galachipa & Rangabali Municipality
3. Meeting with Local people
4. Meeting in tea stall

3.4 Document and Maps Collected During the Reconnaissance Survey

1. Geology map-sedimentation
2. Geology map-fault lines
3. Hydrology map-SRTM DEM
4. Hydrology map
5. Soil major type
6. Topographic maps of 1942
7. Broad land use map
8. Statistical Data from Bangladesh Burro of Statistics (BBS)
9. Paurashava map, UDD

3.5 Major Findings of the Reconnaissance Survey

Several times the physical plan have been done in this area, especially in the municipality area, but none of those plans have been implemented. Industrial development should be in a proper manner by maintaining rules and regulation to protect the livable environment. Lack of infrastructure, drainage, waste disposal point etc. are the major problems of in the municipality area but rural road condition is good. The railway line is unprotected in most of the junction.

3.5.1 Basic Information of the Study area

The population is 380,000 where Population density is 764 per sq. km. in a literacy rate of 52.01%. The basic information of Galachipa & Rangabali is given bellow which have been collected from secondary sources.

Table 3-1: List of institution of the project area

SL No.	Name	Number
1.	Govt. Primary Schools:	145
2.	Madrasas	36
3.	Hat Bazaars	34
4.	Post Offices:	30

5.	Govt. Hospital:	1; with 50 beds.
6.	Private Clinic	5
7.	Non-government secondary school	46
8.	Non-government college	6

Source: BBS 2011

Table 3-2: Small scale industries

SL No.	Name	Number
1.	Rice mill	154
2.	Handy cottage industry	340
3.	Husking crafts	167
4.	Pottery	65

Source: BBS 2011

Table 3-3: Number of growth center, hat /bazar, poultry farm, dairy farm, nursery, horticulture center, brick kiln

SL No.	Name	Number
1.	Growth center	20
2.	Hat /bazar	38
3.	Poultry farm	44
4.	Dairy farm	9
5.	Nursery	30
6.	Horticulture center	0
7.	Brick kiln	12
8.	Decorator service	90

Source: BBS 2011

Table 3-4: Occurrence of river erosion during the years 2008-2011

Year	River erosion	Storm
2008	Yes	No
2009	Yes	Yes
2010	Yes	No
2011	Yes	No

Source: BBS 2011

3.6 Meeting with Stakeholders and Project Area during Reconnaissance Survey

The survey firm have conducted reconnaissance survey including Focus Group Discussion, Tea Stall Meeting etc.; meeting with the local public representatives including Mayor of the municipalities, UP chairman, counsellor etc. The picture of the reconnaissance survey has been attached below.

3.6.1 Meeting with Municipalities

There are two municipalities (Galachipa & Rangabali) in the Galachipa & Rangabali Upazila. By discussion with the municipality member and official it is found that there is a lot of problem in plan implementation. Lack of infrastructure like-road, water supply, electricity etc. is a common phenomenon. In the present situation Galachipa & Rangabali Upazila might be a virtuous economic hub in the economic development of Bangladesh and they are very much enthusiastic for the Galachipa & Rangabali Upazila Development Plan.

3.6.2 Tea Stall Meeting at in front Galachipa Paurasava

During reconnaissance survey a tea stall meeting was done to understand the people perception about present situation of the study area.

Table 3-5: List of people joined in tea stall meeting

Sl	Name	Address	Phone No.
01	Md. Boshir Ahmed	4 no. Word, B Galachipa Paurasava	
02	Md. Jasim Uddin	5 no. Word, Galachipa Paurasava	
03	Md. Sarwar Hossen	2 no. word, Galachipa Paurasava	
04	Mohammad Hossen	9 no. word, B Galachipa Paurasava	
05	Md. Sujon	Vill. Ratandi	

3.6.3 Tea Stall Meeting Output

Local people are very much concern with development. Government has developed an industry in this region that are affecting the local environment. Development should be in a proper manner so more job opportunity created. The local market should be developed.

Photo 3-2: Meeting with local people at Horidevpur Bazar, Golkhali Union

3.6.4 Focus Group Discussion Output

Most of the people are concern with road, drain, pure drinking water in the municipality area. Planning should be in a participatory way so that local people can be benefited.

3.7 Housing and Household Characteristics

In the upazila, there are 79545 households. Distribution of household by type shows that there are 99.59% general unit, 0.13% institutional and 0.28% other unit. (BBS 2011)

3.7.1 Household Size

The average household size (general) for the Upazila is 5.0 persons, for rural area the size is also 5.0 and for urban area the size is somewhat lower i.e., 4.7 persons. (BBS 2011)

3.7.2 Type of Housing Structure

In the upazila, 9.6% general households live in pucca house, 9.2% in semi-pucca house, 79.2% in kutcha house and the remaining 2.0% live in Jhupri which are shown in Figure 6-1. (BBS 2011)

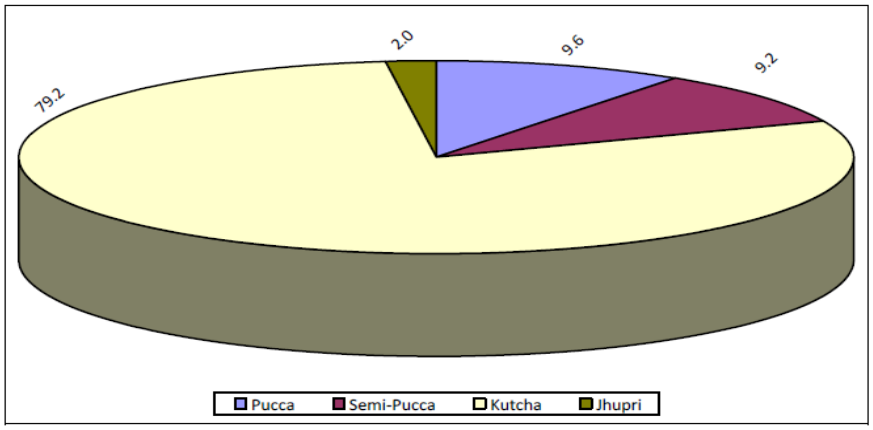


Photo 6-3: Housing Structure by Type, BBS-2011

3.7.3 Source of Drinking Water

In Galachipa upazila, 93.9% general households get the facilities of drinking water from tube-well, 1.6% from tap and the remaining 4.5% households get water from other sources. (BBS 2011)

3.7.4 Sanitation

In the upazila, 76.2% general households use sanitary latrine, 21.7% no sanitary latrine and the remaining 2.1% have no toilet facilities. (BBS 2011)

3.7.5 Access to Electricity

All the 16 unions of the upazila have been brought under the Rural Electrification Program. However, a total of 56.0% general households reported to have electricity connection in the entire upazila in 2011 as against 34.7% in 2001. (BBS 2011)

3.8 Broad Classification of the Area

In Galachipa & Rangabali upazila mixed Land use are existing in terms of broad categories. The below table and map show the broad classification of land in the project area.

Chapter 4

4 Data Collection and Analysis:

4.1 Galachipa Paurashava:

We analyzed the data Collected from Galachipa Paurashava and the results are following,

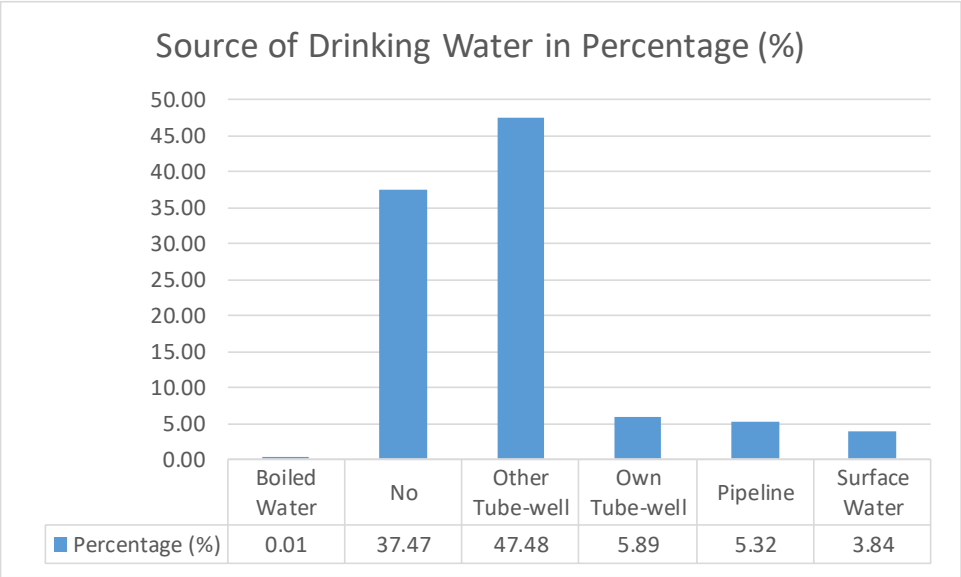
4.1.1 Source of drinking water:

In Galachipa Paurashava, most of the people (47.48 %) use Tube-well (Other) water as their drinking water source. 5.89 % of the residents uses water from their own Tube-well and 5.32 % uses pipeline water and a few of them uses common tube well water. See figure 7-1.

Table 4-1 Source of drinking water

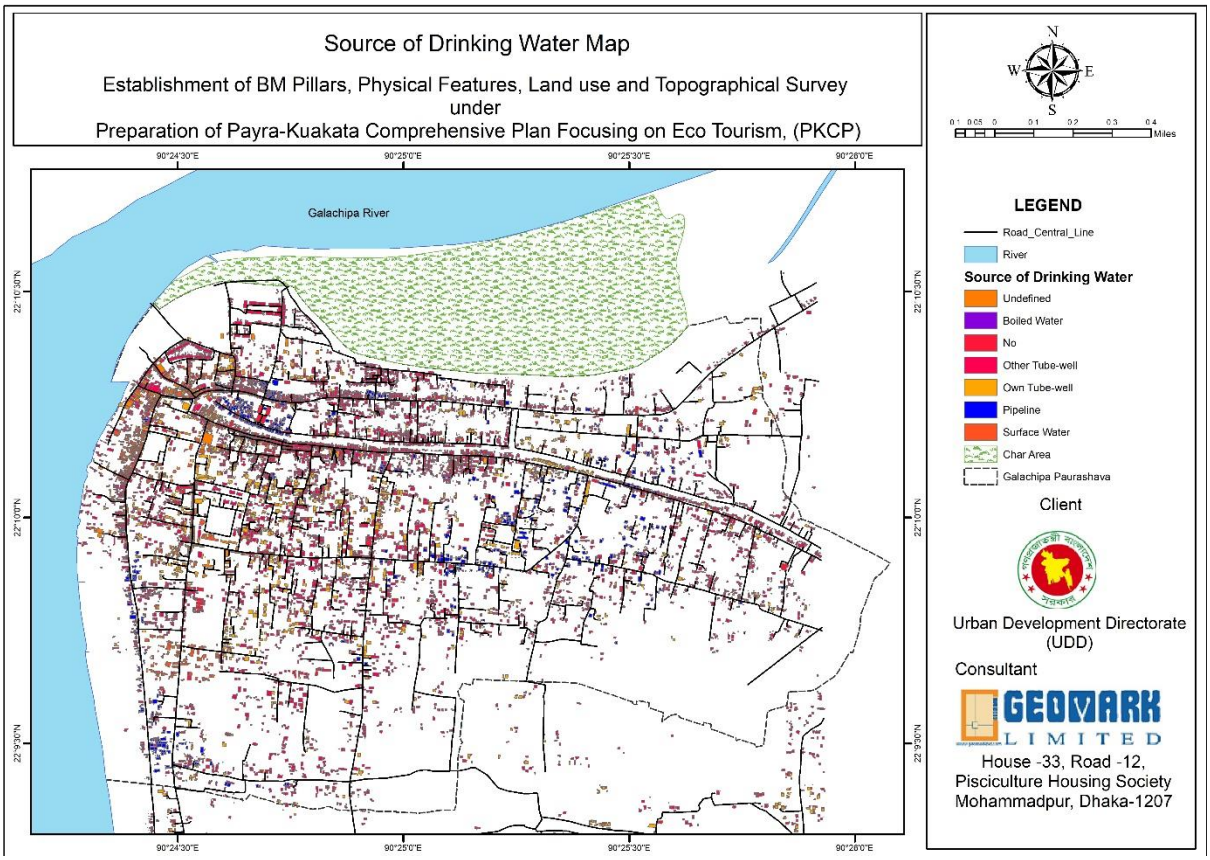
Drinking Water	Frequency	Percentage (%)
Boiled Water	1	0.01
No	4863	37.47
Other Tube-well	6163	47.48
Own Tube-well	764	5.89
Pipeline	691	5.32
Surface Water	498	3.84
Total	12980	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-1: Source of drinking water



Map 4-1 Source of drinking water

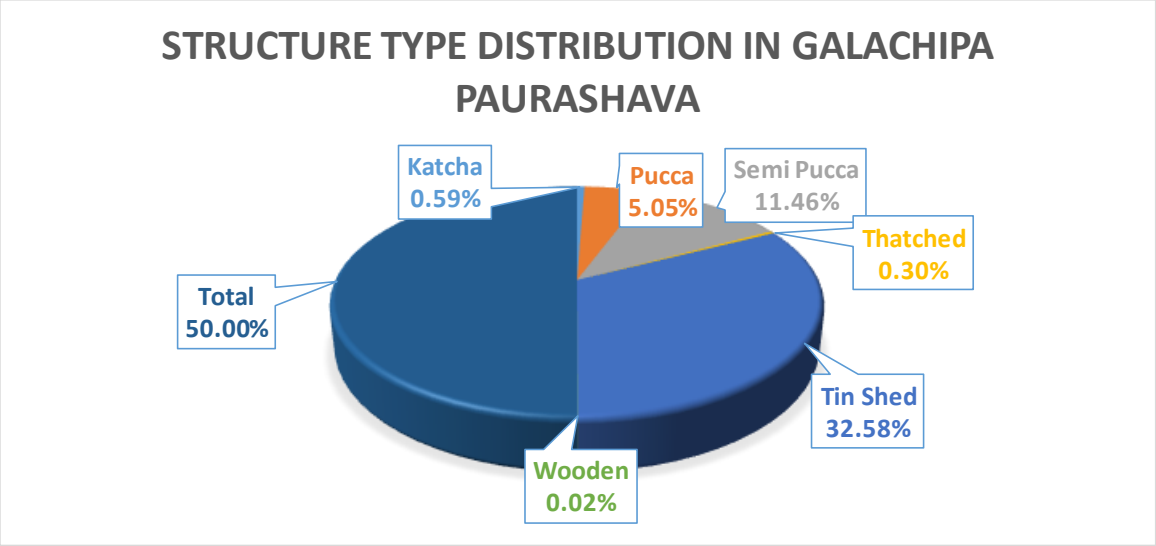
4.1.2 Structure Type:

In Galachipa Paurashava, majority of the houses (65.15 %) are Tin Shed. Pucca and Semi pucca has been found 10.09 % and 22.92 % respectively. See figure 7-2.

Table 4-2 Structure Type Distribution

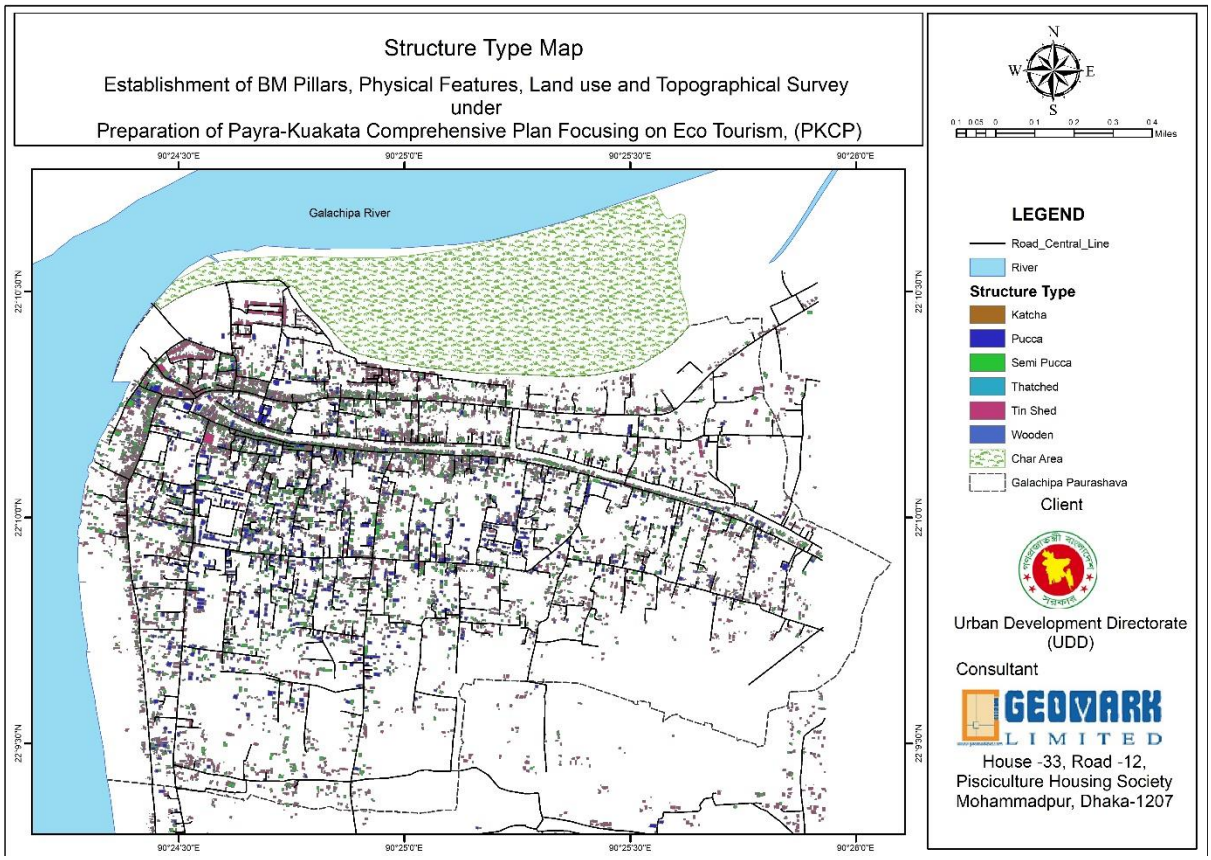
Structure Type	Frequency	Percentage (%)
Katcha	154	1.19
Pucca	1310	10.09
Semi Pucca	2975	22.92
Thatched	78	0.60
Tin Shed	8457	65.15
Wooden	6	0.05
Total	12980	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-2: Structure Type Distribution



Map 4-2 Structure Type Map

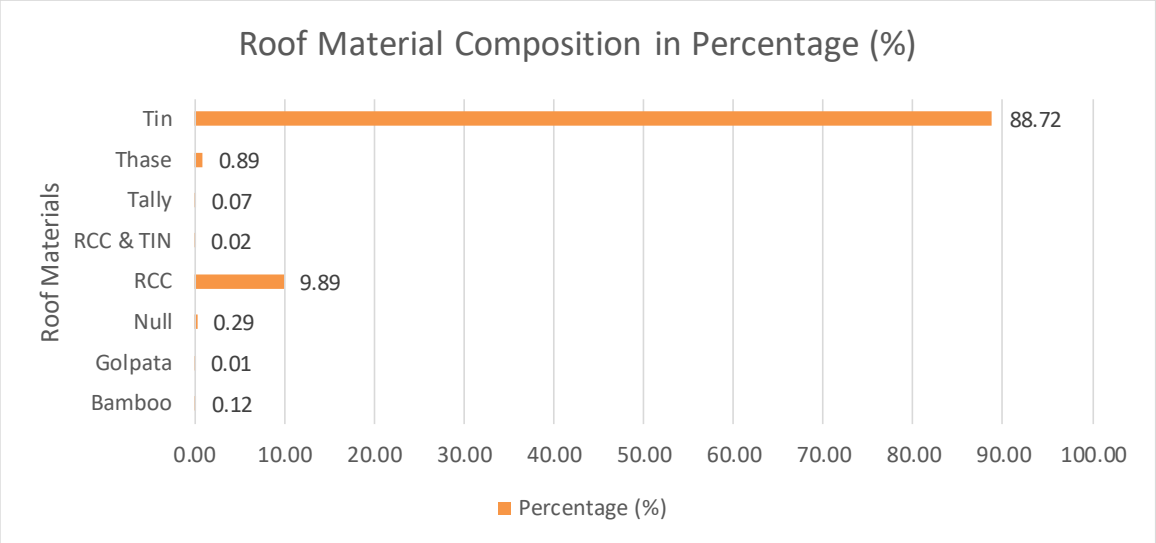
4.1.3 Roof Material:

In Galachipa Paurashava, most of the structures are Tin Shed (88.72 %). And a good number of structures (9.89 %) roof material is RCC. See figure 7-3.

Table 4-3 Roof Material

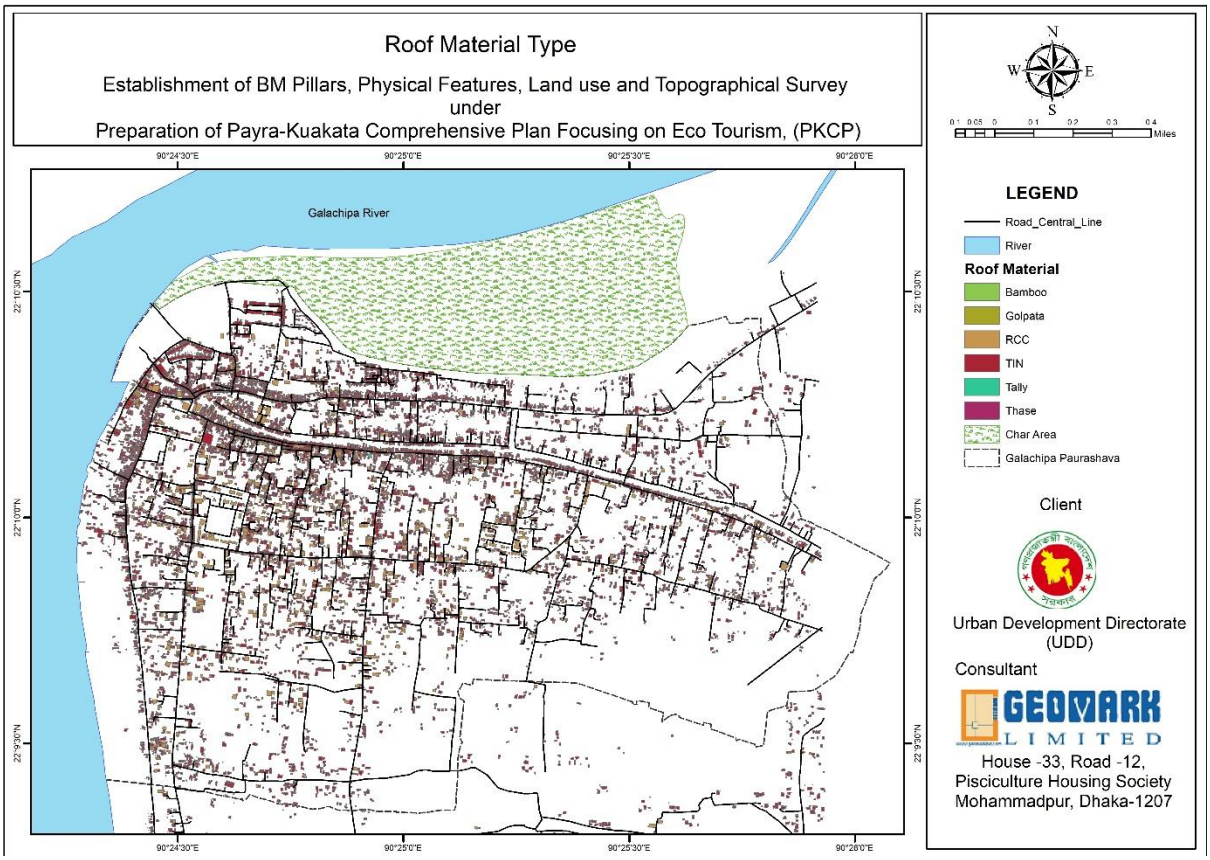
Roof Material	Frequency	Percentage (%)
Bamboo	16	0.12
Golpata	1	0.01
Null	37	0.29
RCC	1284	9.89
RCC & TIN	2	0.02
Tally	9	0.07
Thase	115	0.89
Tin	11516	88.72
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-3 Roof Material



Map 4-3 Roof Material Type Map

4.1.4 Wall Material:

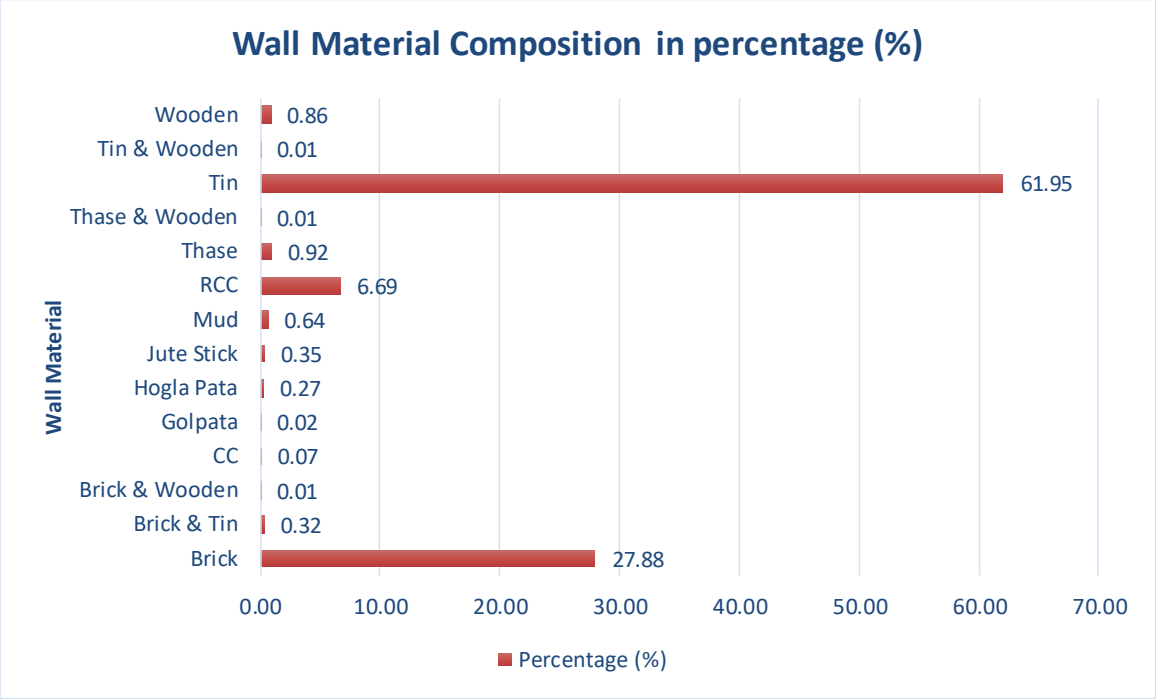
In Galachipa Paurashava, Tin has been used as wall material for almost 61.95 percent of the total structures. The second dominating wall material has been identified as Brick. See figure 7-4.

Table 4-4 Wall Material

Wall Material	Frequency	Percentage (%)
Brick	3619	27.88
Brick & Tin	42	0.32
Brick & Wooden	1	0.01
CC	9	0.07
Golpata	3	0.02
Hogla Pata	35	0.27
Jute Stick	46	0.35
Mud	83	0.64
RCC	868	6.69
Thase	120	0.92
Thase & Wooden	1	0.01
Tin	8041	61.95
Tin & Wooden	1	0.01
Wooden	111	0.86

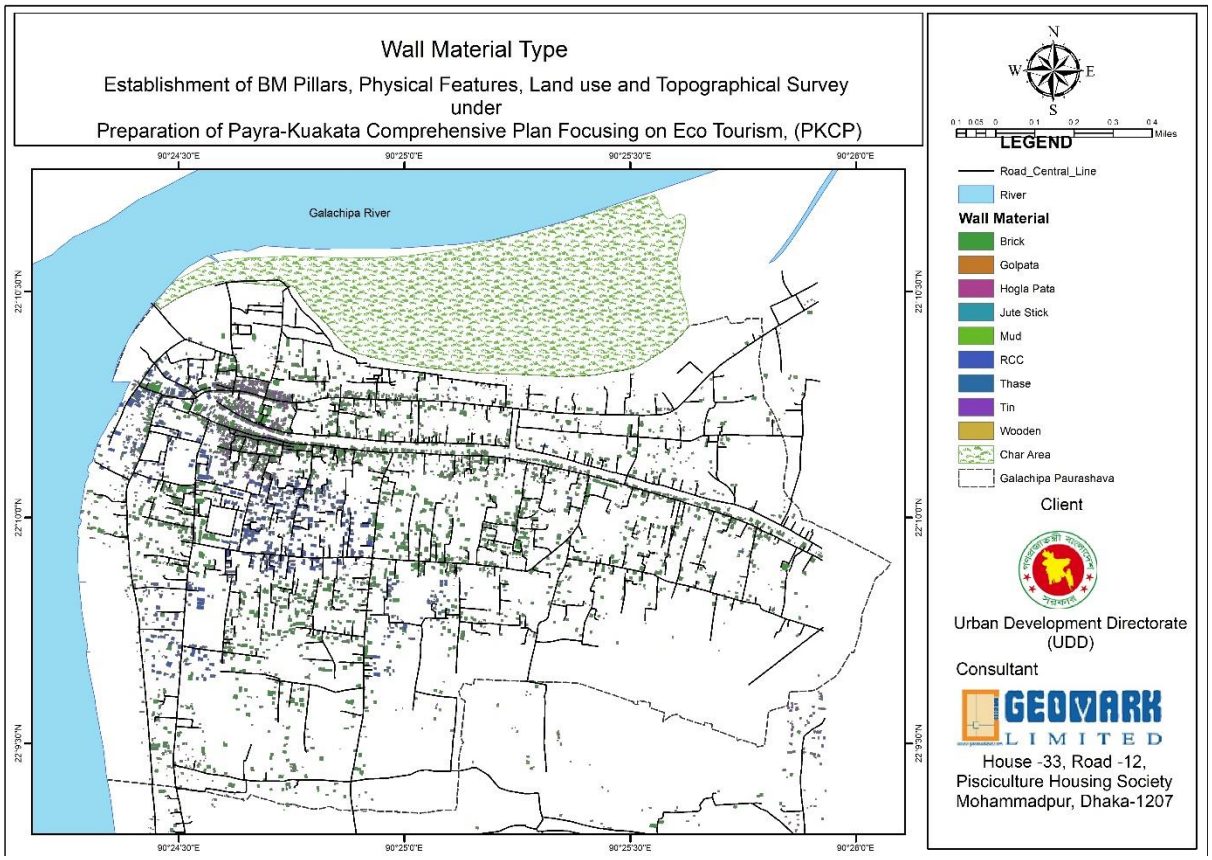
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-4 Wall Material



Map 4-4 Wall Material type Map

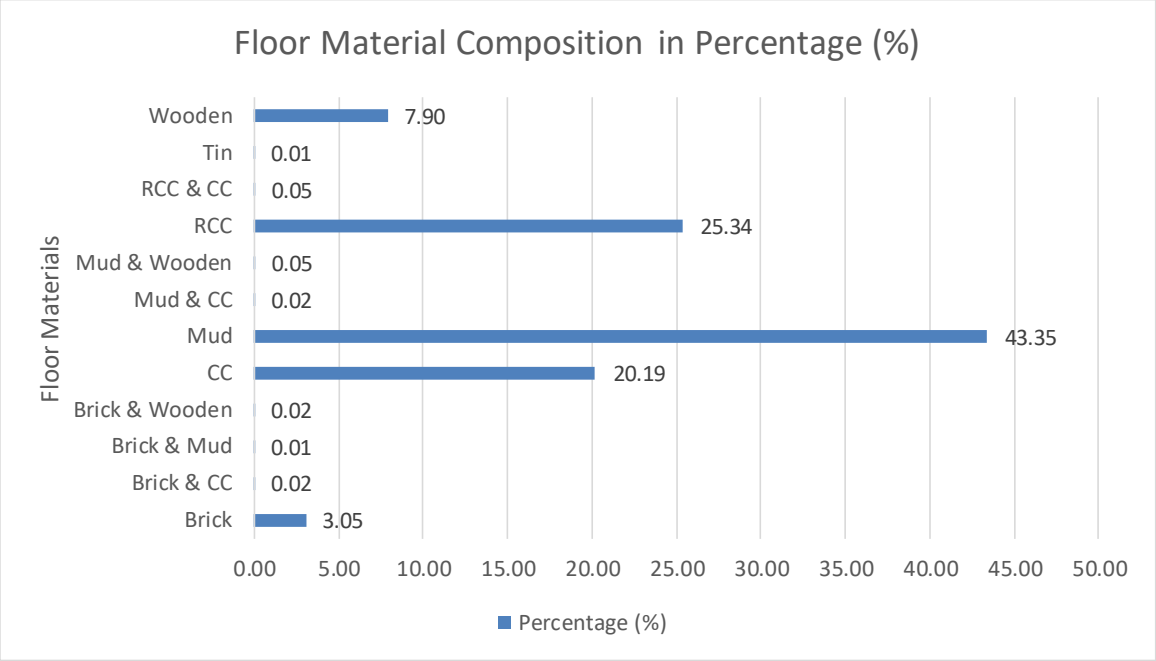
4.1.5 Floor Material:

Almost 43.35 percent has Mud Floor. Other notable compositions are RCC 25.43 percent, Cement Concrete 20.19 percent and Brick 3.05 percent. See figure 7-5.

Table 4-5 Floor Material

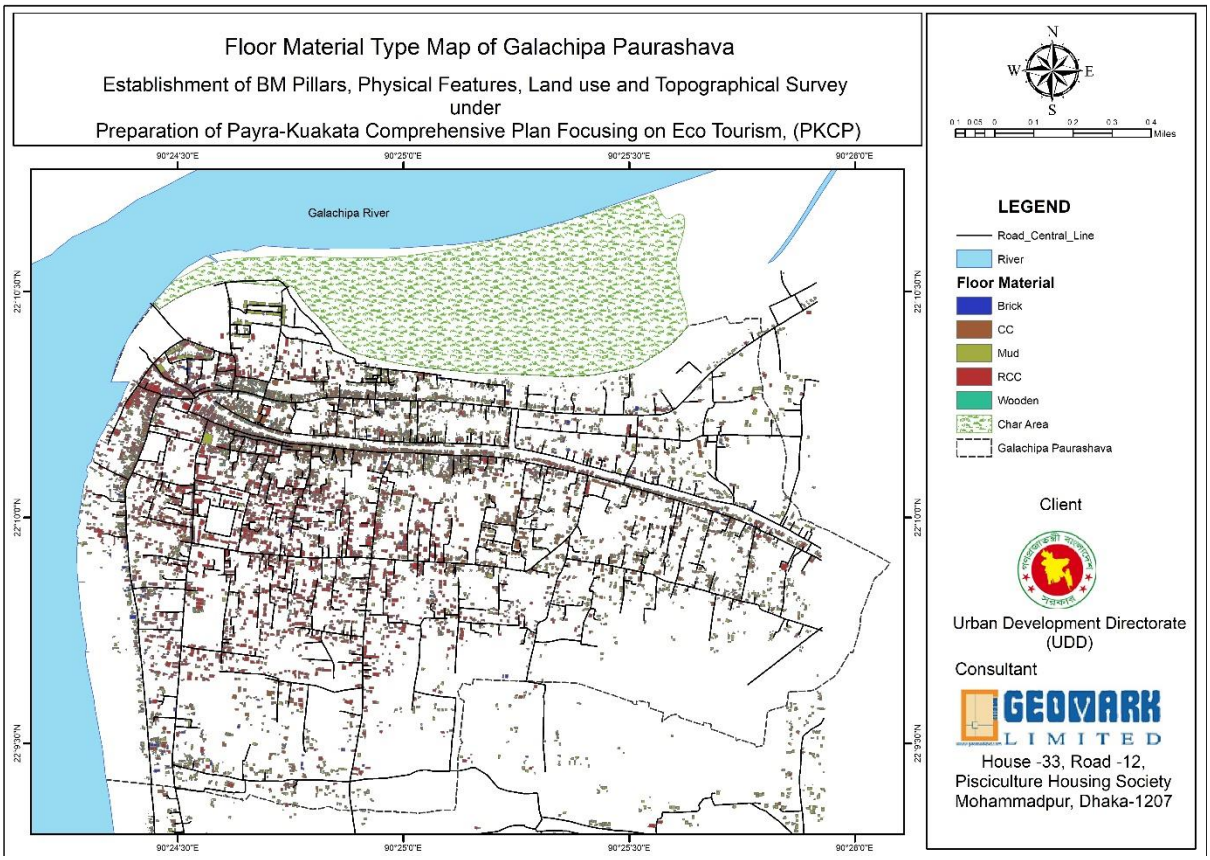
Brick	396	3.05
Brick & CC	2	0.02
Brick & Mud	1	0.01
Brick & Wooden	2	0.02
CC	2621	20.19
Mud	5627	43.35
Mud & CC	3	0.02
Mud & Wooden	6	0.05
RCC	3289	25.34
RCC & CC	6	0.05
Tin	1	0.01
Wooden	1026	7.90
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-5 Floor Material



Map 4-5 Floor Material Type Map

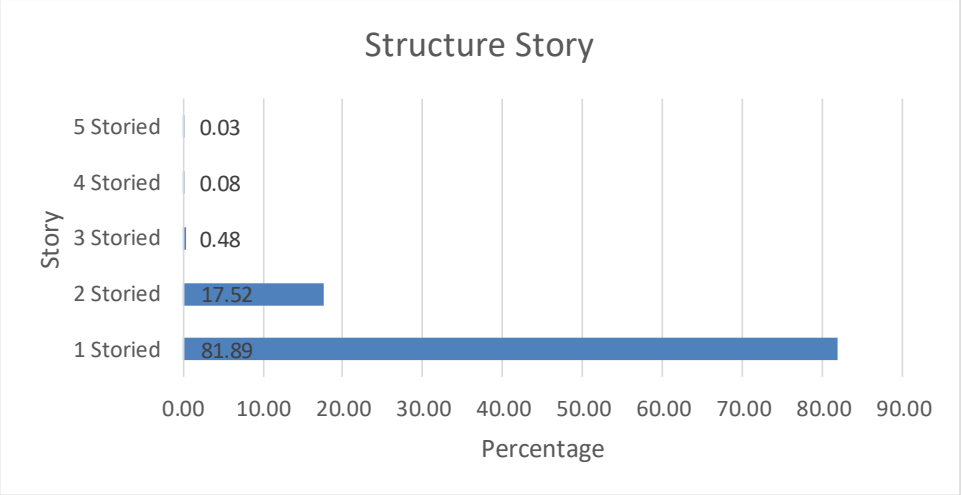
4.1.6 Number of Floors:

In Galachipa Paurashava, it seems that majority of the structures are mono storied (almost 81.89 %). But a good number of 2 storied Buildings are also there. See figure 7-6.

Table 4-6 Structure Story

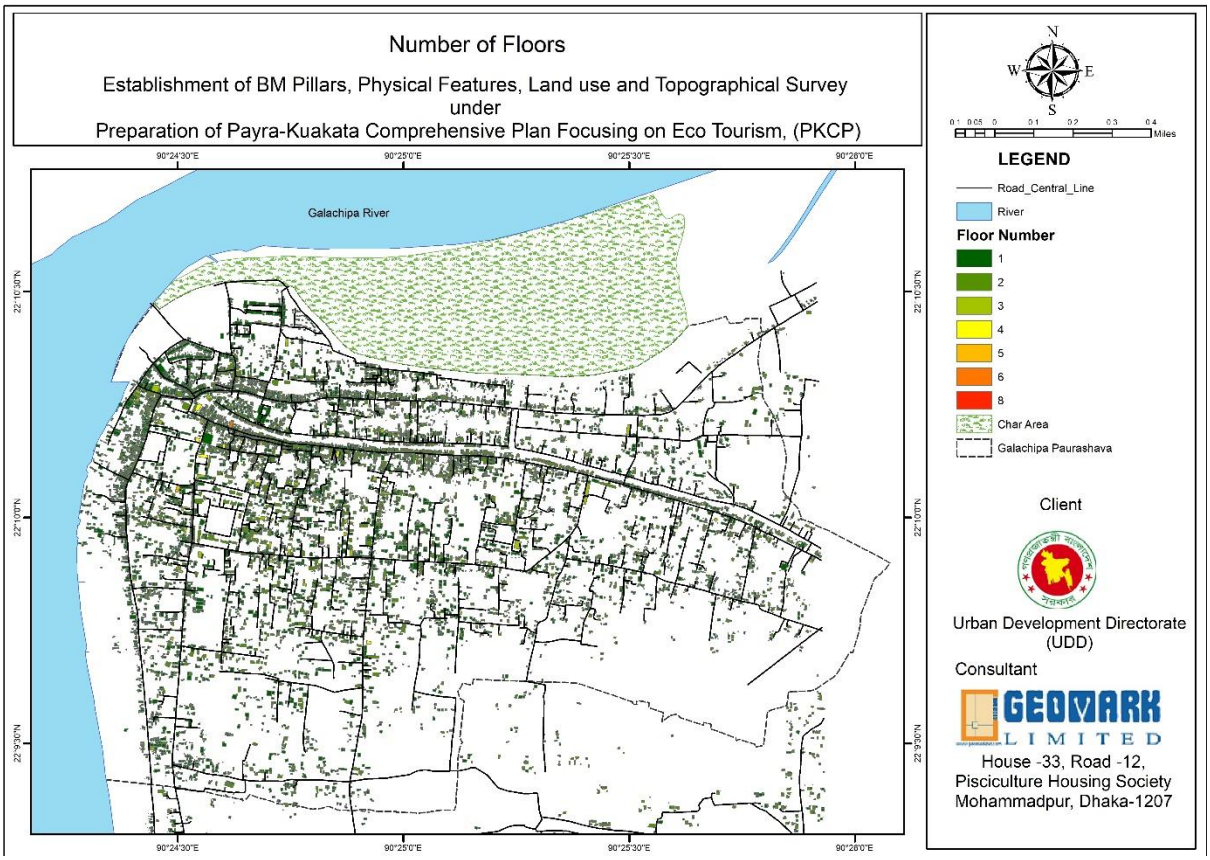
Story	Frequency	Percentage (%)
1 Storied	10629	81.89
2 Storied	2274	17.52
3 Storied	62	0.48
4 Storied	11	0.08
5 Storied	4	0.03
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-6 Structure Story



Map 4-6 Structure Story Map

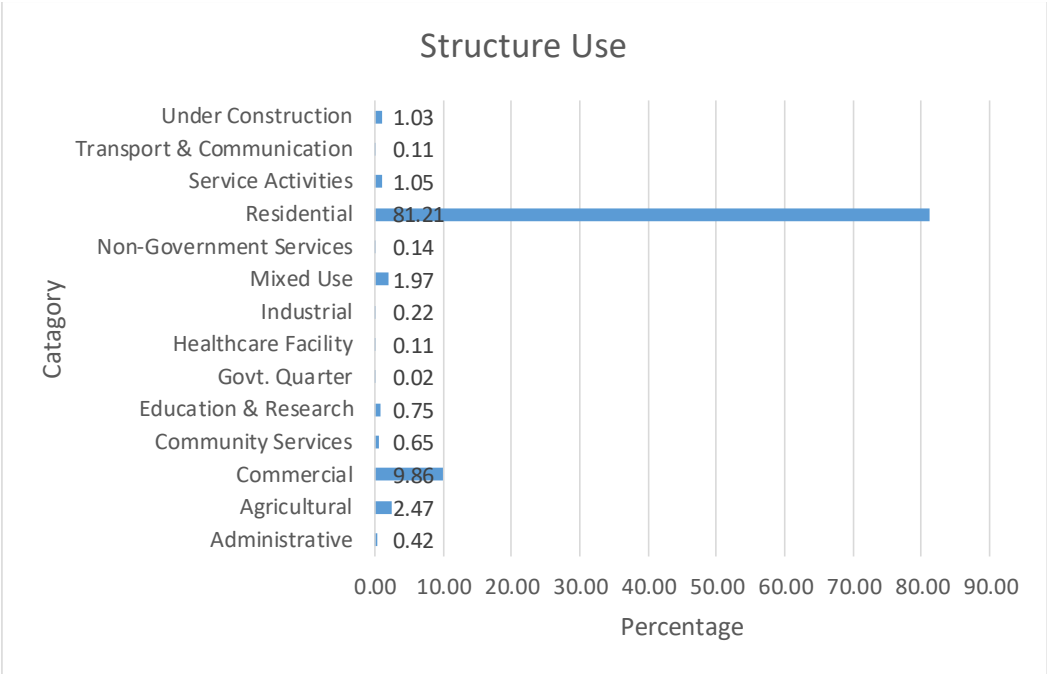
4.1.7 Structure Use:

Almost 81.21 percent of the structures are being used as residential purpose. The second dominating use is commercial use. See figure 7-7.

Table 4-7 Structure Use

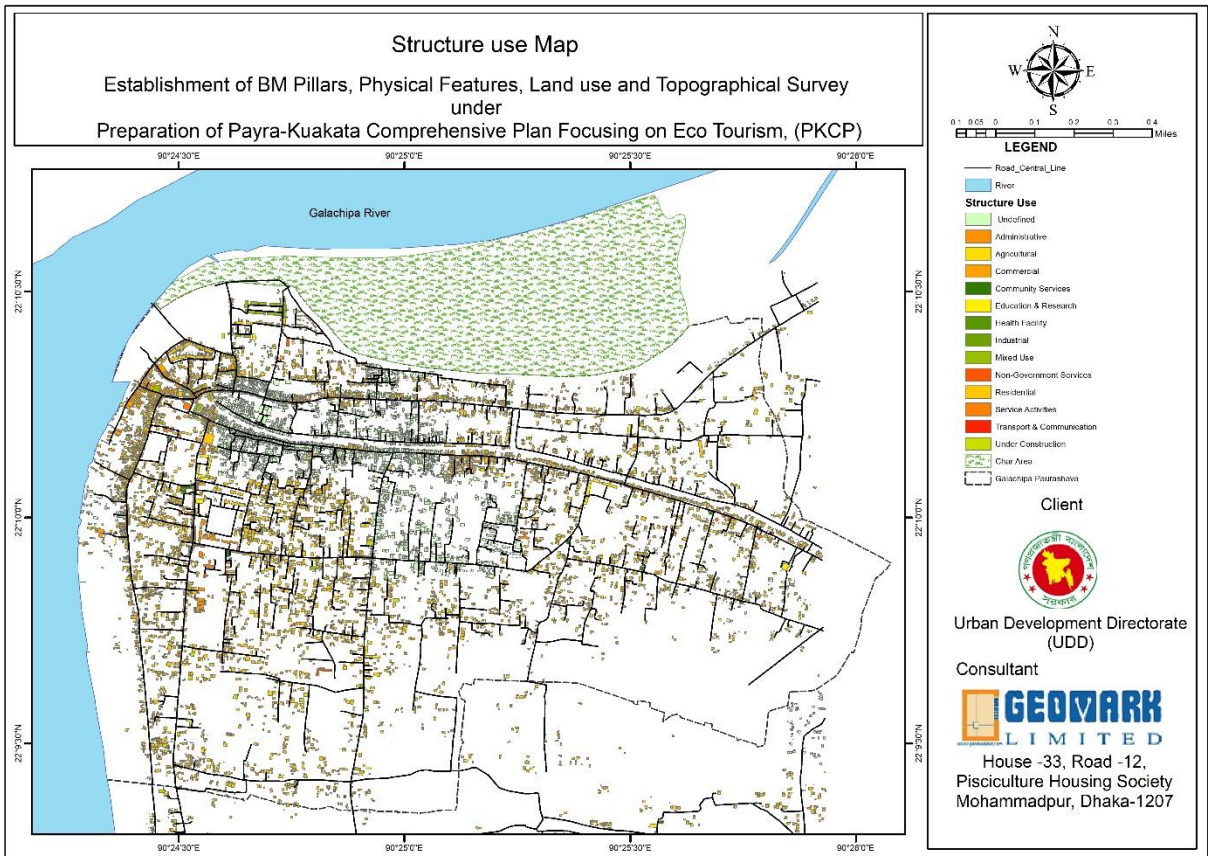
Structure Use	Frequency	Percentage (%)
Administrative	54	0.42
Agricultural	321	2.47
Commercial	1280	9.86
Community Services	85	0.65
Education & Research	97	0.75
Govt. Quarter	2	0.02
Healthcare Facility	14	0.11
Industrial	28	0.22
Mixed Use	256	1.97
Non-Government Services	18	0.14
Residential	10541	81.21
Service Activities	136	1.05
Transport & Communication	14	0.11
Under Construction	134	1.03
Total	12980	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-7 Structure Use



Map 4-7 Structure use Map

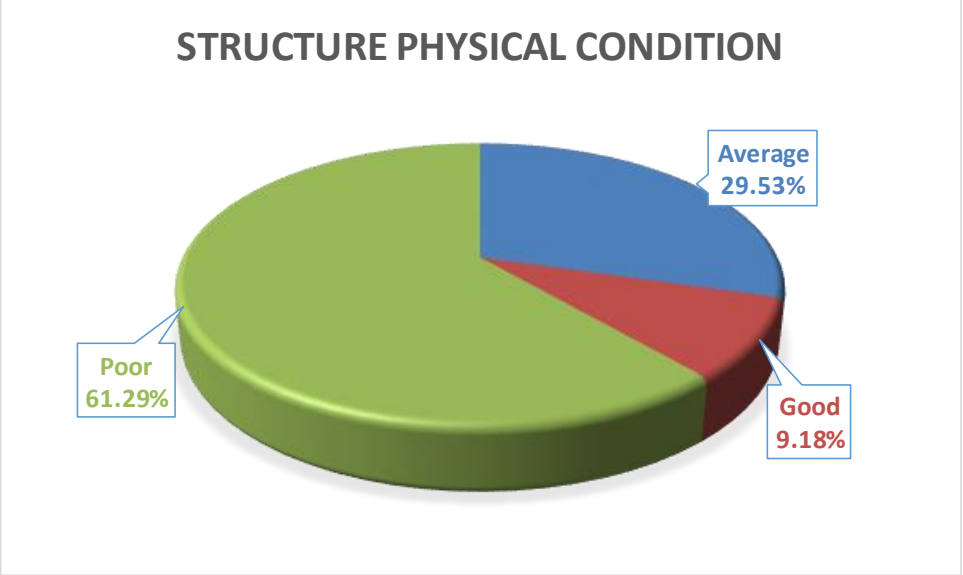
4.1.8 Structure Physical Condition:

In galachipa paurashava, majority of the structures are physically poor in condition, 29.53 percent are in average condition and only 9.18 percent are in good condition. See figure 7-8.

Table 4-8 Structure Physical Condition

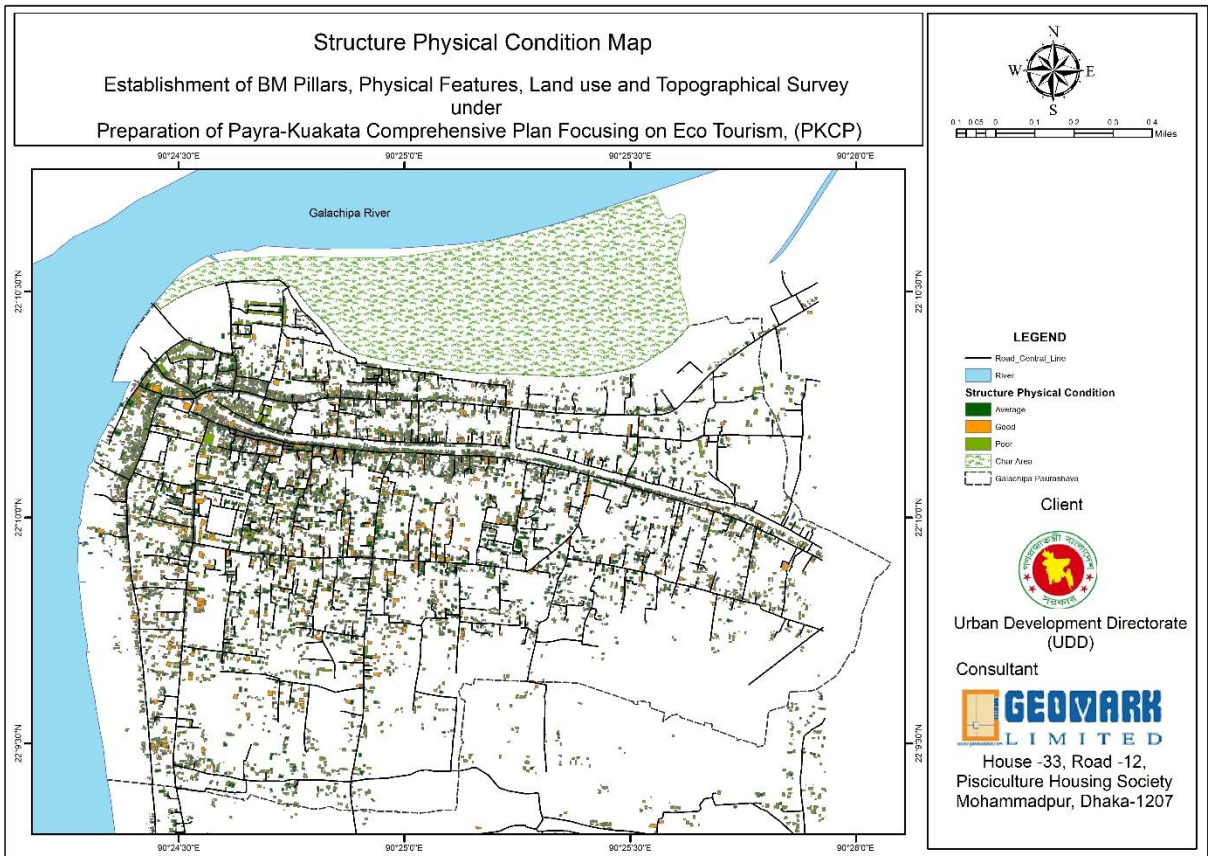
Structure Physical Condition	Frequency	Percentage (%)
Average	3833	29.53
Good	1191	9.18
Poor	7956	61.29
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-8 Structure Physical Condition



Map 4-8 Structure Physical Condition Map

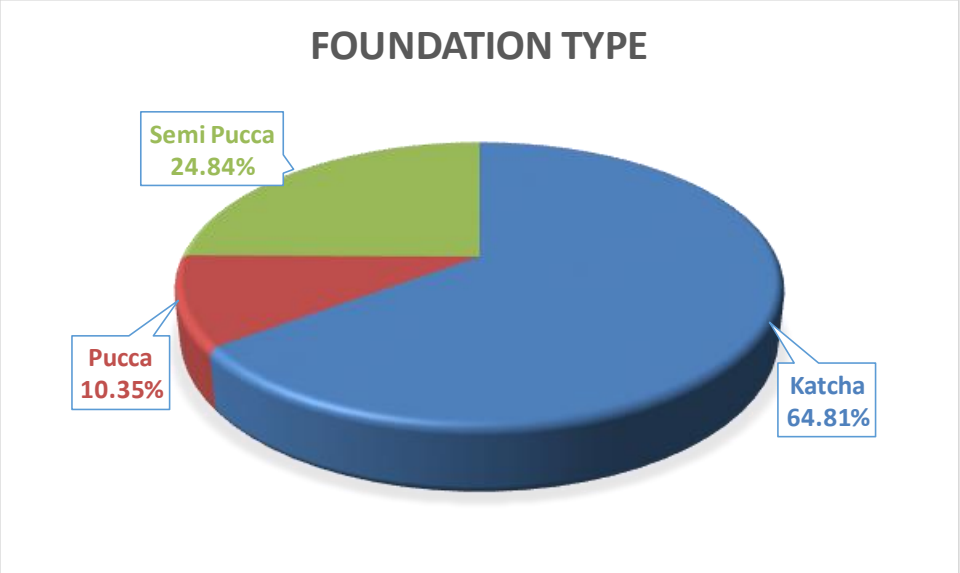
4.1.9 Foundation Type:

Majority of the structure foundations are Katcha. Semi-Pucca and Pucca are 24.84 % and 10.35 % respectively. See figure 7-9.

Table 4-9 Foundation Type

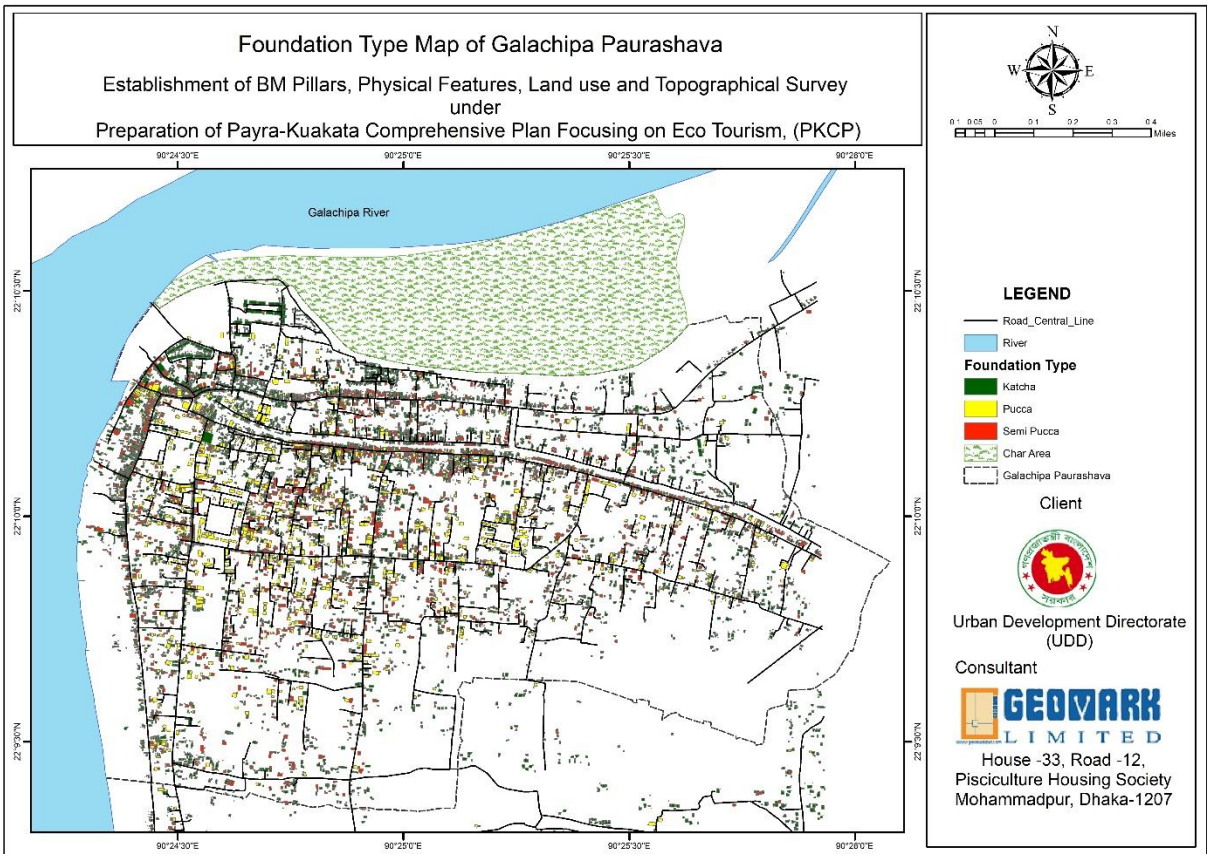
Foundation Type	Frequency	Percentage (%)
Katcha	8412	64.81
Pucca	1344	10.35
Semi Pucca	3224	24.84
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-9 Foundation Type



Map 4-9 Foundation Type Map

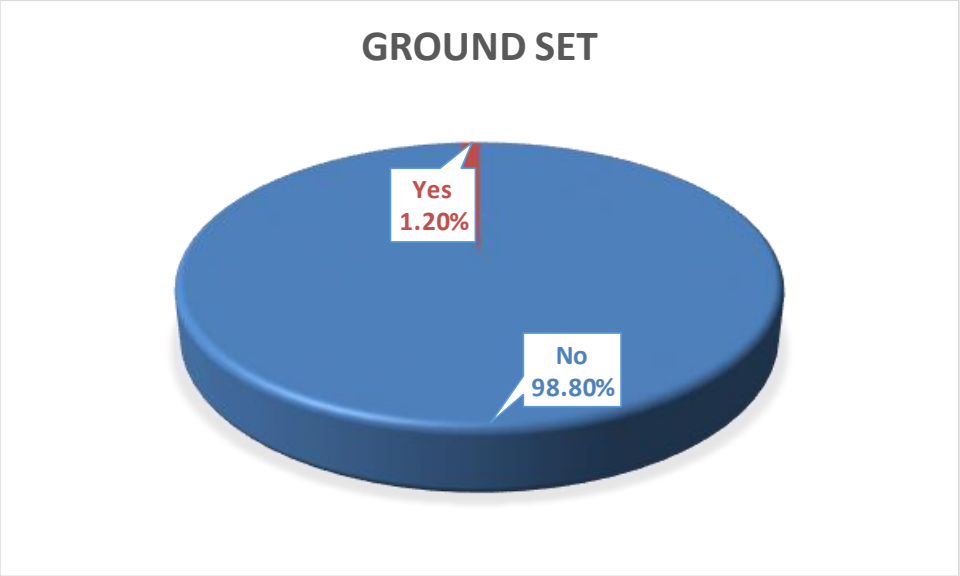
4.1.10 Ground Set:

Ground Set has not been detected for almost 98.8 percent of the structures. See figure 7-10.

Table 4-10 Ground Set

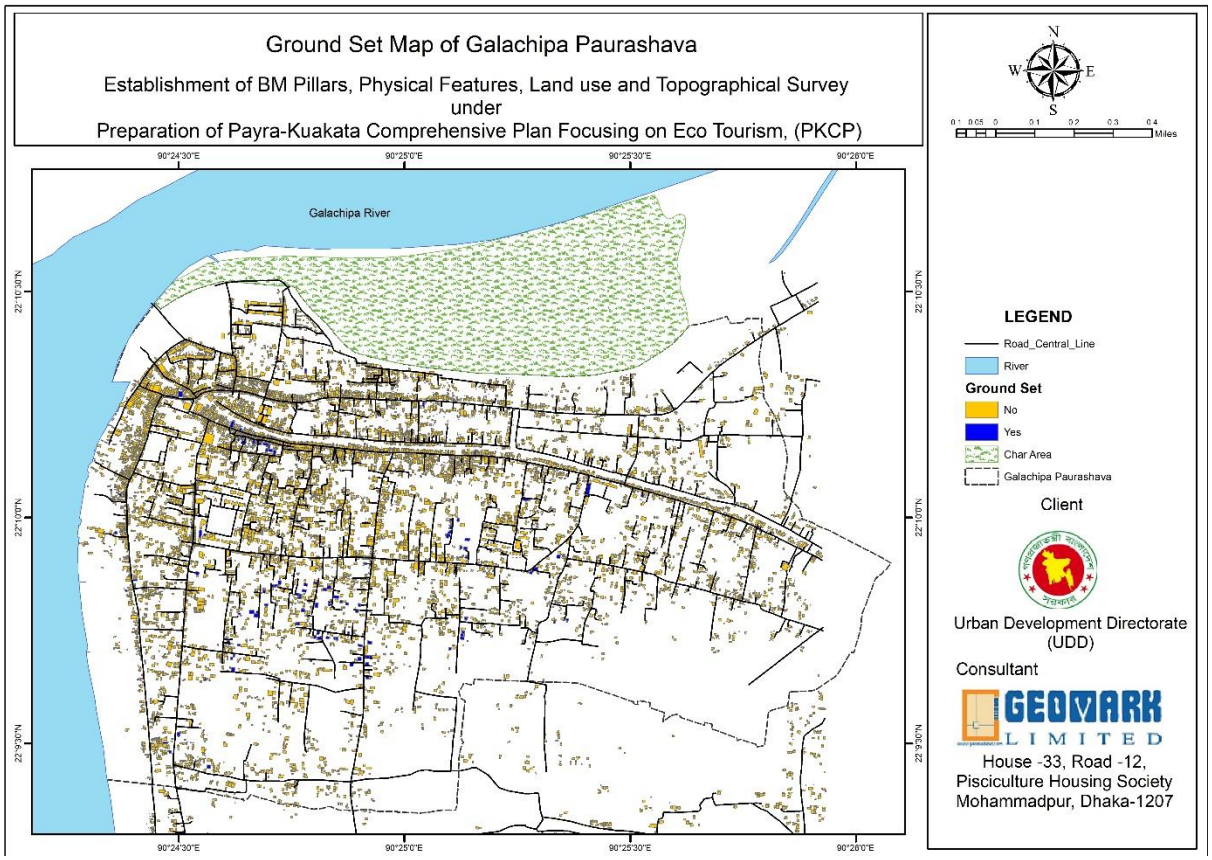
Ground Set	Frequency	Percentage (%)
No	12824	98.80
Yes	156	1.20
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-10 Ground Set



Map 4-10 Ground Set Map

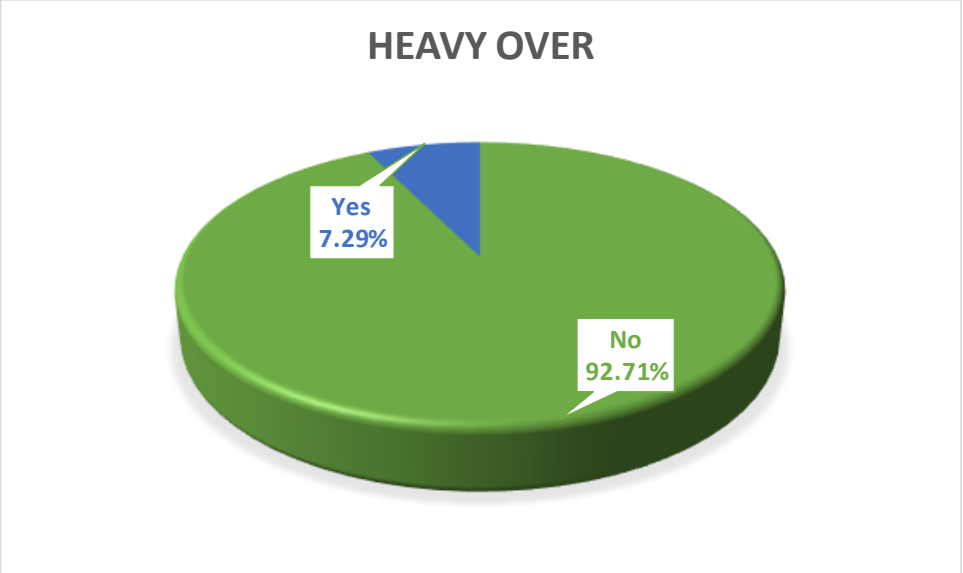
4.1.11 Heavy Over:

Heavy Over has not been detected for almost 92.71 percent of the structures. See figure 7-11.

Table 4-11 Heavy Over

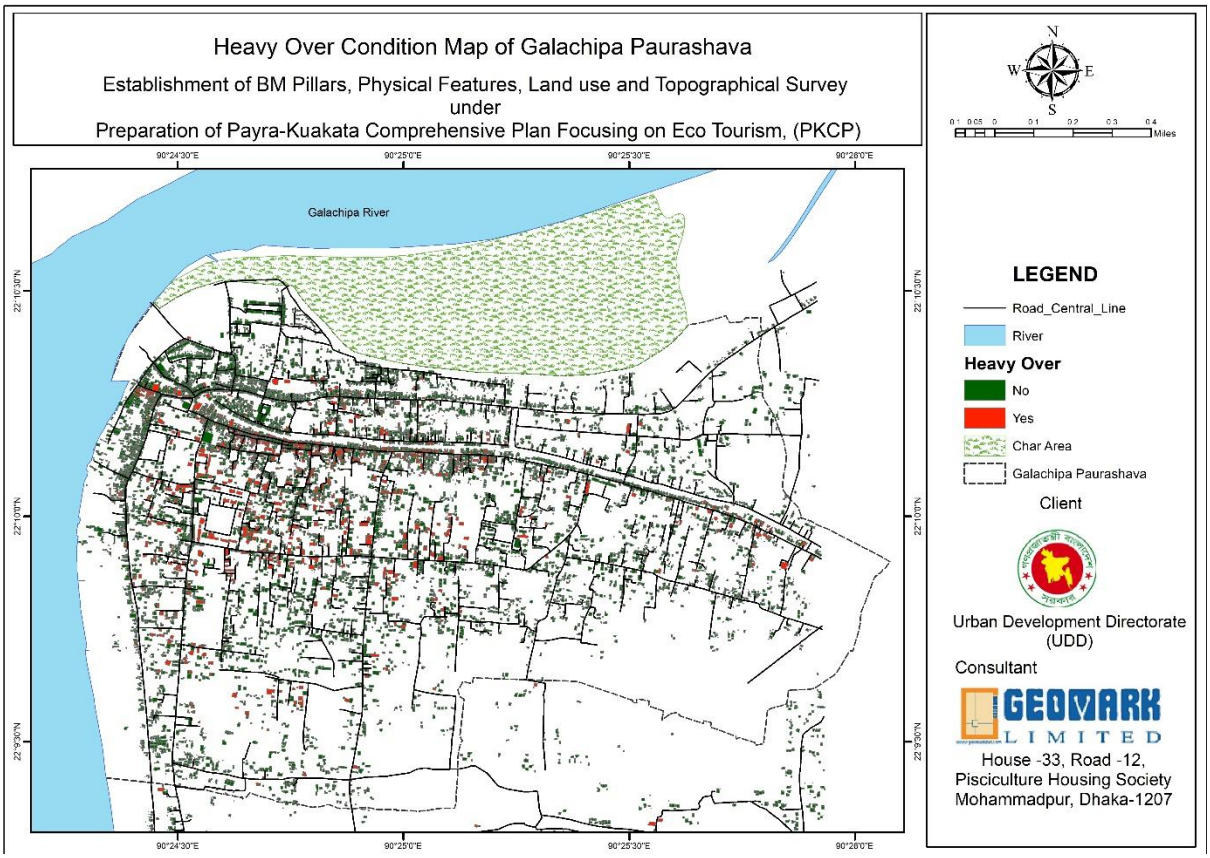
Heavy Over	Frequency	Percentage (%)
No	12034	92.711
Yes	946	7.288
Total	12980	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-11 Heavy Over



Map 4-11 Heavy Over Map

4.1.12 Pounding Possibility:

Pounding Possibility has not been detected for almost 95.93 percent of the structures. See figure 7-12.

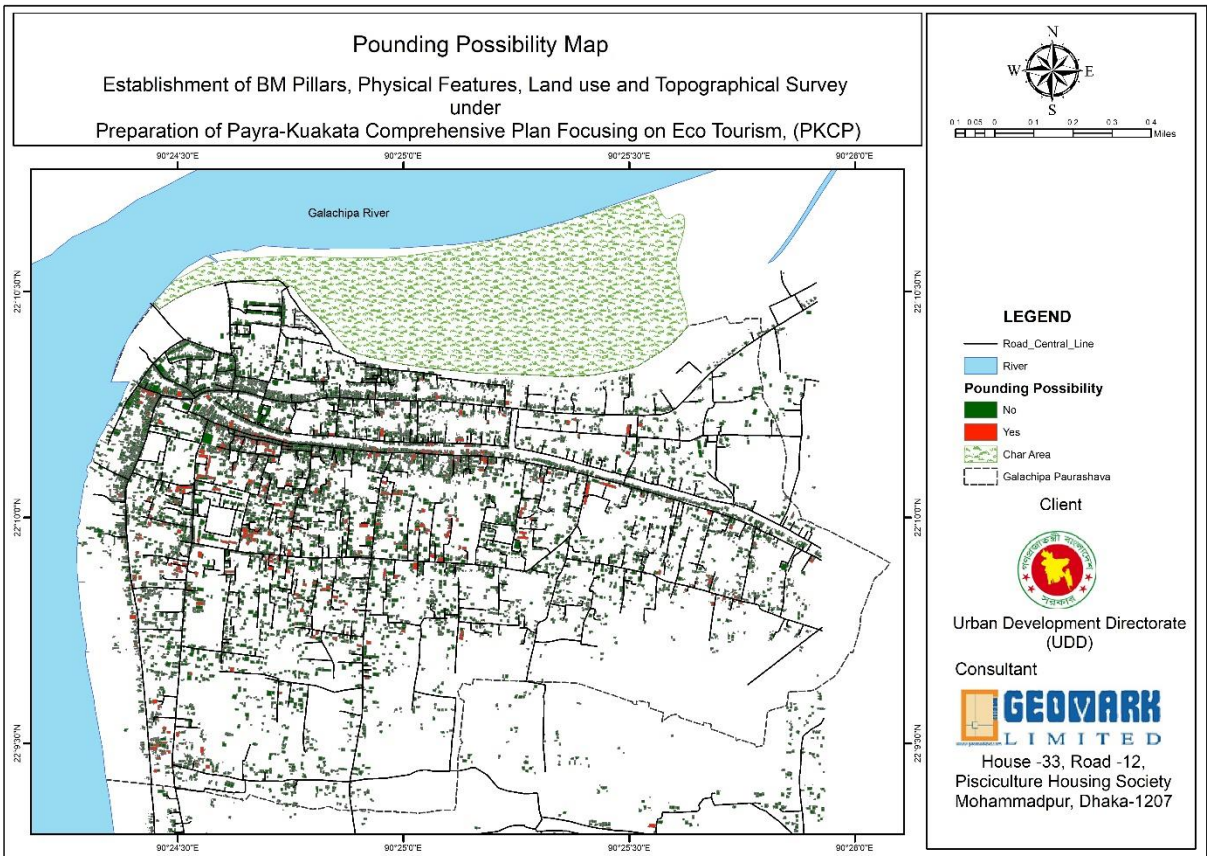
Table 4-12 Pounding Possibility

Pounding Possibility	Frequency	Percentage (%)
No	12452	95.93
Yes	528	4.07
Total	12980	100.00

Data source: UDD Field Survey, 2019

Data source: UDD Field Survey, 2019

Figure 4-12 Pounding Possibility



Map 4-12 Pounding Possibility Map

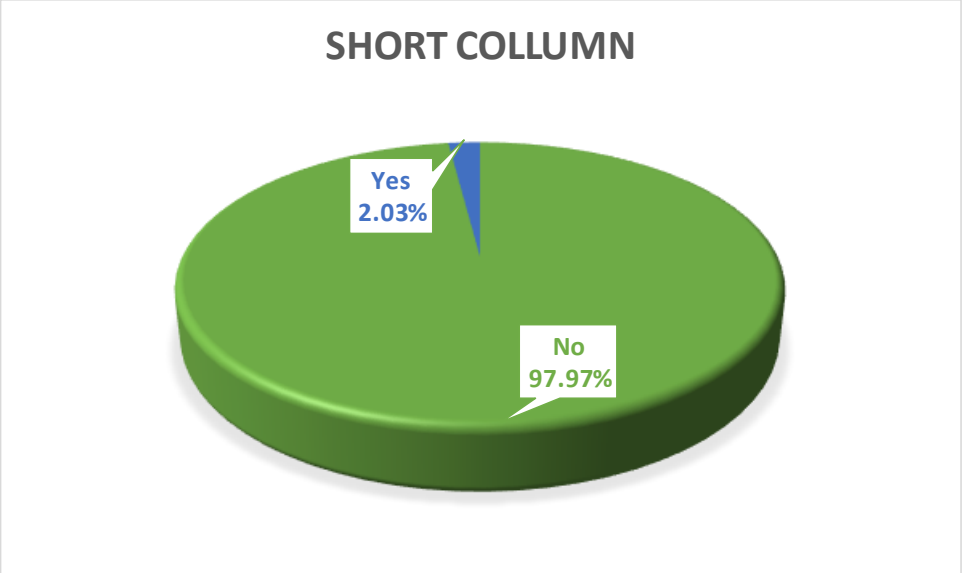
4.1.13 Short Column:

Short Column has not been detected for almost 97.97 percent of the structures. See figure 7-13.

Table 4-13 Short Column

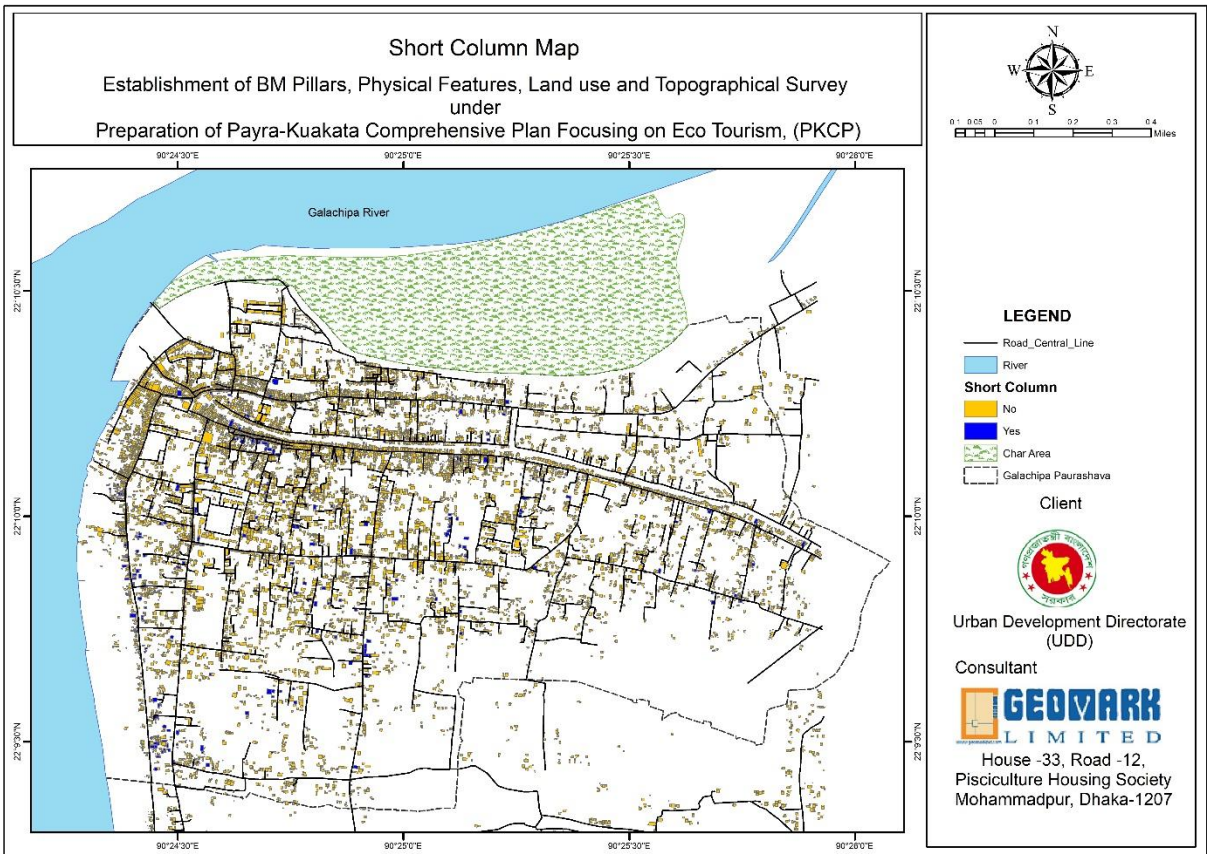
Short Column	Frequency	Percentage (%)
No	12717	97.97
Yes	263	2.03
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-13 Short Column



Map 4-13 Short Column Map

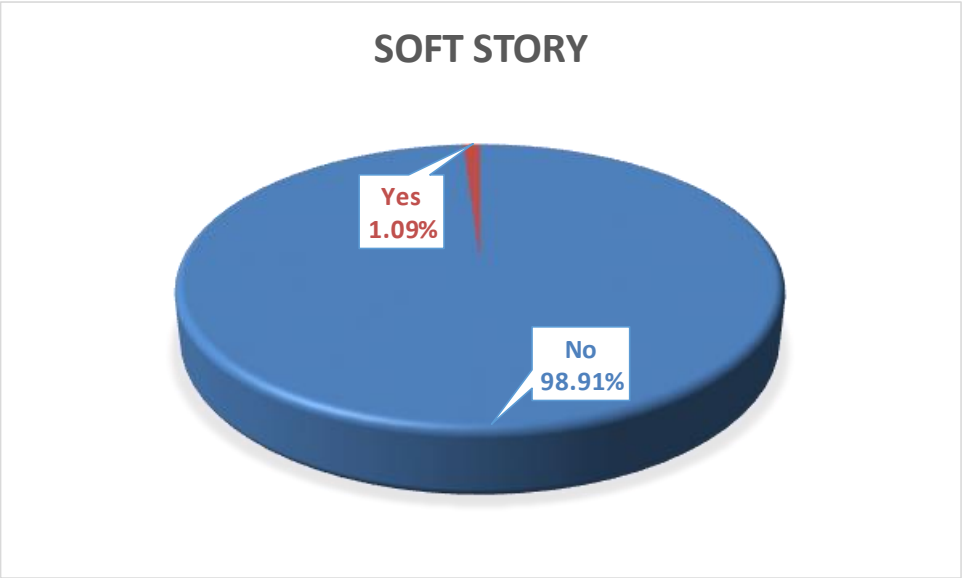
4.1.14 Soft Story:

Soft Story has not been detected for almost 98.91 percent of the structures. See figure 7-14.

Table 4-14 Soft Story

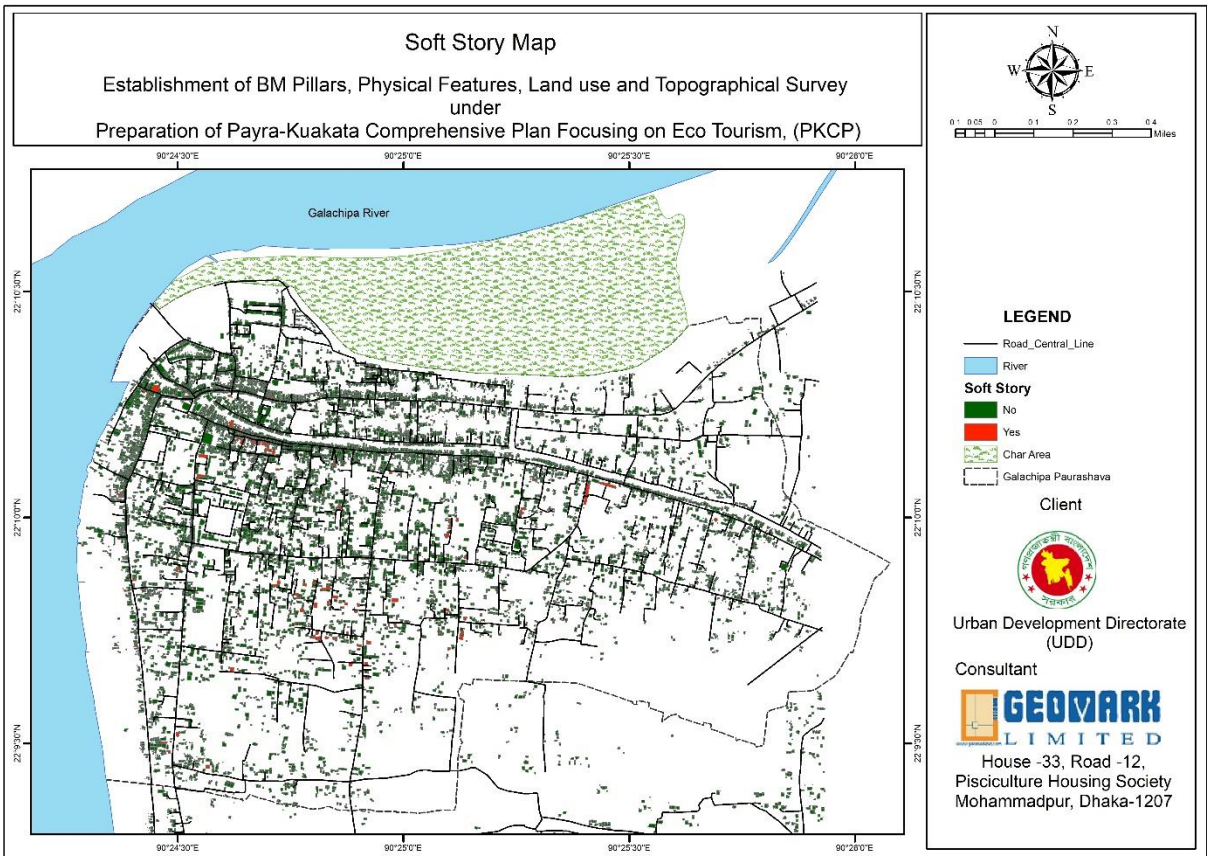
Soft Story	Frequency	Percentage (%)
No	12839	98.91
Yes	141	1.09
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-14 Soft Story



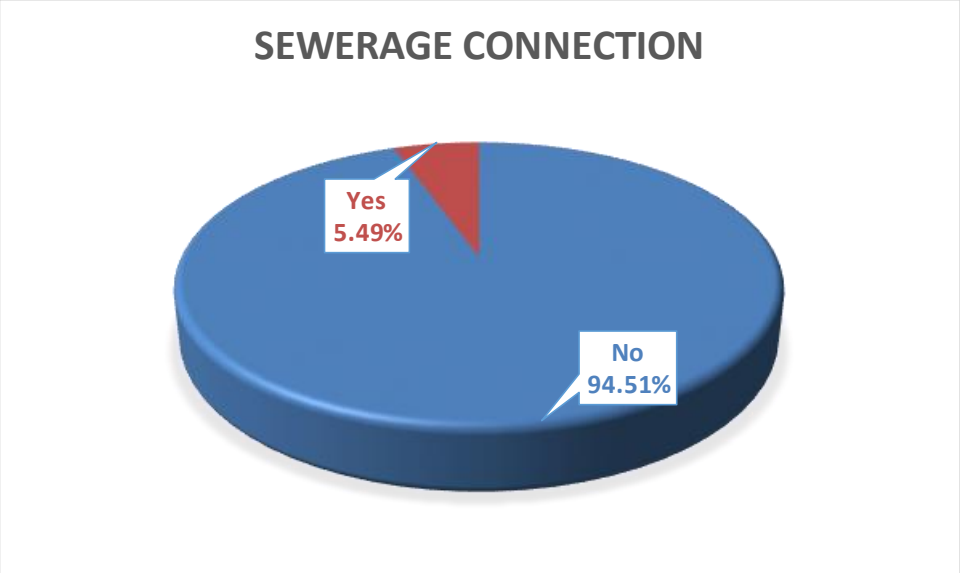
Map 4-14 Soft Story Map

4.1.15 Sewerage Connection:

Almost 94.51 percent houses are not connected to Sewerage Connection. See figure 7-15.

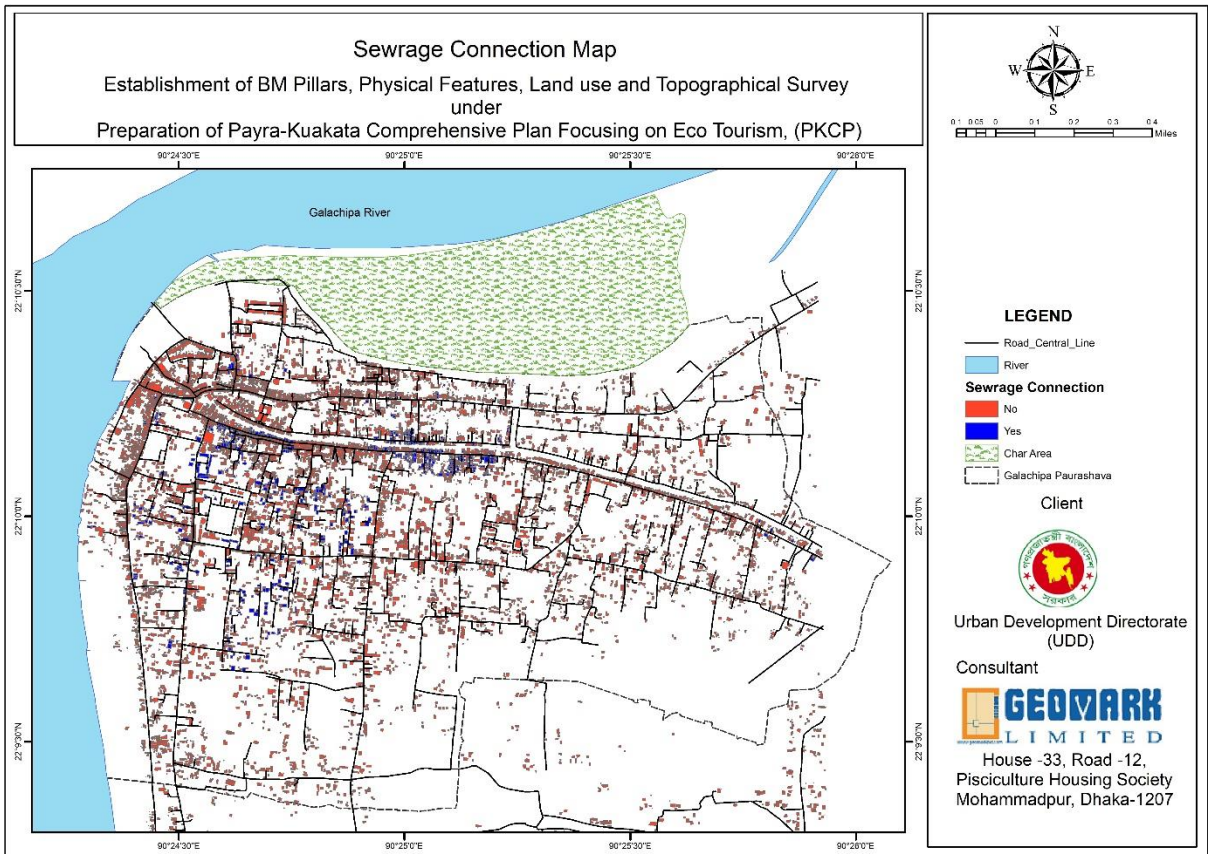
Sewerage Connection	Frequency	Percentage (%)
No	12268	94.51
Yes	712	5.49
Total	12980	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-15 Sewerage Connection



Map 4-15 Sewerage Connection Map

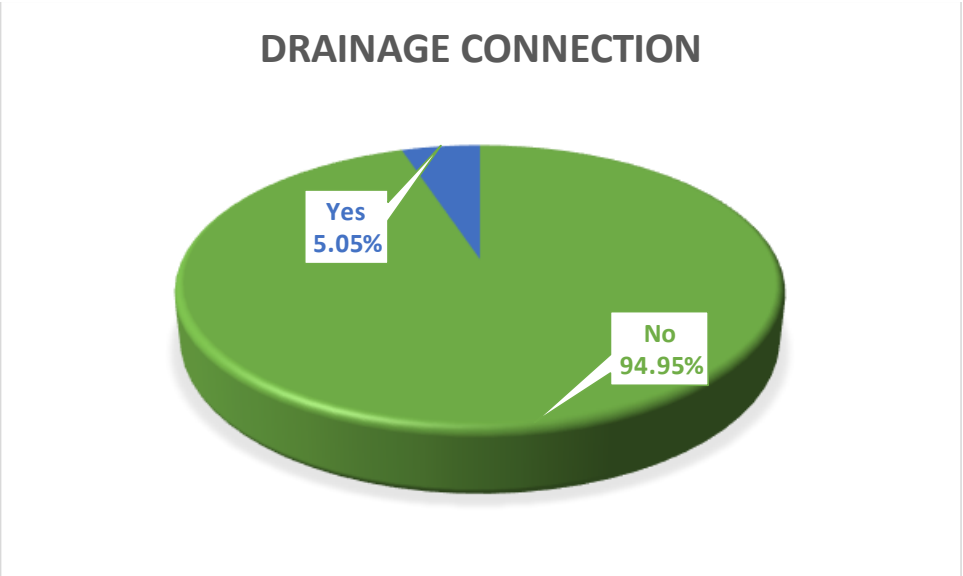
4.1.16 Drain connection:

Almost 94.95 percent houses do not have drainage connection. See figure 7-16.

Drain connection	frequency	Percentage (%)

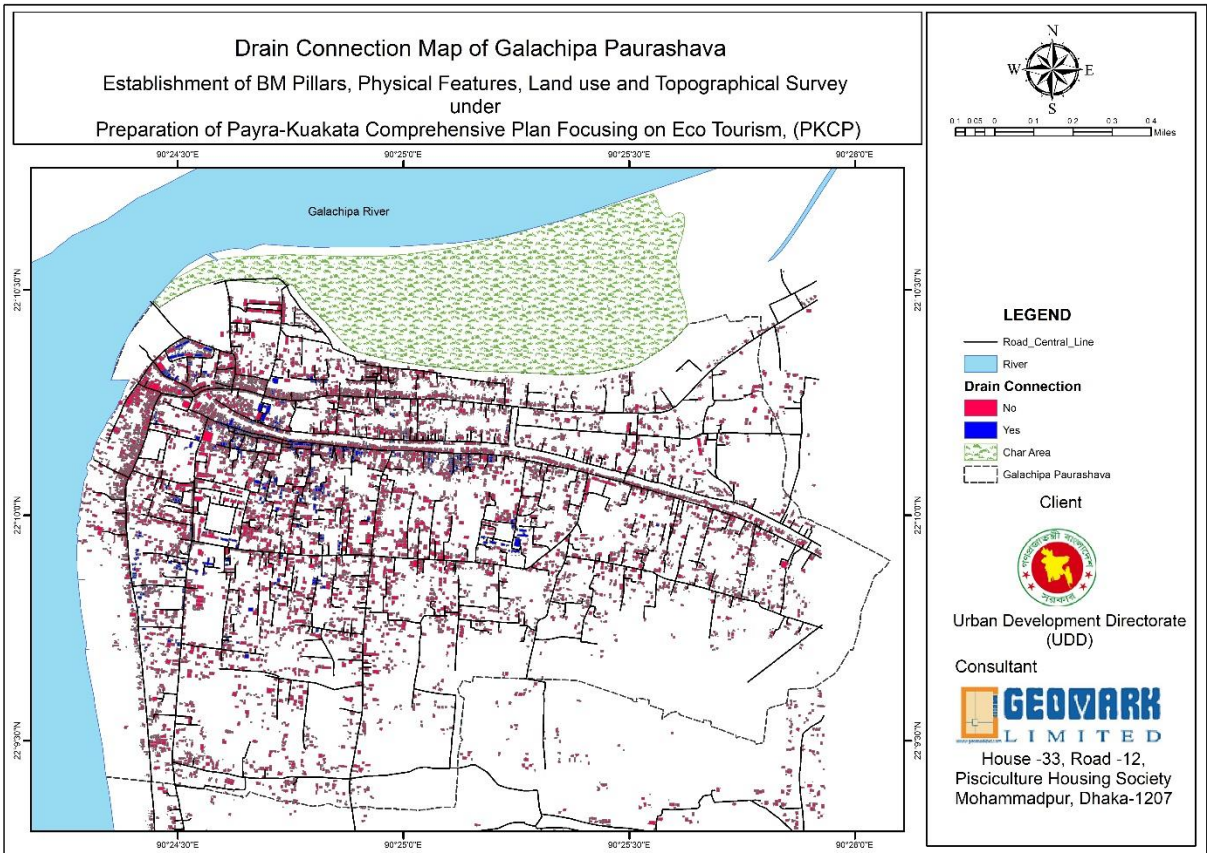
No	12325	94.95
Yes	655	5.05
Total	12980	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-16 Drain connection



Map 4-16 Drainage Connection Map

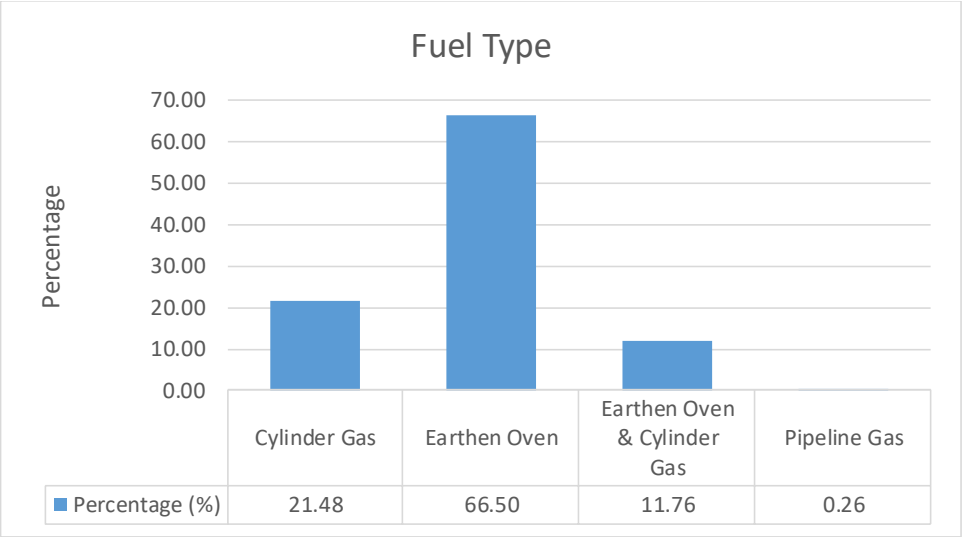
4.1.17 Source of Fuel:

In Galachipa, most of the people (66.5 %) use wood as the source of fuel in Earthen Oven. The second most popular fuel source is cylinder Gas, See figure 7-17.

Table 4-15 Source of Fuel

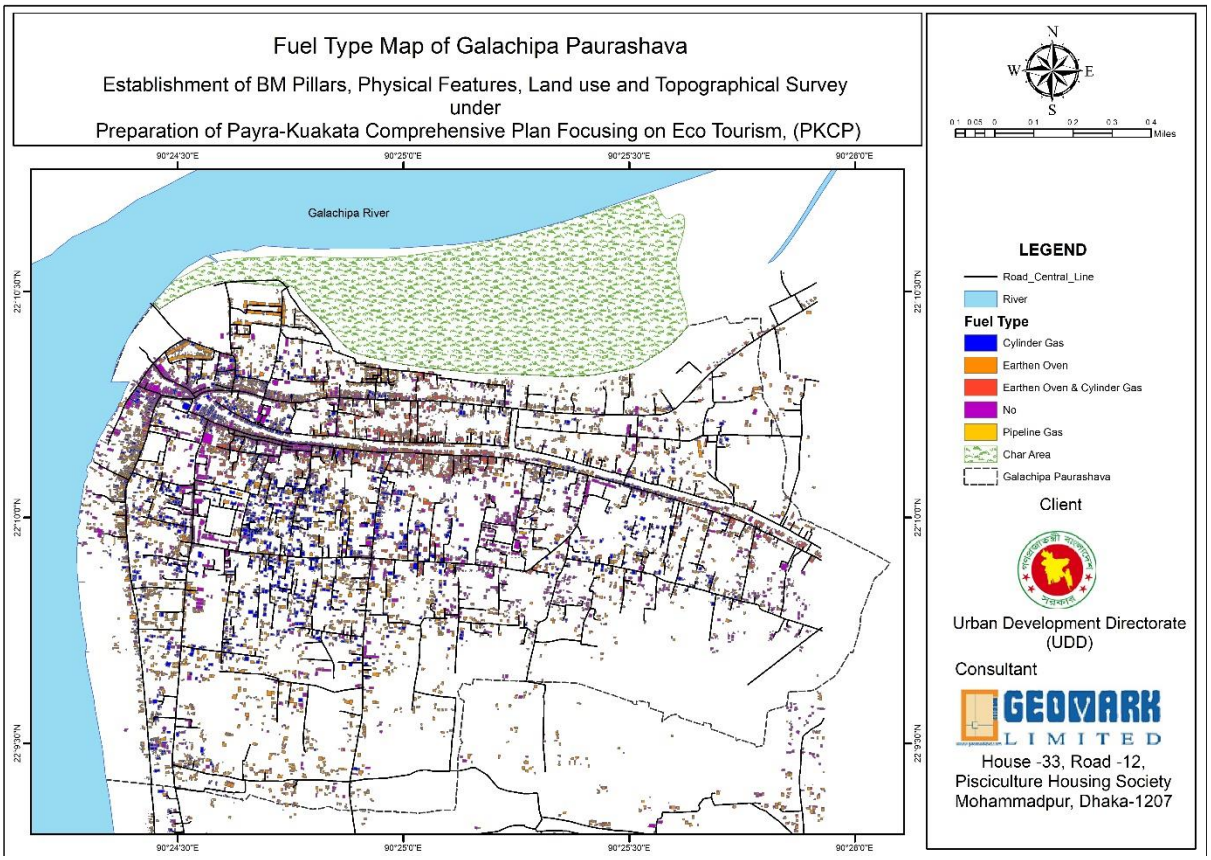
Fuel Type	Frequency	Percentage (%)
Cylinder Gas	1322	21.48
Earthen Oven	4093	66.50
Earthen Oven & Cylinder Gas	724	11.76
Pipeline Gas	16	0.26
Total	6155	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-17: Source of Fuel

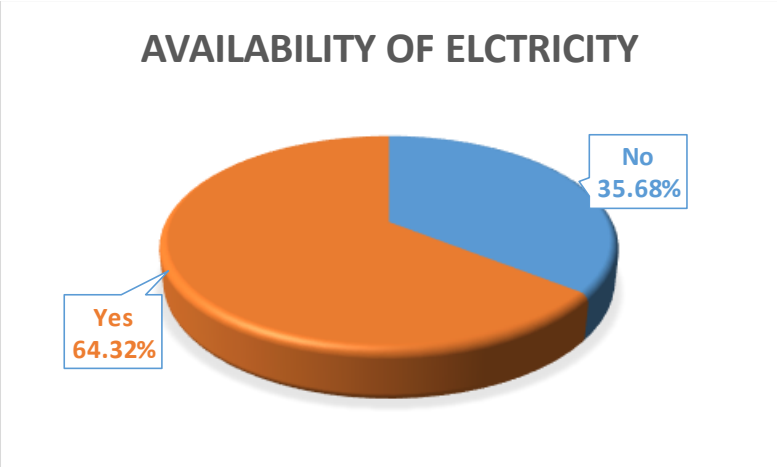


Map 4-17 Source of Fuel Map

4.1.18 Availability of Electricity:

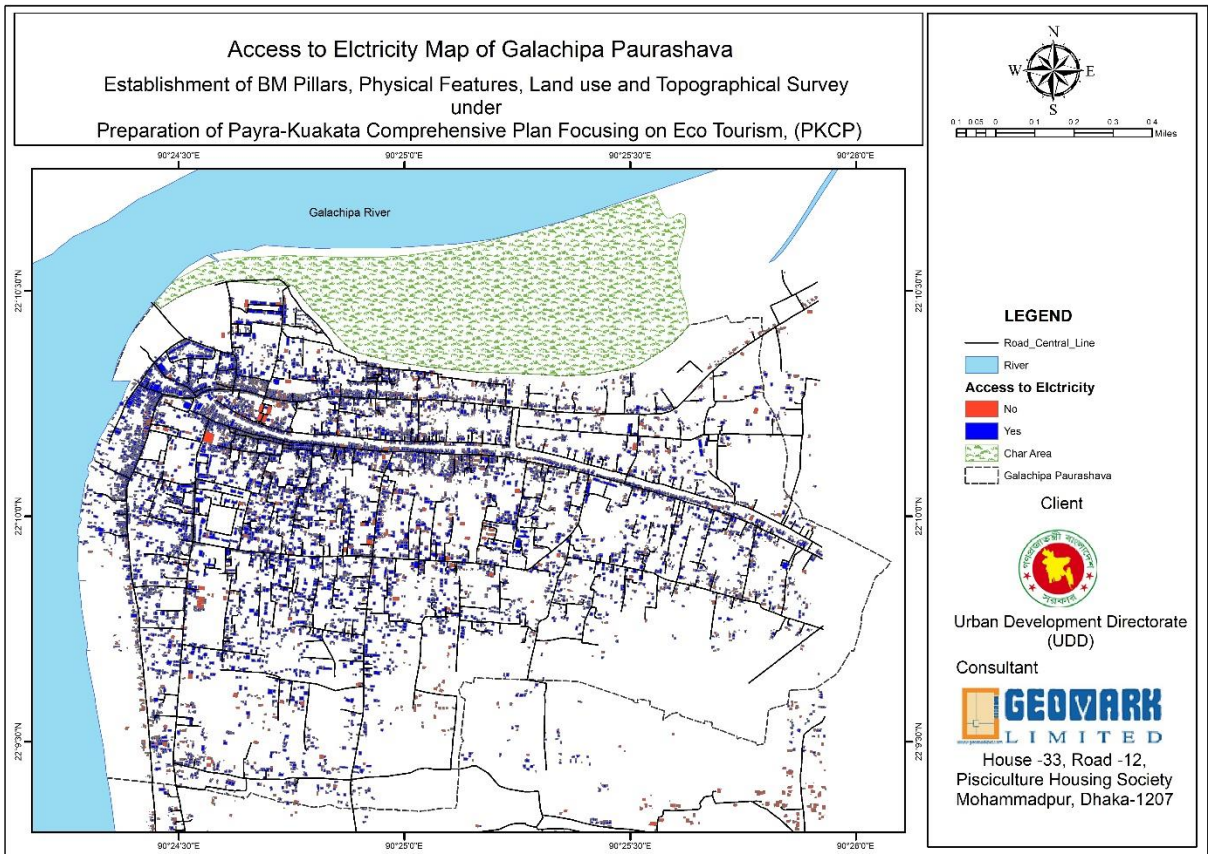
Almost 64.32 percent of the respondents have access to electricity and it is their source of light. See figure 7-18.

Availability of Electricity	Frequency	Percentage (%)
No	4464	35.68
Yes	8046	64.32
	12510	100



Data source: UDD Field Survey, 2019

Figure 4-18: Availability of Electricity



Map 4-18 Access to Electricity Map

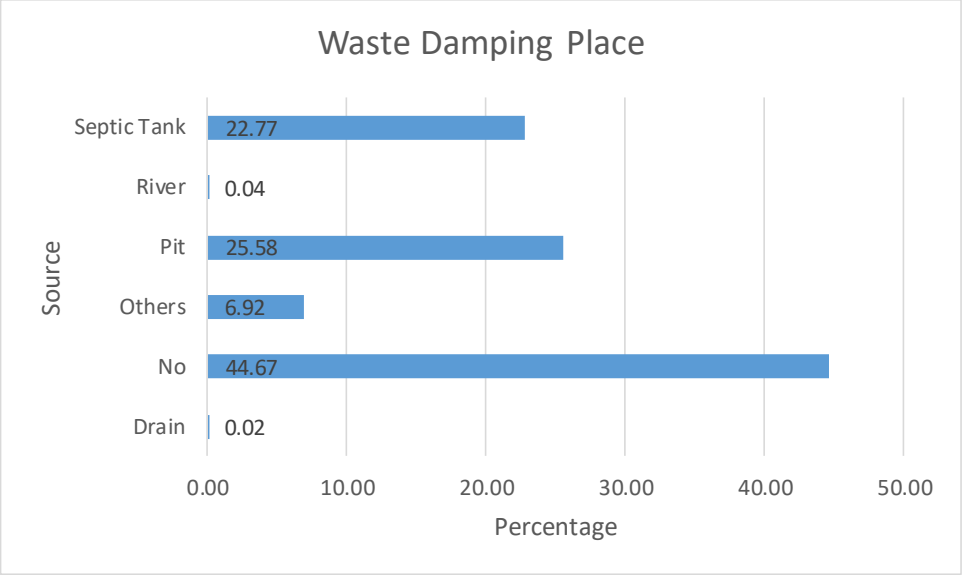
4.1.19 Waste disposal:

There is no waste disposal facility in almost 44.67 % Structures. 25.58 % residents use pit latrine and 22.27 % uses septic tank to dispose their fecal waste. Some of them dispose their waste in drain, river etc. See figure 7-19.

Table 4-16 Waste Disposal location

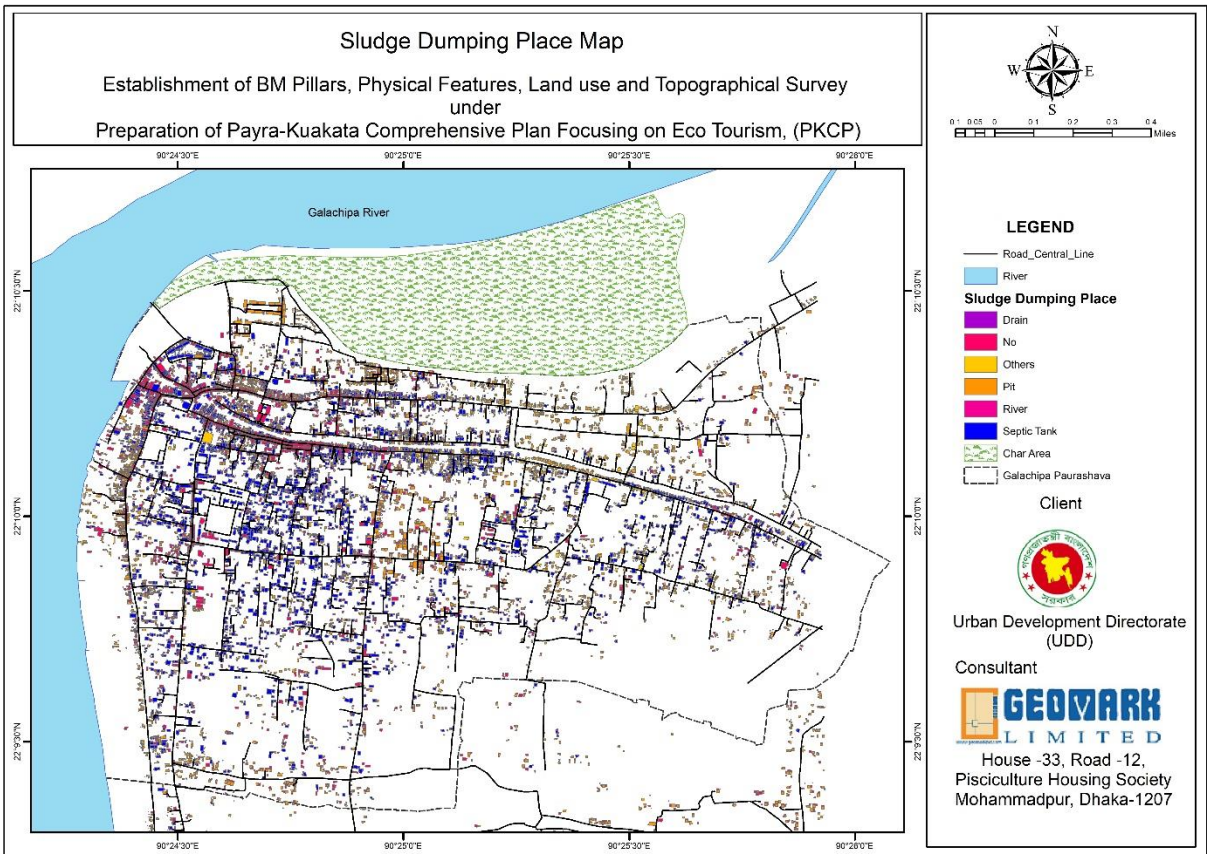
Waste Damping Place	Frequency	Percentage (%)
Drain	3	0.02
No	5798	44.67
Others	898	6.92
Pit	3320	25.58
River	5	0.04
Septic Tank	2956	22.77
Total	12980	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-19: Waste Disposal location

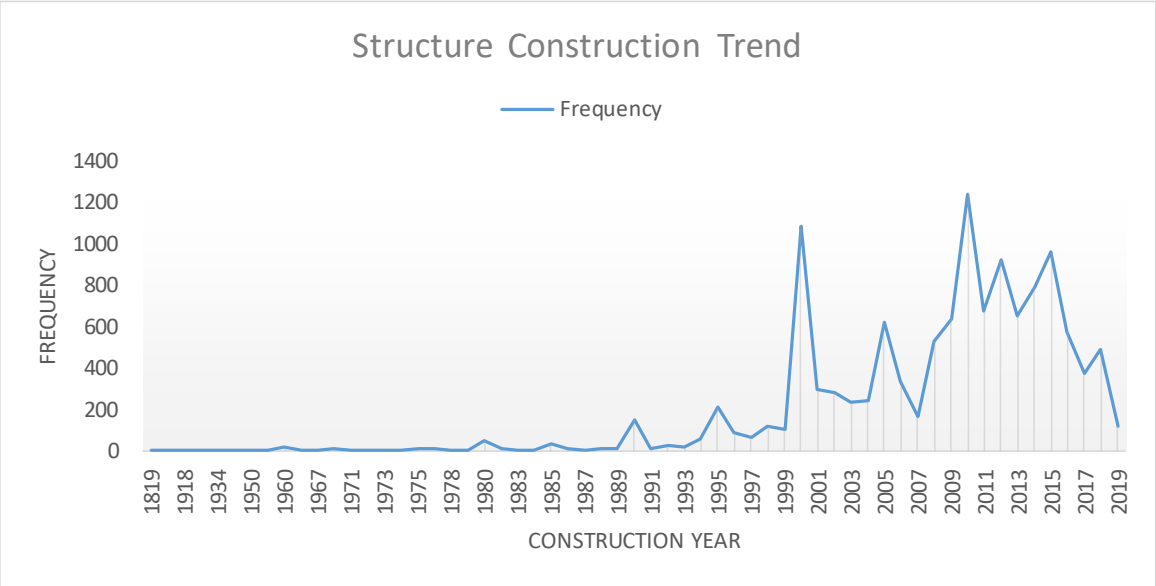


Map 4-19 Sludge Damping Place Map

4.1.20 Structure Construction Trend:

From the structure construction trend (fig. 7-20), we can see that rapid growth in structure construction and urbanization took place in the last 20 years (1999 to 2019) and the

growth is significant. See figure 7-20.



Data source: UDD Field Survey, 2019

Figure 4-20 Structure Construction Year

4.2 Galachipa Upazila Rural Area:

We analyzed the data Collected from Galachipa Upazila Rural Area and the results are following,

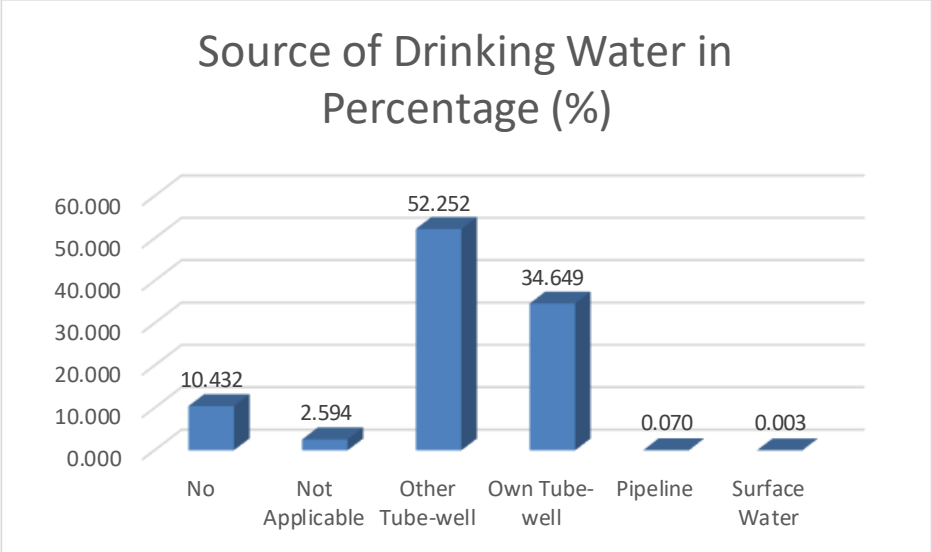
4.2.1 Source of drinking water:

In Galachipa Upazila Rural Area, most of the people (52.25 %) use Tube-well (Other) water as their drinking water source. 34.64 % of the residents uses water from their own Tube-well and 0.07 % uses pipeline water and a few of them uses common tube well water. See figure 7-21.

Table 4-17 Source of drinking water

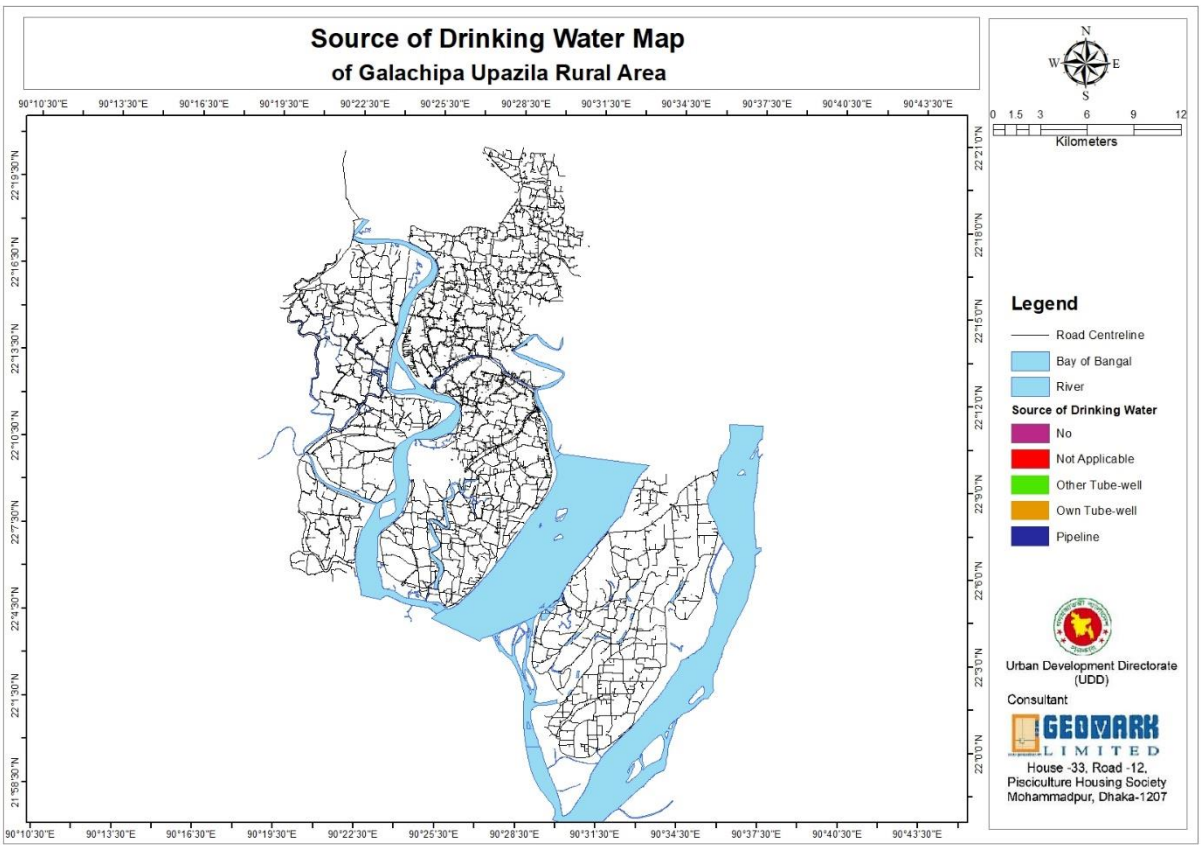
Source of Drinking Water	Frequency	Percentage
No	6234	10.432
Not Applicable	1550	2.594
Other Tube-well	31225	52.252
Own Tube-well	20706	34.649
Pipeline	42	0.070
Surface Water	2	0.003
Total	59759	100.000

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-21: Source of drinking water



Map 4-20 Source of drinking water

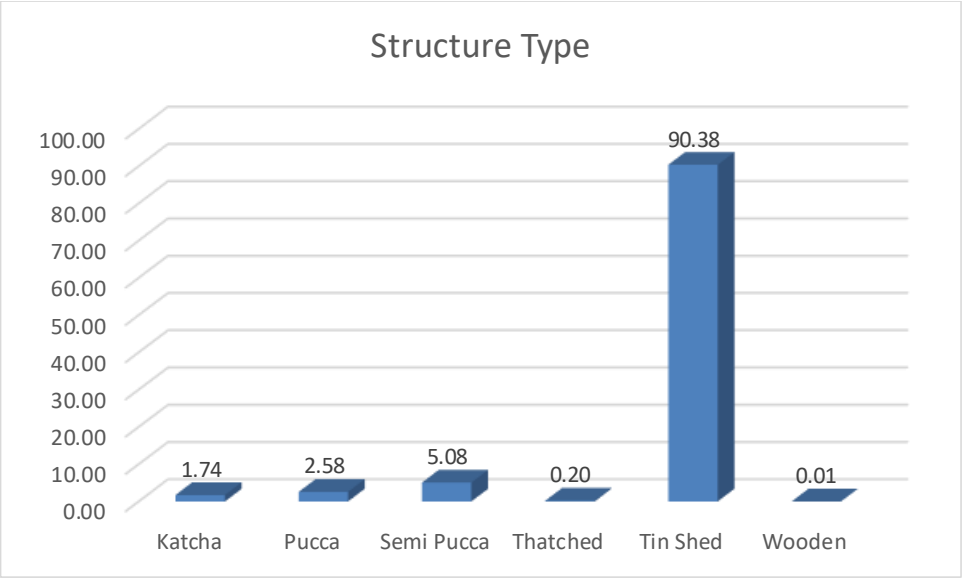
4.2.2 Structure Type:

In Galachipa Upazila Rural Area, majority of the houses (90.38 %) are Tin Shed. Pucca and Semi pucca has been found 2.58 % and 5.08 % respectively. See figure 7-22.

Table 4-18 Structure Type Distribution

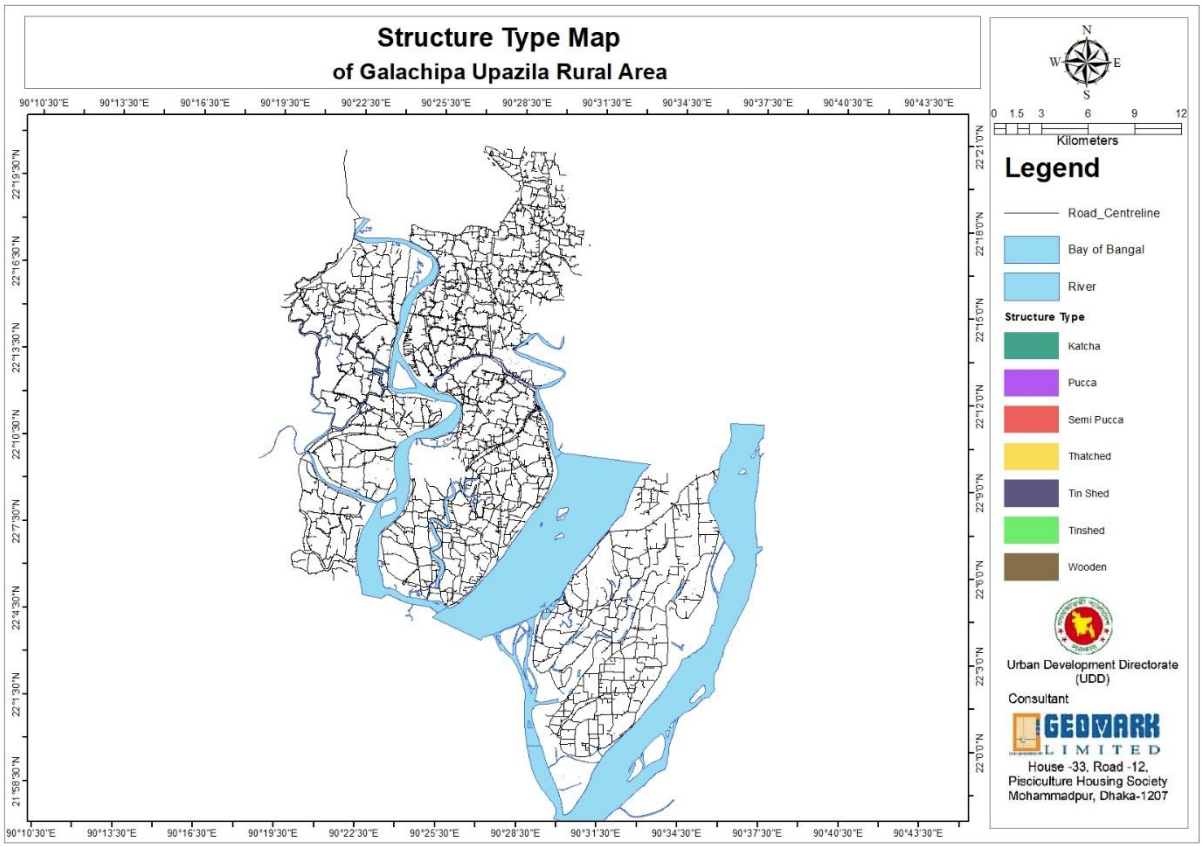
Structure Type	Frequency	Percentage
Katcha	1037	1.74
Pucca	1543	2.58
Semi Pucca	3037	5.08
Thatched	121	0.20
Tin Shed	54013	90.38
Wooden	8	0.01
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-22: Structure Type Distribution



Map 4-21 Structure Type Map

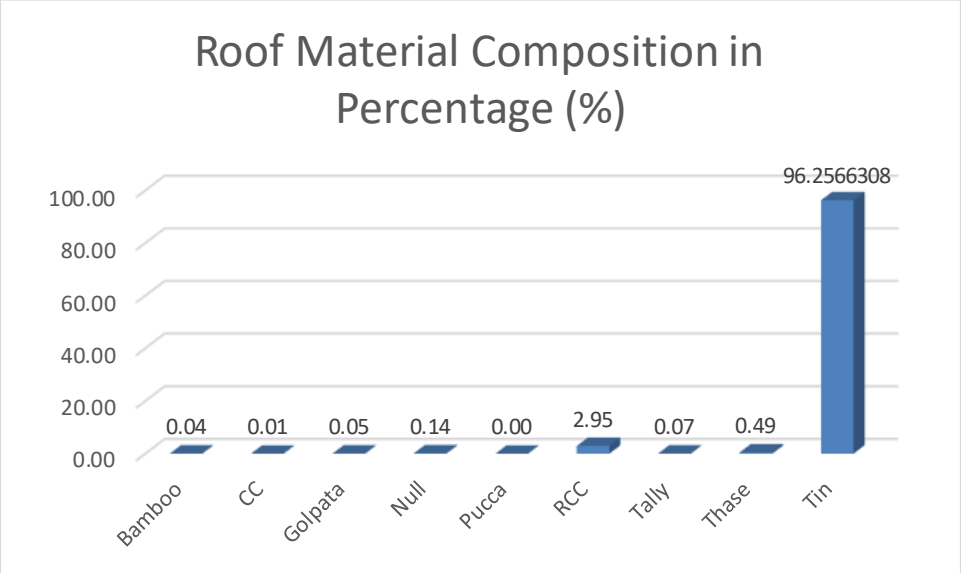
4.2.3 Roof Material:

In Galachipa Upazila Rural Area, most of the structures are Tin Shed (96.26 %). And a small number of structures (2.95 %) roof material is RCC. See figure 7-23.

Table 4-19 Roof Material

Roof Material	Frequency	Percentage
Bamboo	25	0.04
CC	4	0.01
Golpata	29	0.05
Null	85	0.14
Pucca	1	0.00
RCC	1764	2.95
Tally	39	0.07
Thase	290	0.49
Tin	57522	96.25663
Total	59759	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-23 Roof Material

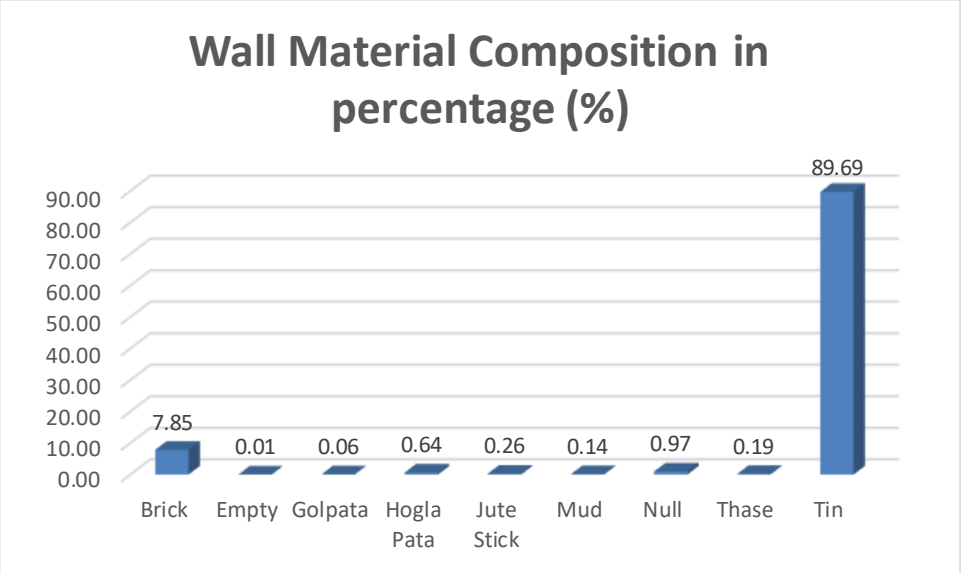
4.2.4 Wall Material:

In Galachipa Upazila Rural Area, Tin has been used as wall material for almost 89.69 percent of the total structures. The second dominating wall material has been identified as Brick. See figure 7-24.

Table 4-20 Wall Material

Brick	4693	7.85321
Empty	4	0.006694
Golpata	37	0.061915
Hogla Pata	385	0.644254
Jute Stick	153	0.256028
Mud	83	0.138891
Null	581	0.972238
Thase	115	0.19244
Tin	53600	89.6936
Wooden	108	0.180726
Total	59759	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-24 Wall Material

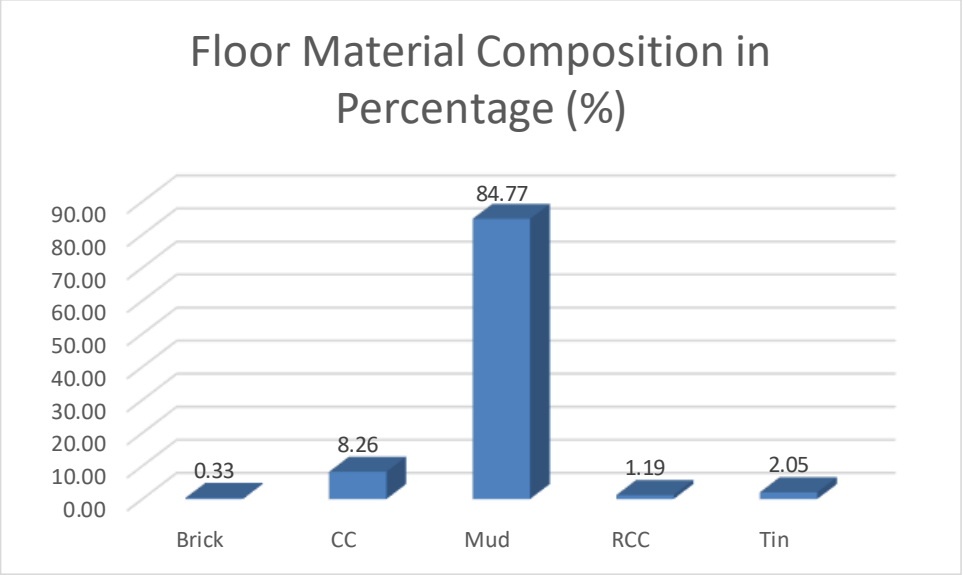
4.2.5 Floor Material:

Almost 84.77 percent has Mud wall. Other notable compositions are CC 8.26 percent, and Brick 0.33 percent. See figure 7-25.

Table 4-21 Floor Material

Floor Material	Frequency	Percentage
Brick	197	0.33
CC	4934	8.26
Mud	50660	84.77
RCC	711	1.19
Tin	1223	2.05
Wooden	2034	3.40
Total	59759	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-25 Floor Material

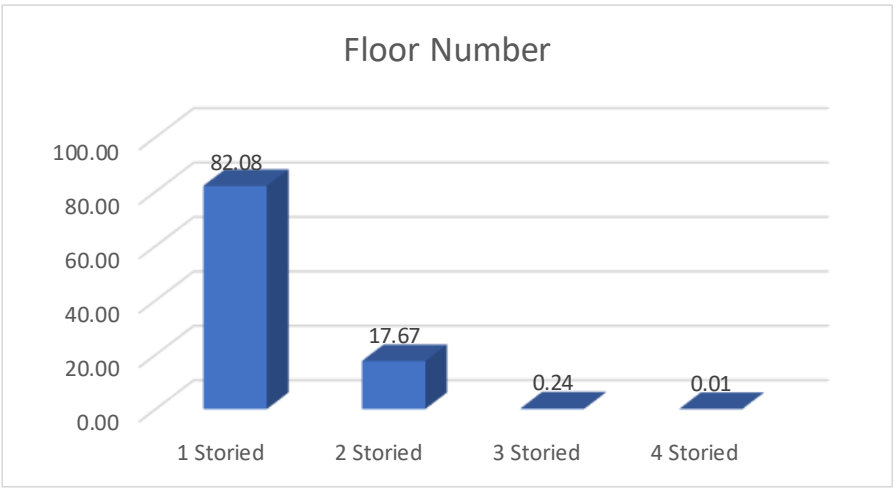
4.2.6 Number of Floors:

In Galachipa Upazila Rural Area, it seems that majority of the structures are mono storied (almost 82.08 %). But a good number of 2 storied Buildings are also there. See figure 7-26.

Table 4-22 Structure Story

Floor Number	Frequency	Percentage
1 Storied	49052	82.08
2 Storied	10558	17.67
3 Storied	141	0.24
4 Storied	8	0.01
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-26 Structure Story

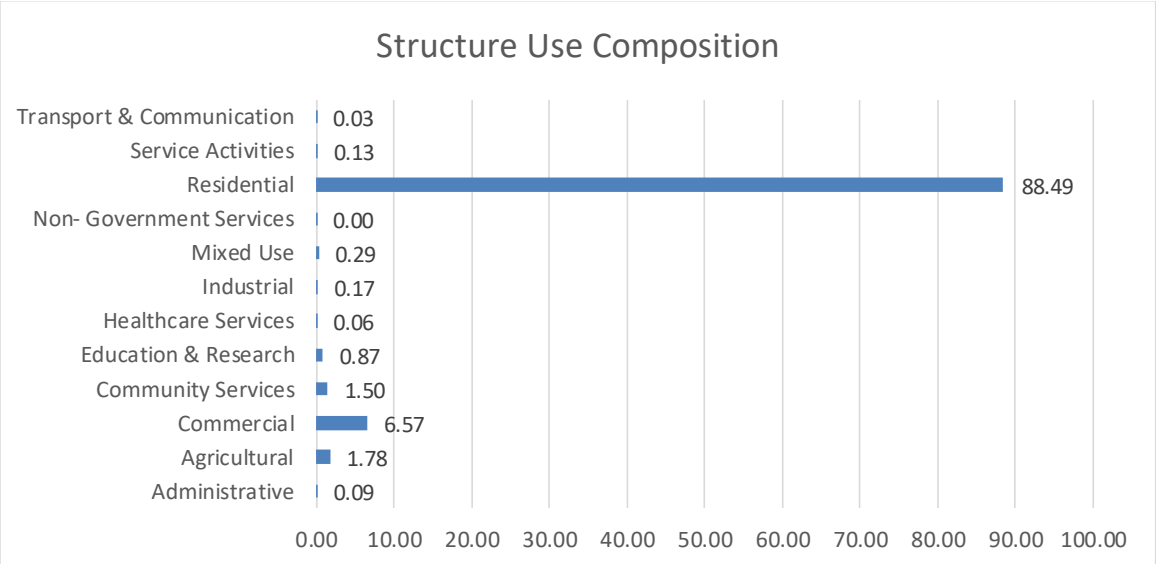
4.2.7 Structure Use:

Almost 88.49 percent of the structures are being used as residential purpose. The second dominating use is commercial use. See figure 7-27.

Table 4-23 Structure Use

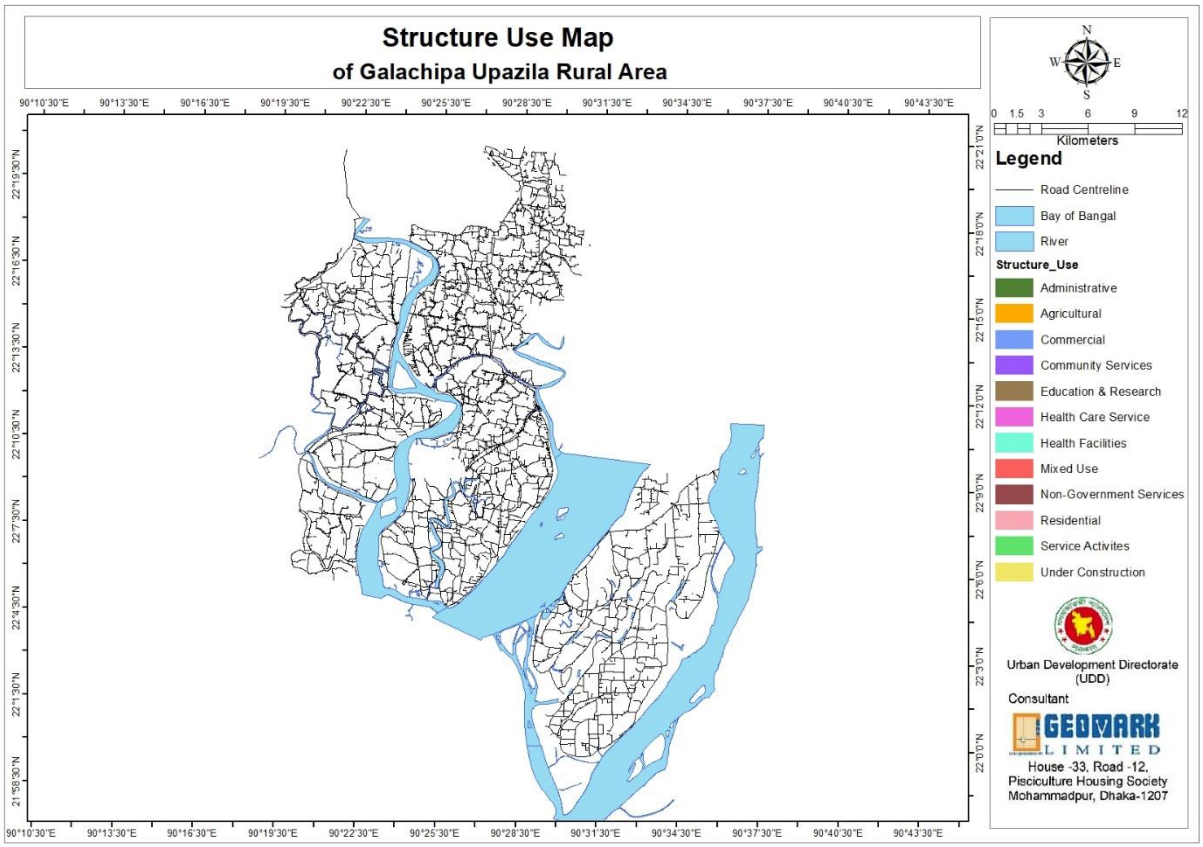
Structure Use	Frequency	Percentage
Administrative	53	0.09
Agricultural	1065	1.78
Commercial	3929	6.57
Community Services	899	1.50
Education & Research	518	0.87
Healthcare Services	35	0.06
Industrial	99	0.17
Mixed Use	176	0.29
Non- Government Services	1	0.00
Residential	52878	88.49
Service Activities	76	0.13
Transport & Communication	16	0.03
Under Construction	14	0.02
total	59759	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-27 Structure Use



Map 4-22 Structure use Map

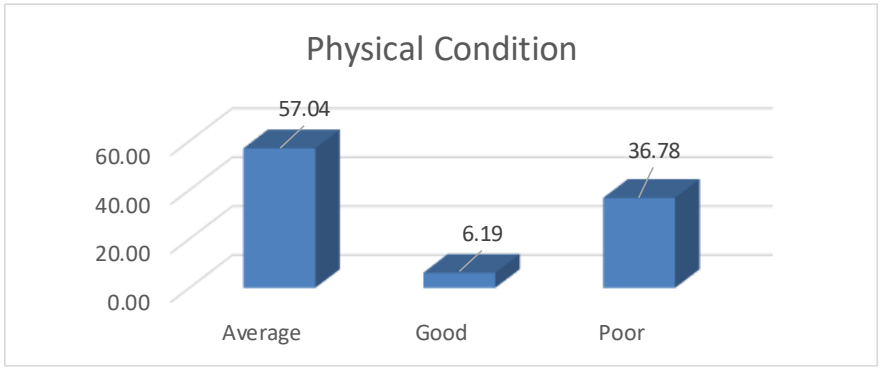
4.2.8 Structure Physical Condition:

In Galachipa Upazila Rural Area, majority (57.04 %) of the structures are physically average in condition, 36.78 percent are in Poor condition and only 6.19 percent are in good condition. See figure 7-28.

Table 4-24 Structure Physical Condition

Physical Condition	Frequency	Percentage
Average	34084	57.04
Good	3698	6.19
Poor	21977	36.78
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-28 Structure Physical Condition

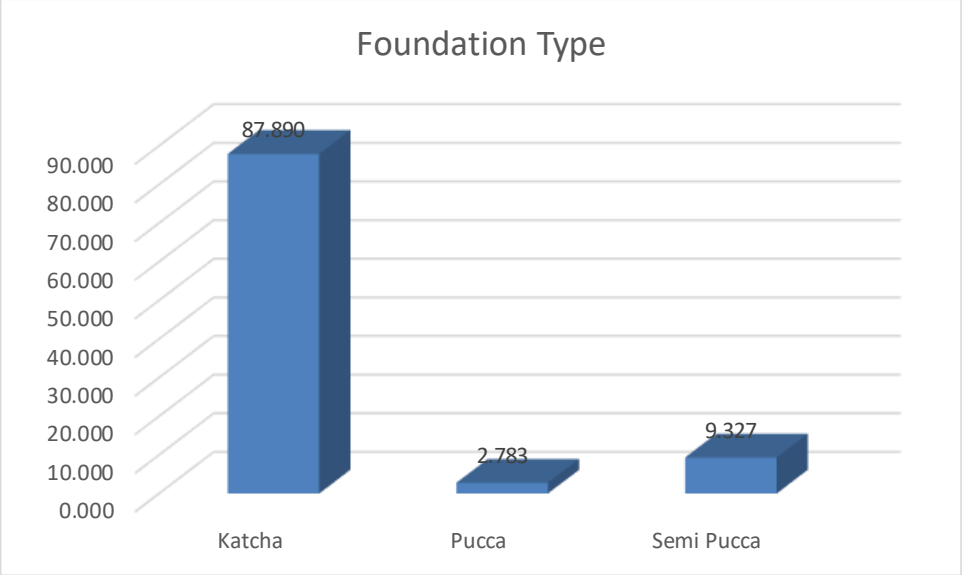
4.2.9 Foundation Type:

Majority of the structure foundations are Katcha. Semi-Pucca and Pucca are 9.33 % and 2.78 % respectively. See figure 7-29.

Table 4-25 Foundation Type

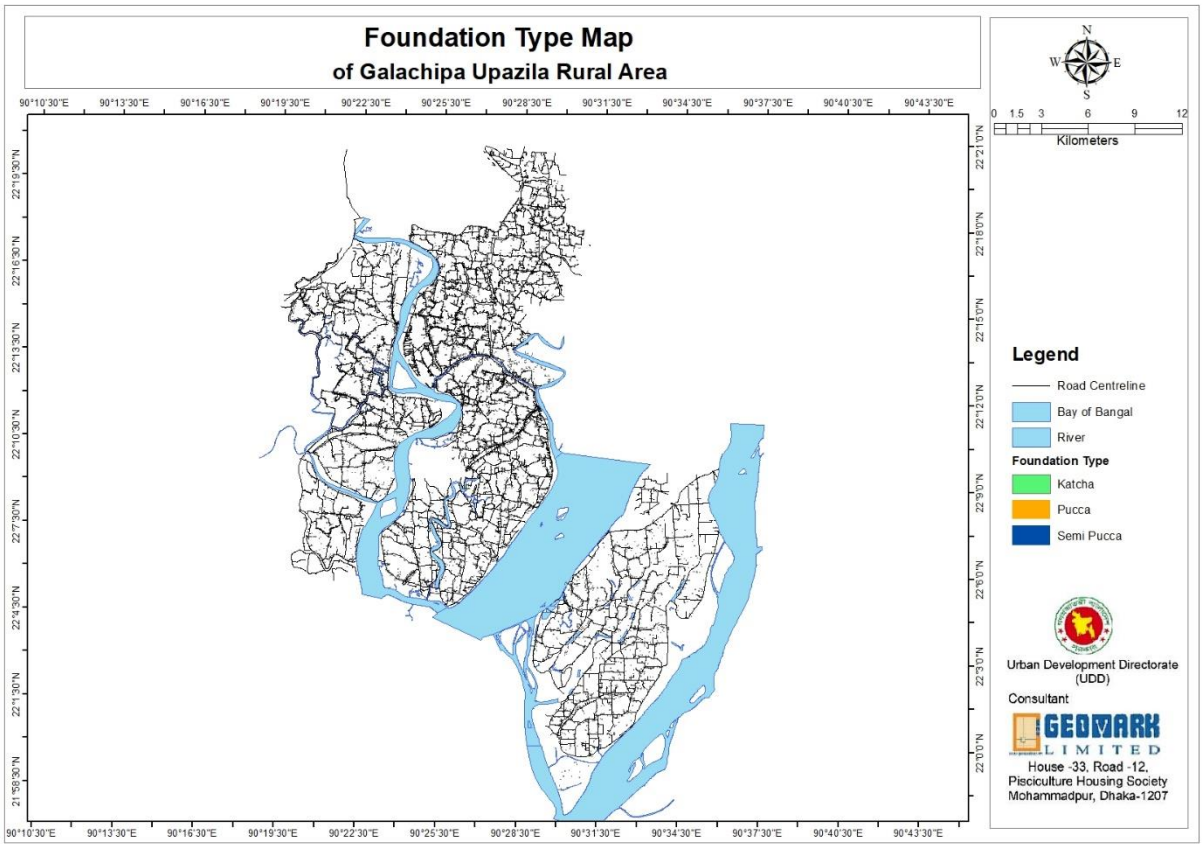
Foundation Type	Frequency	Percentage
Katcha	52522	87.890
Pucca	1663	2.783
Semi Pucca	5574	9.327
Total	59759	100.000

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-29 Foundation Type



Map 4-23 Foundation Type Map

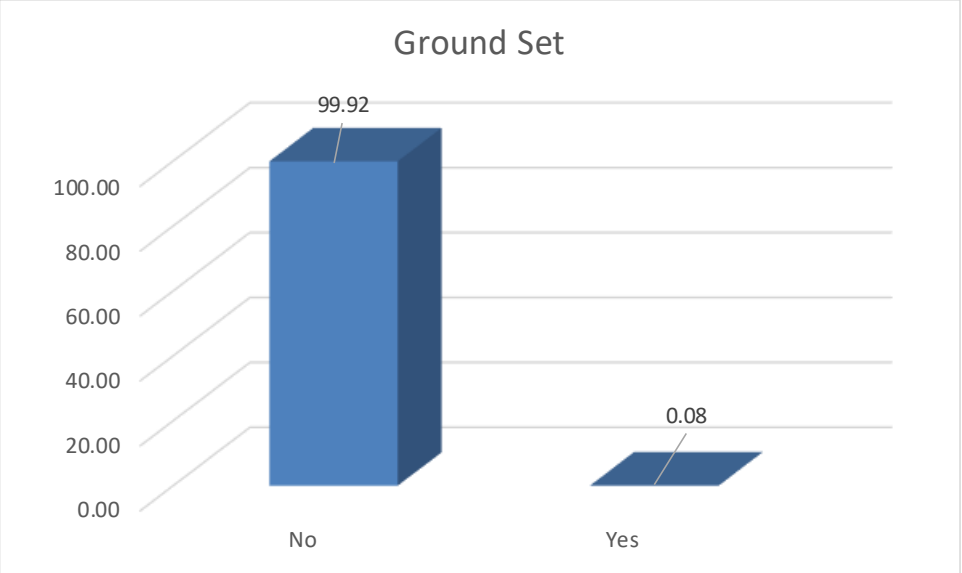
4.2.10 Ground Set:

Ground Set has not been detected for almost 99.9 percent of the structures. See figure 7-30.

Table 4-26 Ground Set

Ground Set	Frequency	Percentage
No	59709	99.92
Yes	50	0.08
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-30 Ground Set

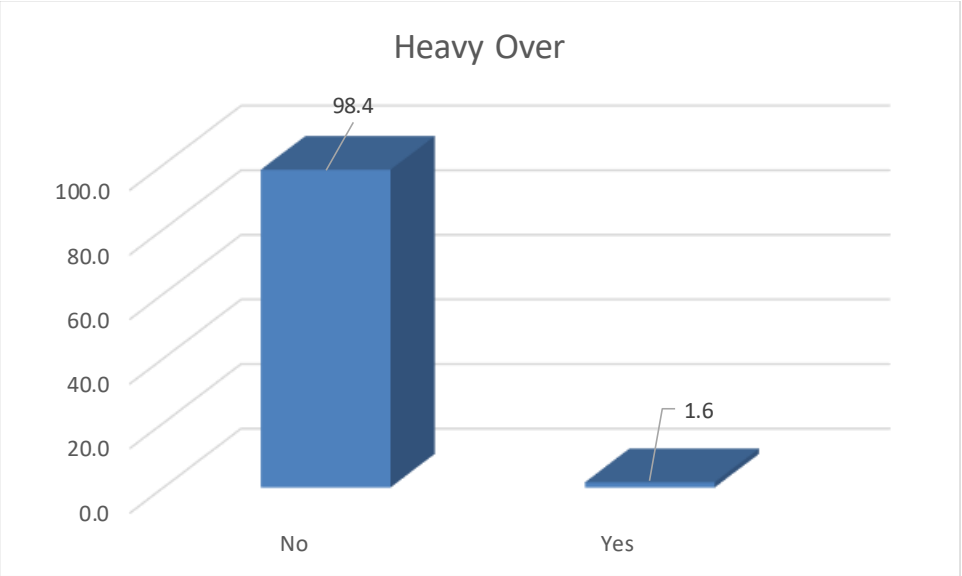
4.2.11 Heavy Over:

Heavy Over has not been detected for almost 98.4 percent of the structures. See figure 7-31.

Table 4-27 Heavy Over

Heavy Over	Frequency	Percentage
No	58794	98.4
Yes	965	1.6
Total	59759	100.0

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-31 Heavy Over

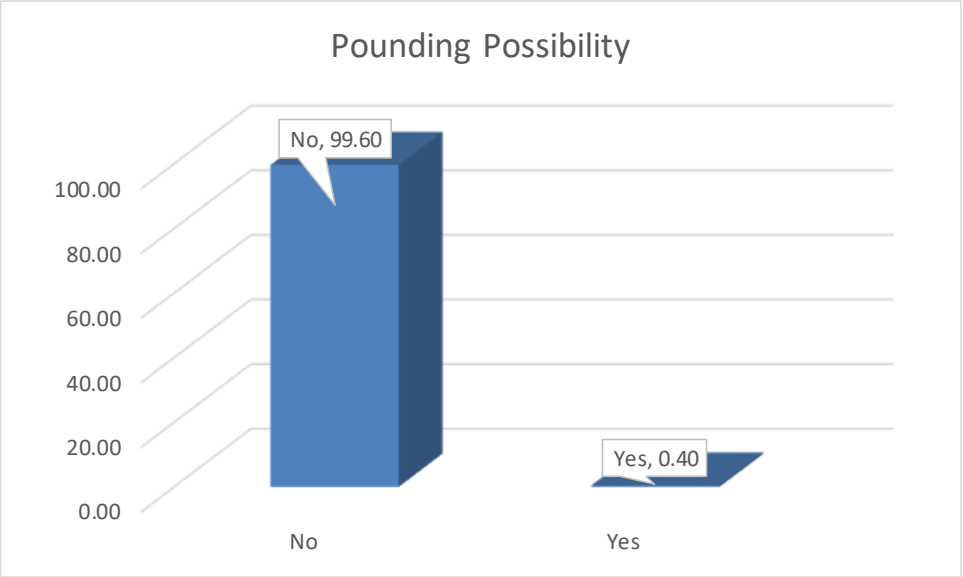
4.2.12 Pounding Possibility:

Pounding Possibility has not been detected for almost 99.6 percent of the structures. See figure 7-32.

Table 4-28 Pounding Possibility

Pounding Possibility	Frequency	Percentage
No	59519	99.60
Yes	240	0.40
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-32 Pounding Possibility

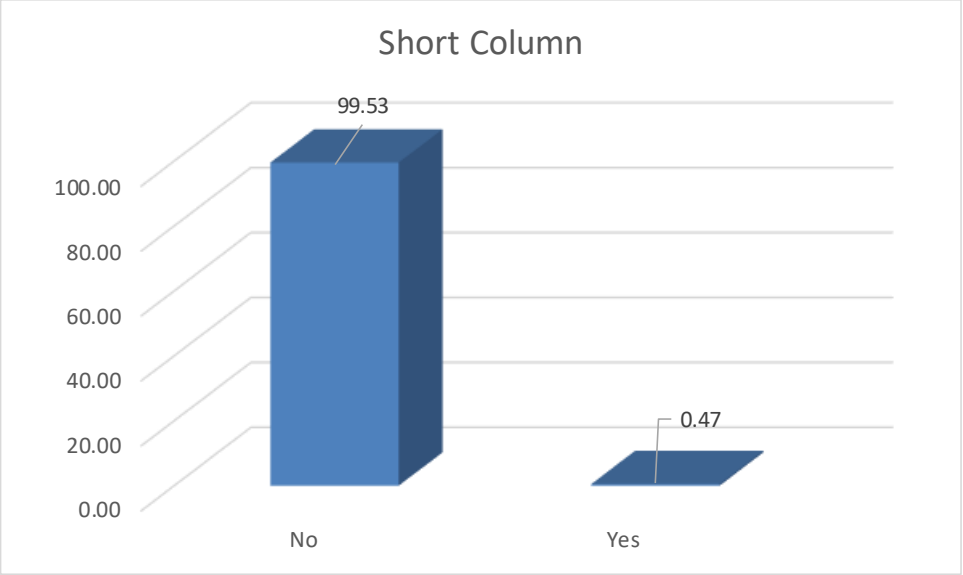
4.2.13 Short Column:

Short Column has not been detected for almost 99.53 percent of the structures. See figure 7-33.

Table 4-29 Short Column

Short Column	Frequency	Percentage
No	59477	99.53
Yes	282	0.47
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-33 Short Column

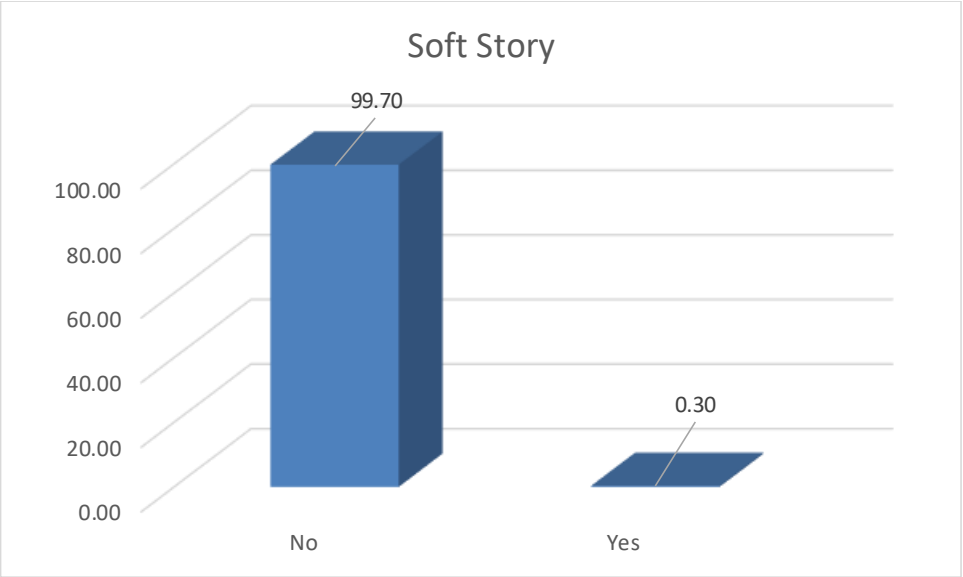
4.2.14 Soft Story:

Soft Story has not been detected for almost 99.7 percent of the structures. See figure 7-34.

Table 4-30 Soft Story

Soft Story	Frequency	Percentage
No	59577	99.70
Yes	182	0.30
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-34 Soft Story

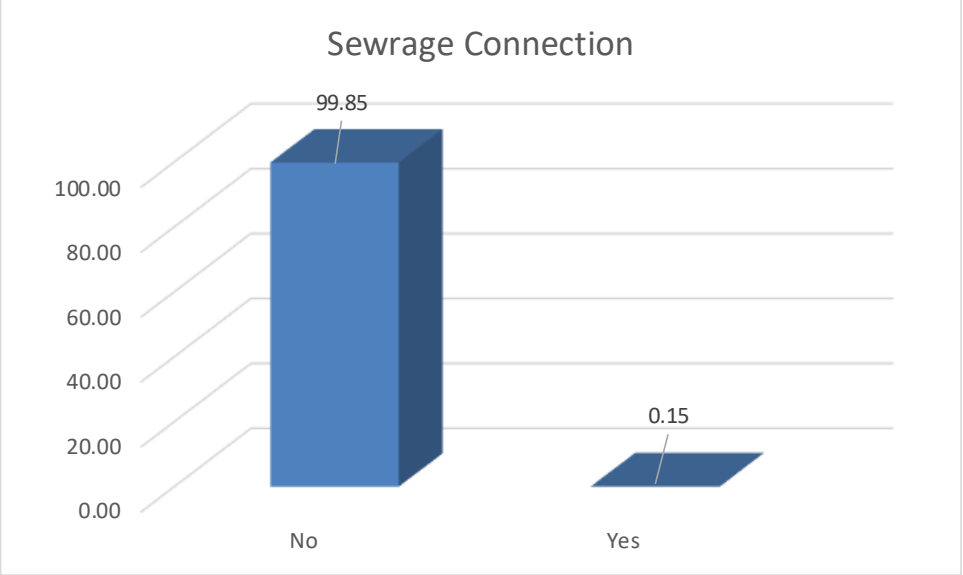
4.2.15 Sewerage Connection:

Almost 99.85 percent houses are not connected to Sewerage Connection. See figure 7-25.

Table 4-31 Sewerage Connection

Sewerage Connection	Frequency	Percentage
No	59669	99.85
Yes	90	0.15
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-35 Sewerage Connection

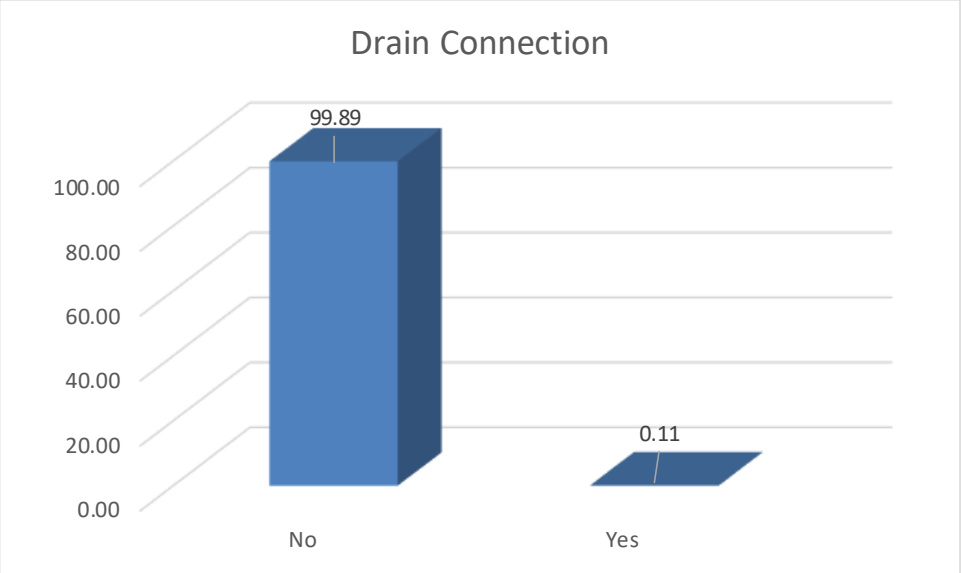
4.2.16 Drain connection:

Almost 99.89 percent houses do not have drainage connection. See figure 7-36.

Table 4-32 Drain connection

Drain Connection	Frequency	Percentage
No	59692	99.89
Yes	67	0.11
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-36 Drain connection

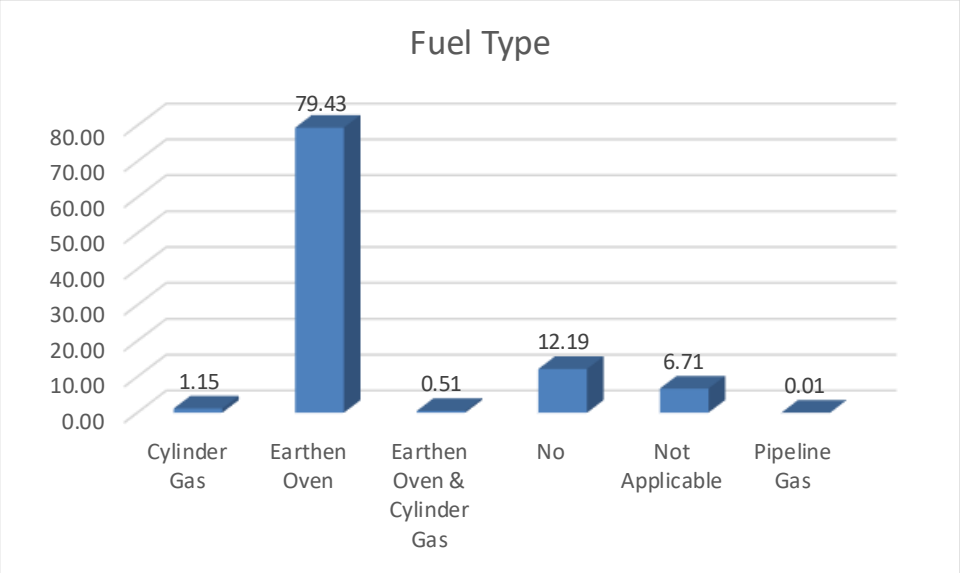
4.2.17 Source of Fuel:

In Galachipa, most of the people (79.43 %) use wood as the source of fuel in Earthen Oven. The second most popular fuel source is cylinder Gas, See figure 7-37.

Table 4-33 Source of Fuel

Fuel Type	Frequency	Percentage
Cylinder Gas	686	1.15
Earthen Oven	47467	79.43
Earthen Oven & Cylinder Gas	304	0.51
No	7283	12.19
Not Applicable	4012	6.71
Pipeline Gas	7	0.01
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-37: Source of Fuel

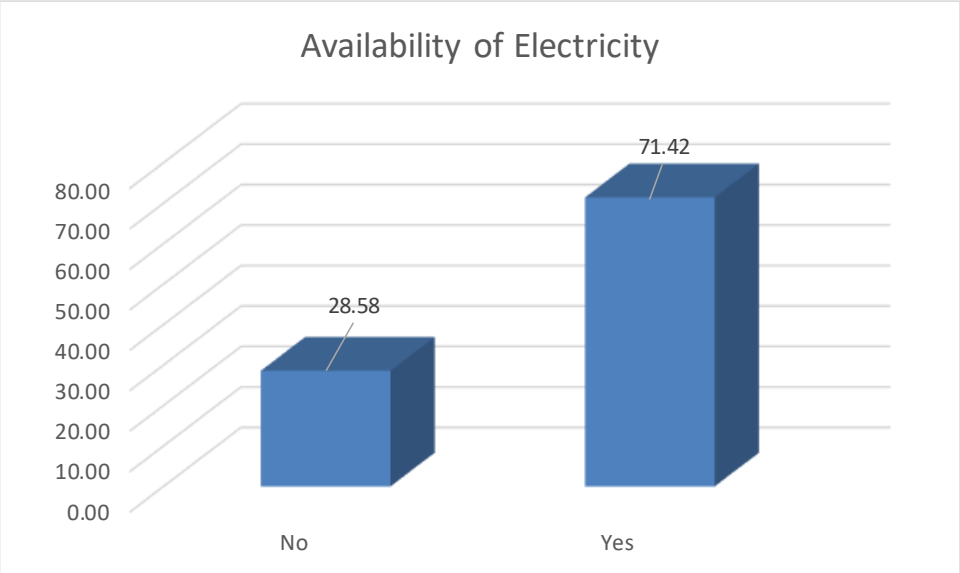
4.2.18 Availability of Electricity:

Almost 71.42 percent of the respondents have access to electricity and it is their source of light. See figure 7-38.

Table 4-34 Availability of Electricity

Electricity	Frequency	Percentage
No	17077	28.58
Yes	42682	71.42
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-38: Availability of Electricity

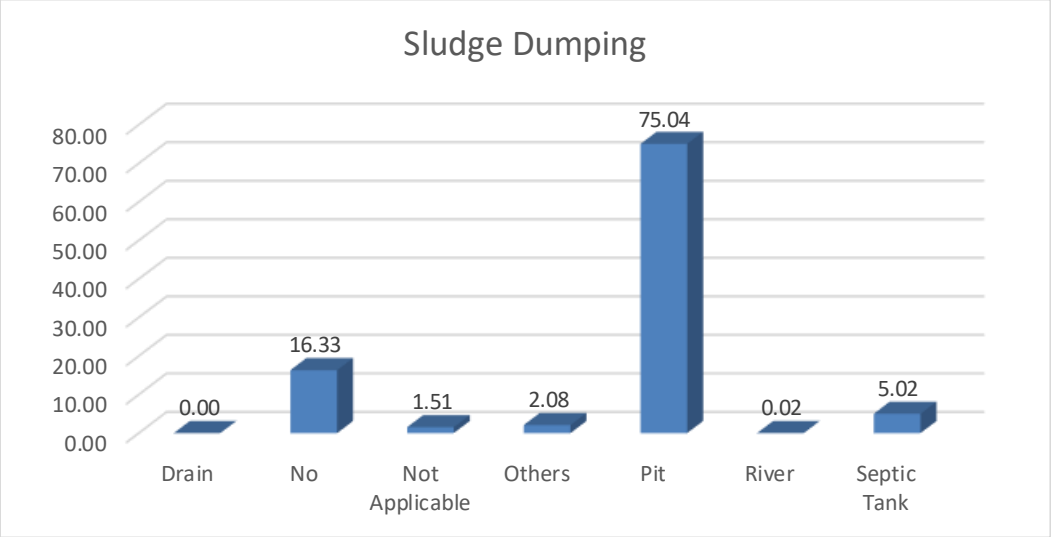
4.2.19 Waste disposal:

75.04 % residents use pit latrine and 5.02 % uses septic tank to dispose their fecal waste. Some of them dispose their waste in drain, river etc. See figure 7-39.

Table 4-35 Waste Disposal location

Sludge Dumping	Frequency	Percentage
Drain	1	0.00
No	9756	16.33
Not Applicable	903	1.51
Others	1242	2.08
Pit	44845	75.04
River	14	0.02
Septic Tank	2998	5.02
Total	59759	100.00

Data source: UDD Field Survey, 2019

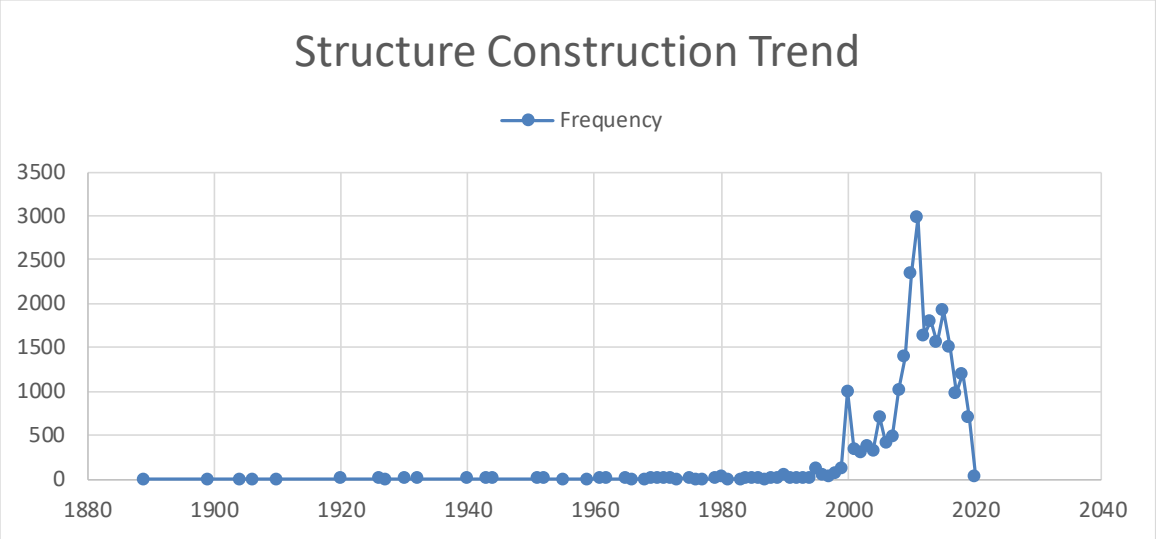


Data source: UDD Field Survey, 2019

Figure 4-39: Waste Disposal location

4.2.20 Structure Construction Trend:

From the structure construction trend (fig. 7-40), we can see that rapid growth in structure construction and urbanization took place in the last 20 years (1999 to 2019) and the growth is significant. See figure 7-40.



Data source: UDD Field Survey, 2019

Figure 4-40 Structure Construction Year

4.3 Rangabali Upazila:

We analyzed the data Collected from Rangabali Upazila consisting of 6 unions and the results are following,

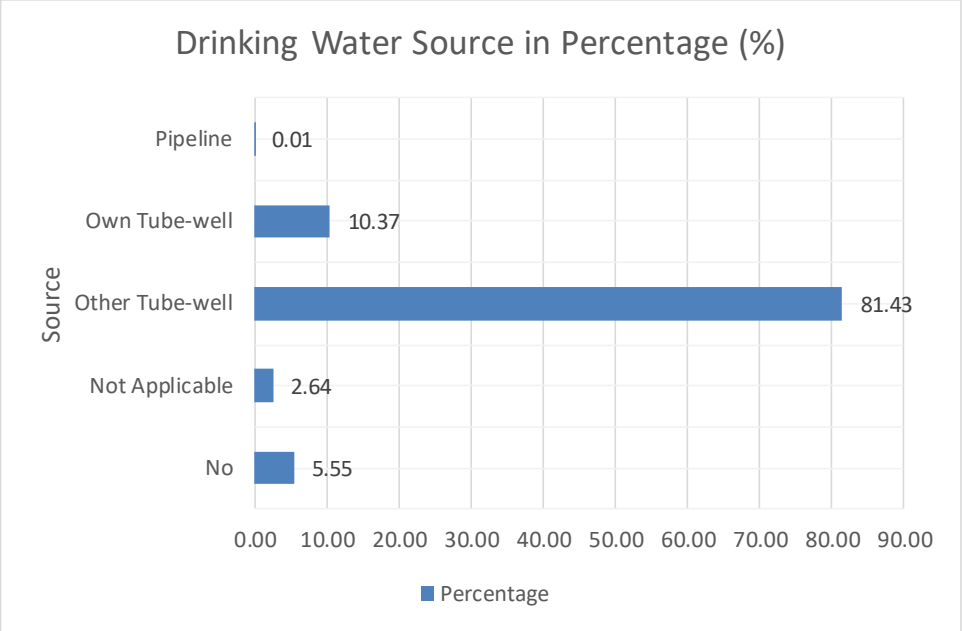
4.3.1 Source of drinking water:

In Rangabali Upazila, most of the people (81.43 %) use others Tube-well water as their drinking water source. 10.37 % of the residents uses water from their own Tube-well and only 0.01 % uses pipeline water and a few of them uses Surface Water. See figure 7-41 for infographics and Map 7-24 for understanding from spatial perspective.

Table 4-36 Source of drinking water

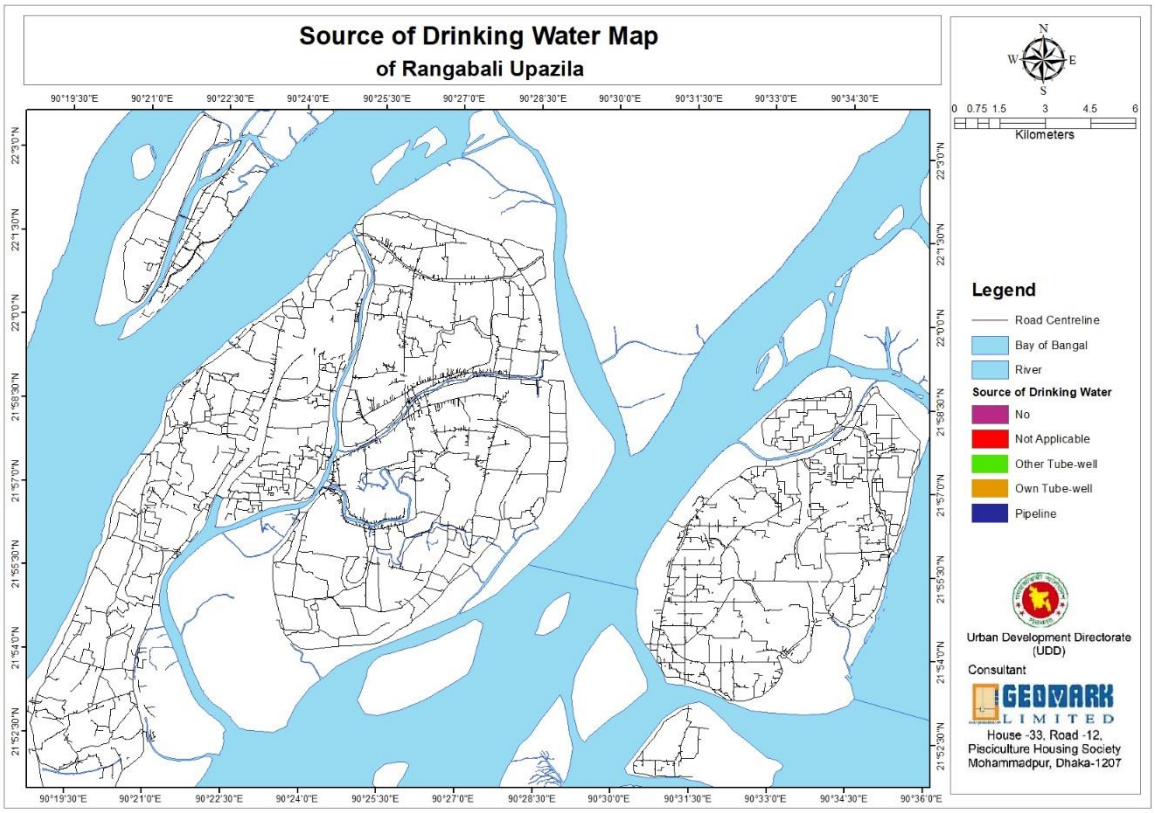
Drinking Water	Frequency	Percentage
No	1637	5.55
Not Applicable	777	2.64
Other Tube-well	24009	81.43
Own Tube-well	3057	10.37
Pipeline	4	0.01
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-41: Source of drinking water



Map 4-24: Source of drinking water

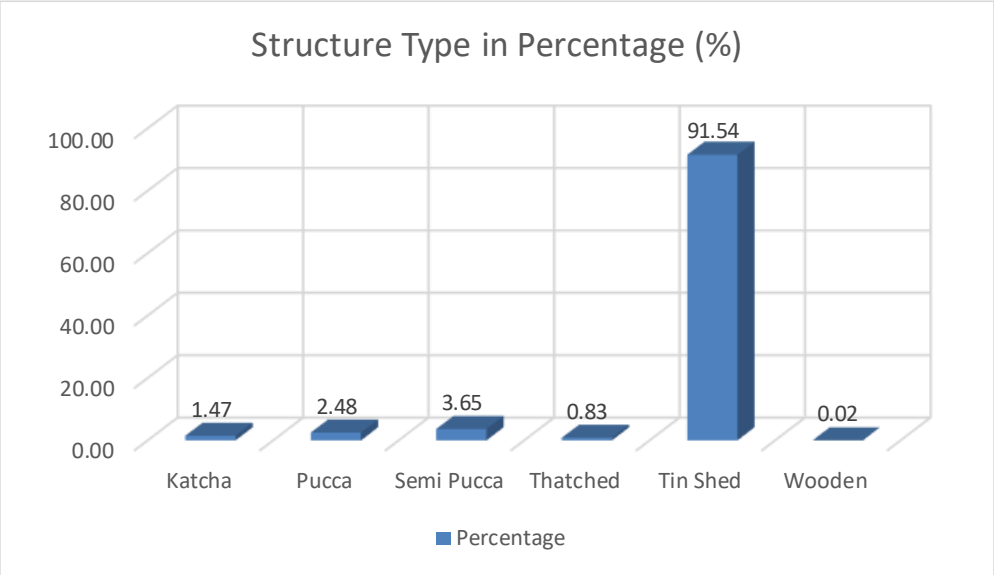
4.3.2 Structure Type:

In Rangabali Upazila, majority of the houses (91.54 %) are Tin Shed. Pucca and Semi pucca has been found 2.48 % and 3.65 % respectively. See figure 7-42 for infographics and Map 7-25 for understanding from spatial perspective.

Table 4-37 Structure Type Distribution

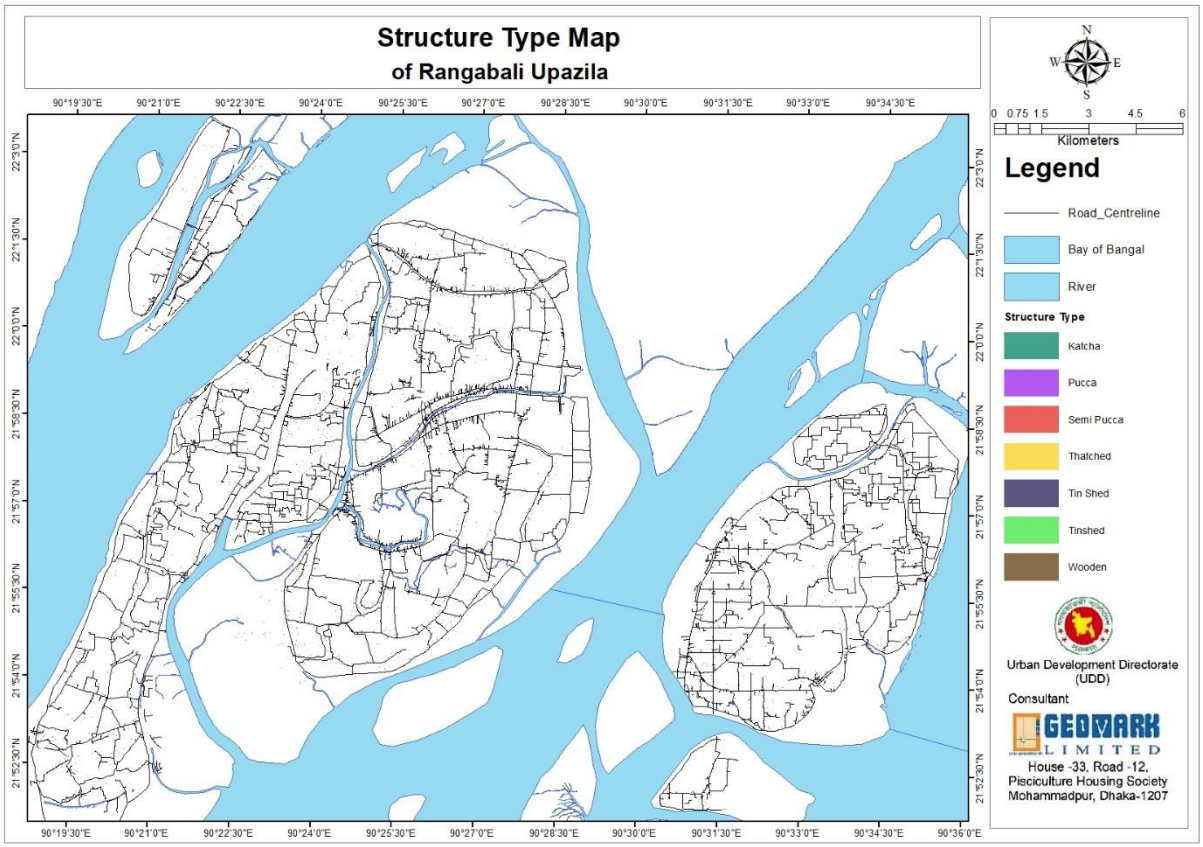
Structure Type	Frequency	Percentage
Katcha	434	1.47
Pucca	731	2.48
Semi Pucca	1076	3.65
Thatched	246	0.83
Tin Shed	26990	91.54
Wooden	7	0.02
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-42: Structure Type Distribution



Map 4-25 Structure Type Map

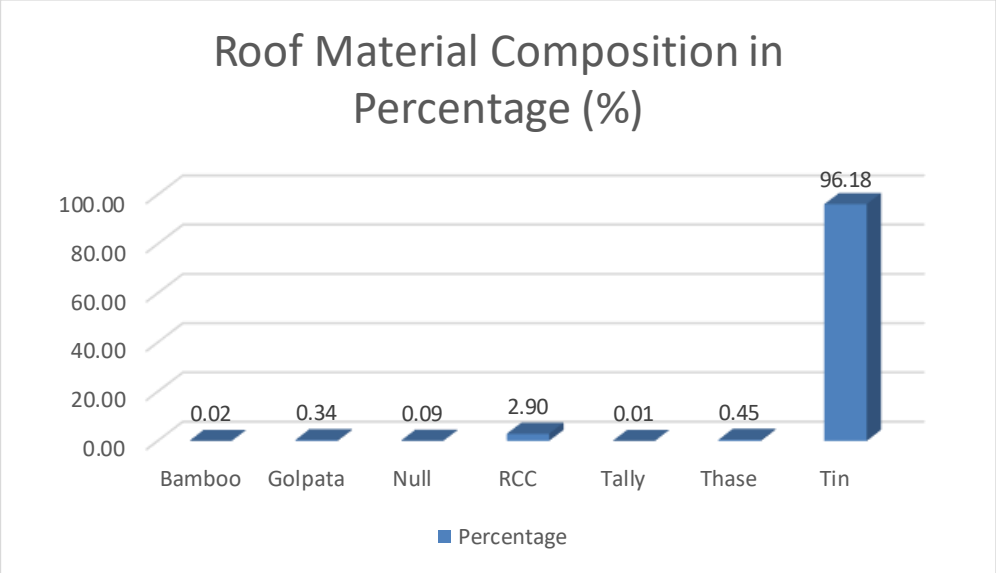
4.3.3 Roof Material:

In Rangabali Upazila, most of the structures are Tin Shed (96.18 %). And a good number of structures (2.9 %) roof material is RCC. See figure 7-43 for infographics and Map 7-26 for understanding from spatial perspective.

Table 4-38 Roof Material

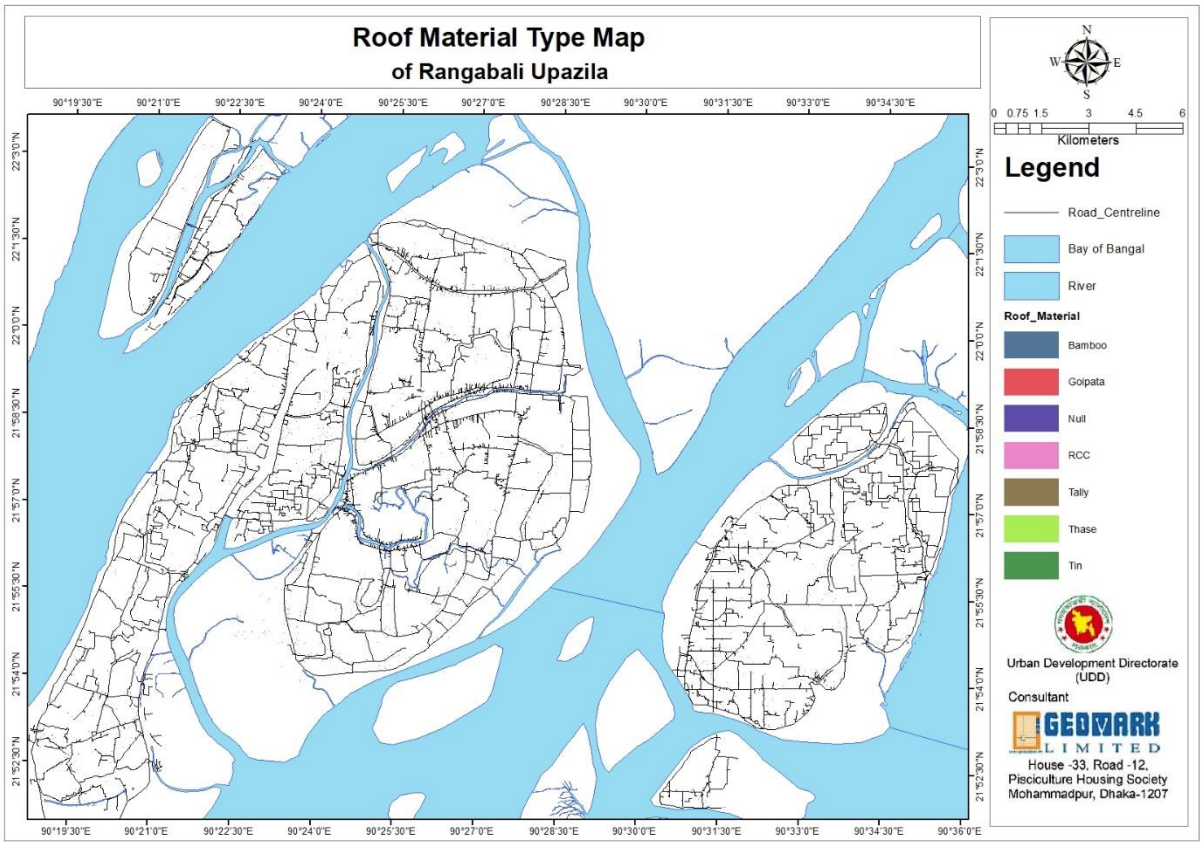
Roof Material	Frequency	Percentage
Bamboo	7	0.02
Golpata	99	0.34
Null	28	0.09
RCC	855	2.90
Tally	2	0.01
Thase	134	0.45
Tin	28359	96.18
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-43 Roof Material



Map 4-26 Roof Material Type Map

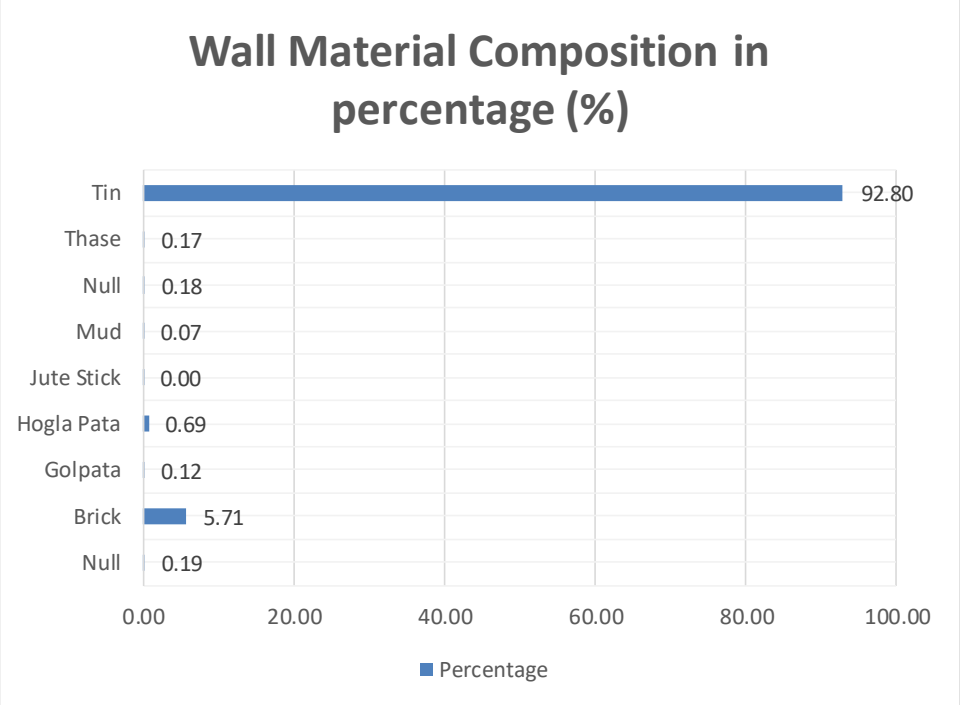
4.3.4 Wall Material:

In Rangabali Upazila, Tin has been used as wall material for almost 92.8 percent of the total structures. The second dominating wall material has been identified as Brick (5.71 %). See figure 7-44 for infographics and Map 7-27 for understanding from spatial perspective.

Table 4-39 Wall Material

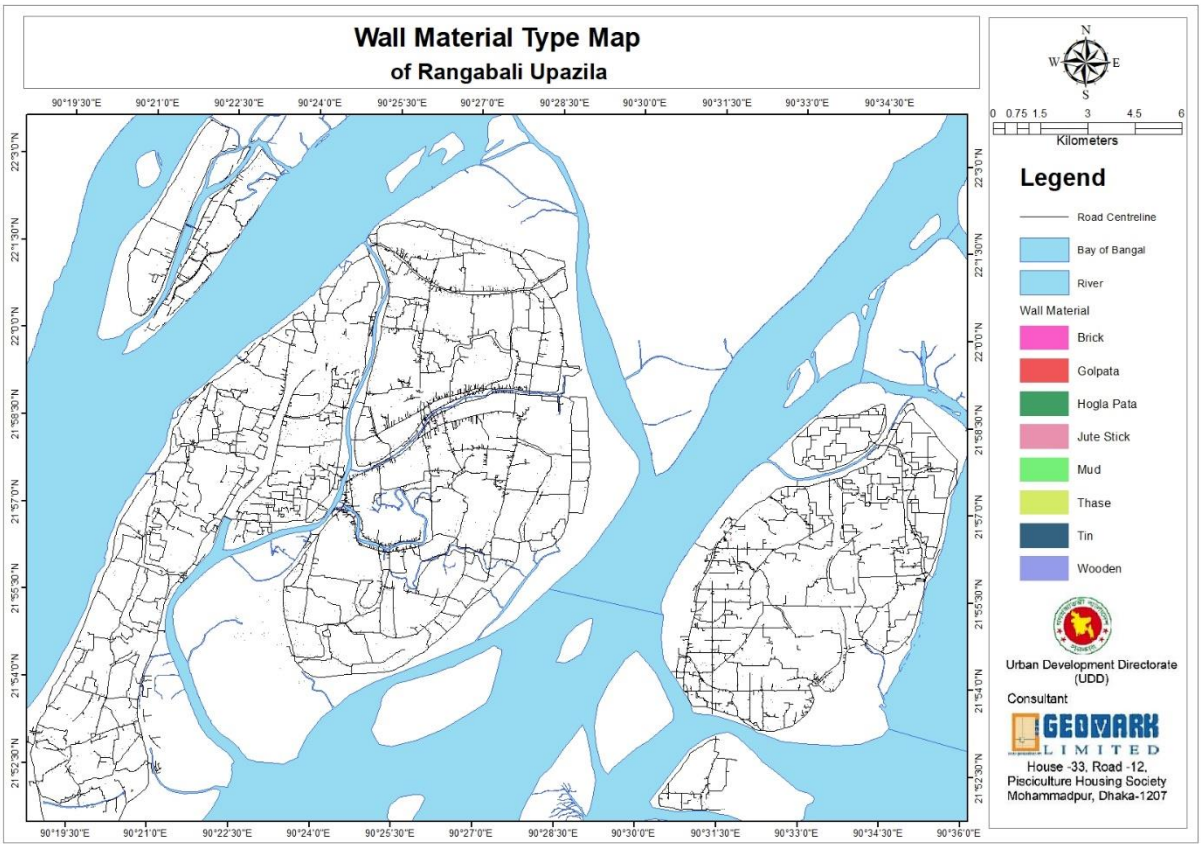
Wall Material	Frequency	Percentage
Null	56	0.19
Brick	1684	5.71
Golpata	36	0.12
Hogla Pata	202	0.69
Jute Stick	1	0.00
Mud	20	0.07
Null	52	0.18
Thase	50	0.17
Tin	27362	92.80
Wooden	21	0.07
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-44 Wall Material



Map 4-27 Wall Material type Map

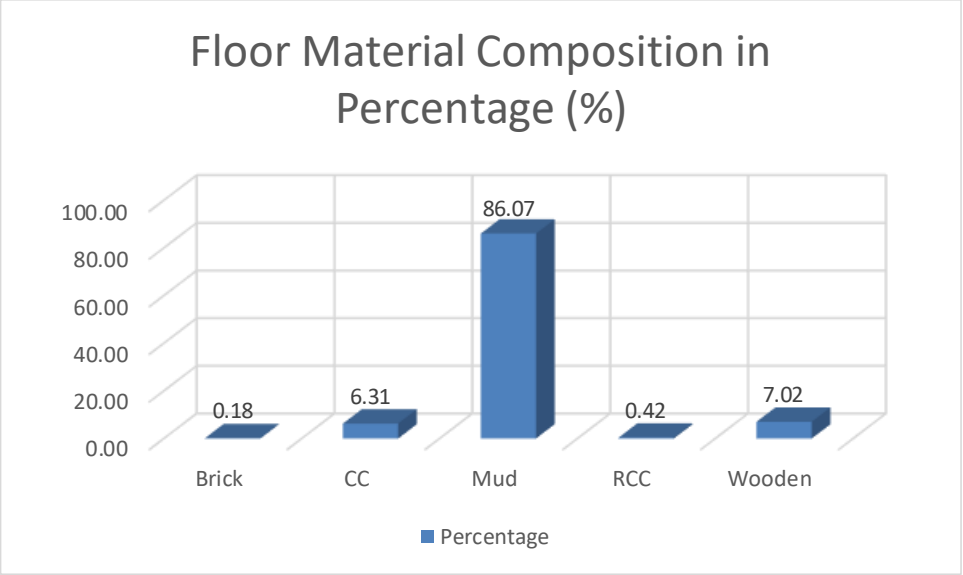
4.3.5 Floor Material:

Almost 86.07 percent has Mud wall. Other notable compositions are RCC 0.42 percent, Cement Concrete 6.31 percent and Brick 0.18 percent. See figure 7-45 for infographics and Map 7-28 for understanding from spatial perspective.

Table 4-40 Floor Material

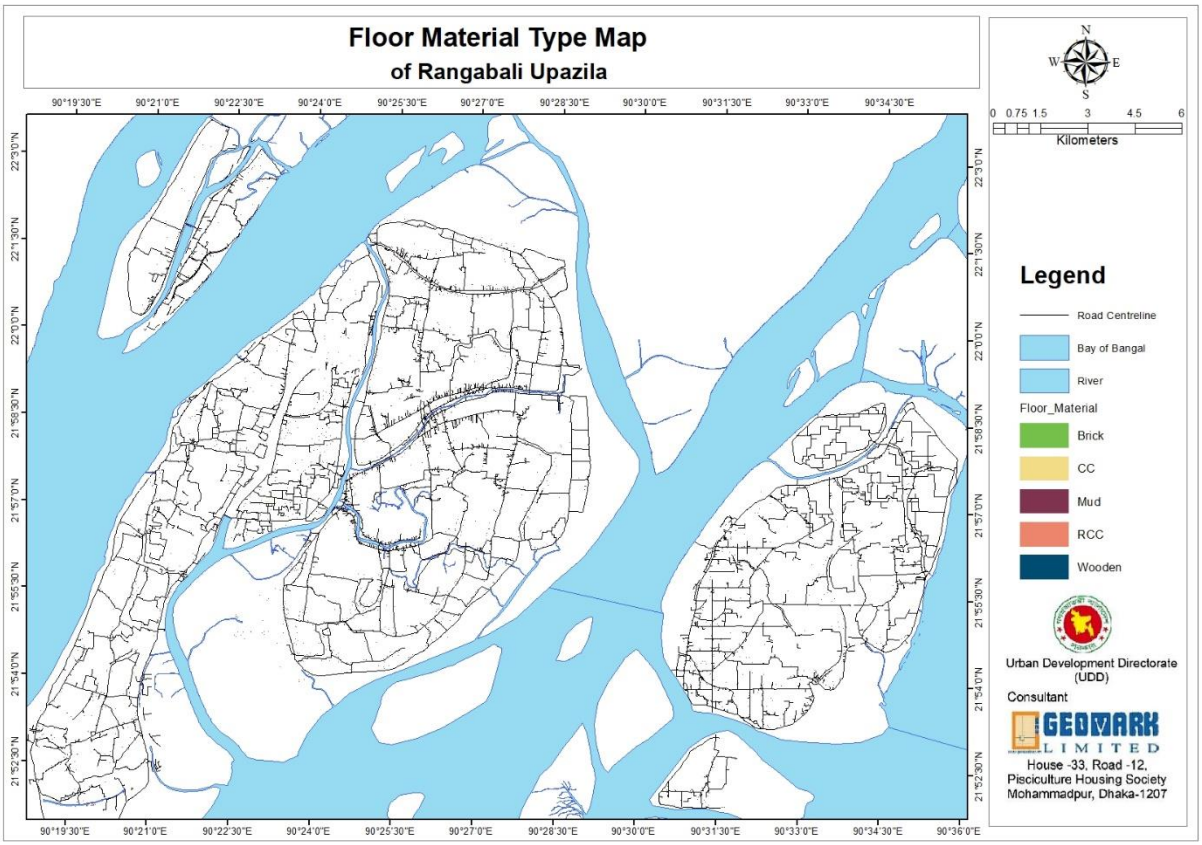
Floor Material Composition	Frequency	Percentage
Brick	52	0.18
CC	1861	6.31
Mud	25377	86.07
RCC	123	0.42
Wooden	2071	7.02
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-45 Floor Material



Map 4-28 Floor Material Type Map

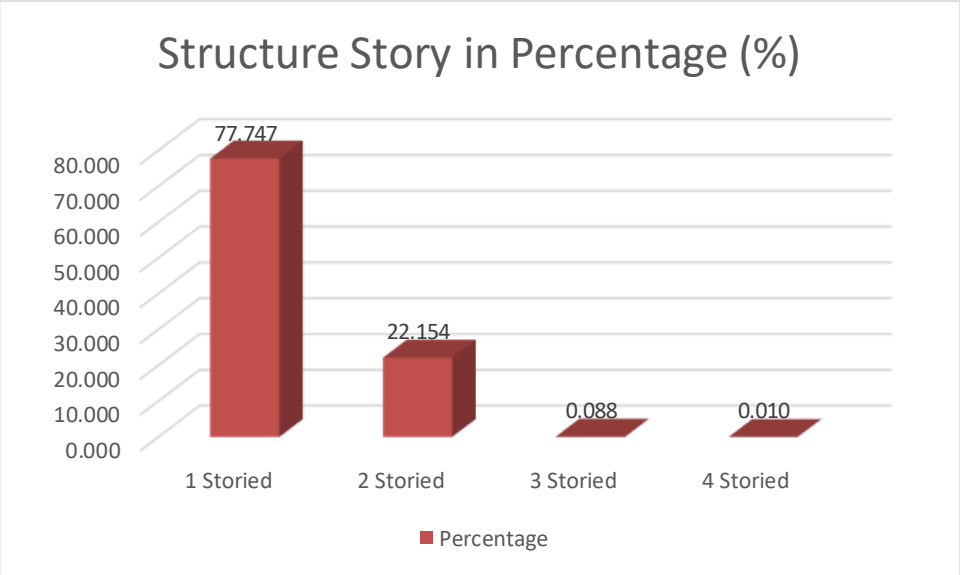
4.3.6 Number of Floors:

In Rangabali Upazila, it seems that majority of the structures are mono storied (almost 77.74 %). But a good number of 2 storied Buildings (22.15 %) are also there. See figure 7-46 for infographics and Map 7-29 for understanding from spatial perspective.

Table 4-41 Structure Story

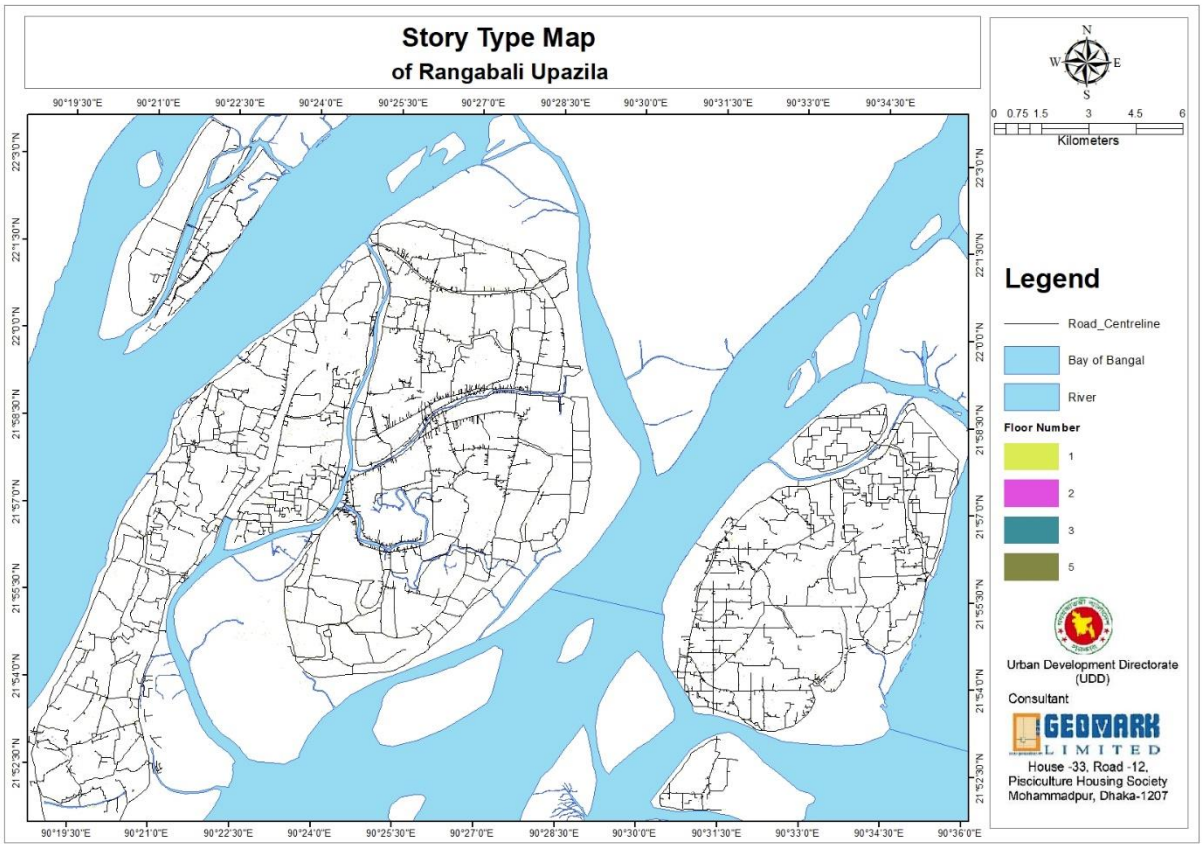
Floor Number	Frequency	Percentage
1 Storied	22923	77.747
2 Storied	6532	22.154
3 Storied	26	0.088
4 Storied	3	0.010
Total	29484	100.000

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-46 Structure Story



Map 4-29 Structure Story Map

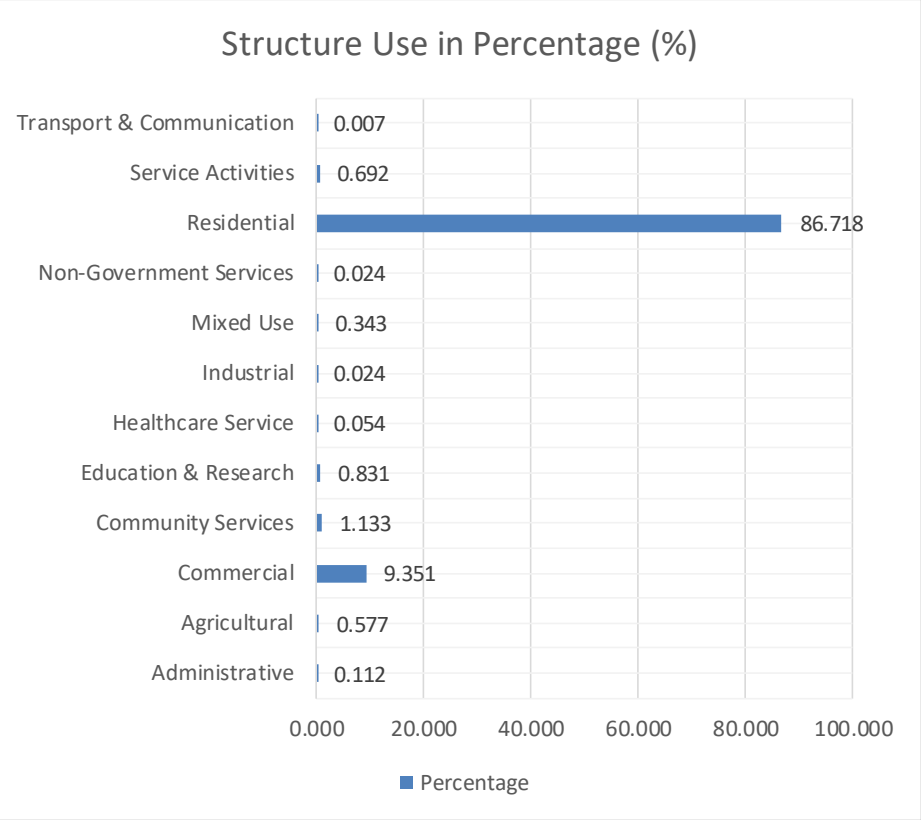
4.3.7 Structure Use:

Almost 86.7 percent of the structures are being used as residential purpose. The second dominating use is commercial use (9.35 %). See figure 7-47 for infographics and Map 7-30 for understanding from spatial perspective.

Table 4-42 Structure Use

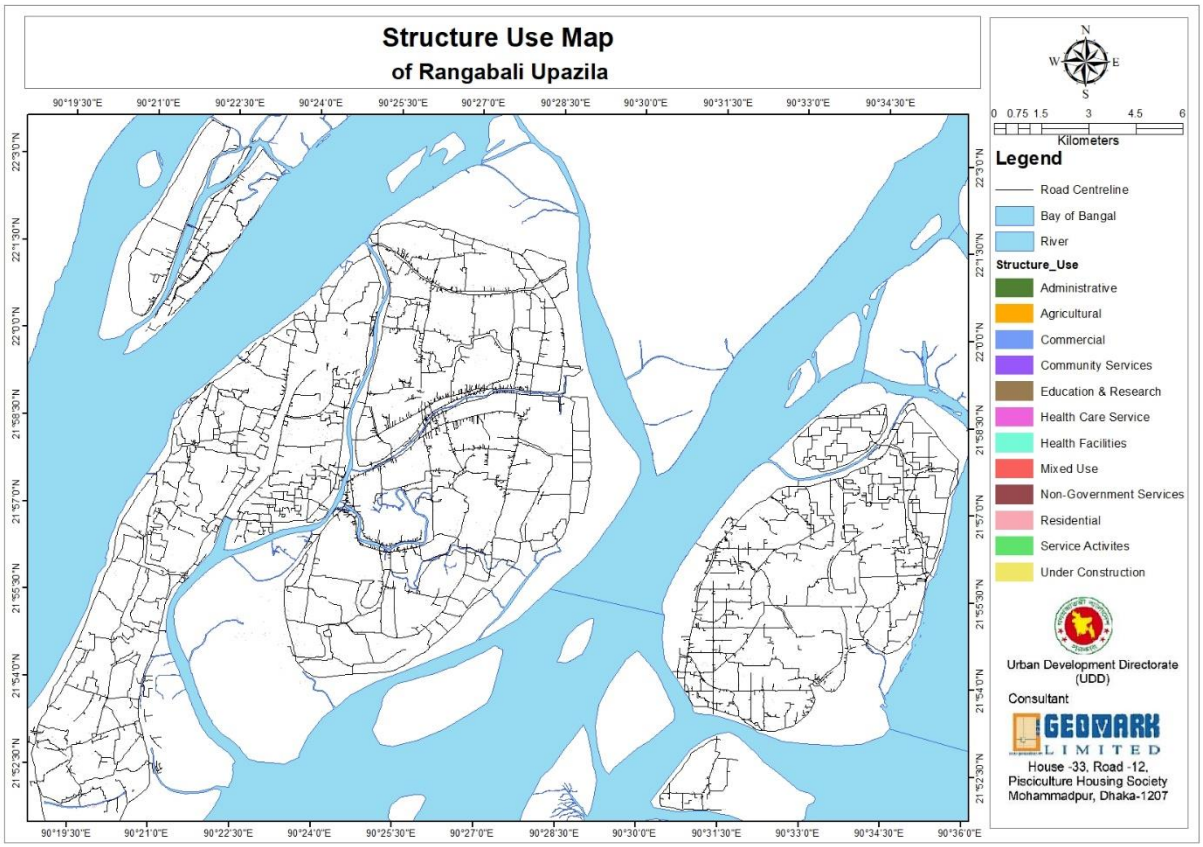
Structure Use	Frequency	Percentage
Administrative	33	0.112
Agricultural	170	0.577
Commercial	2757	9.351
Community Services	334	1.133
Education & Research	245	0.831
Healthcare Service	16	0.054
Industrial	7	0.024
Mixed Use	101	0.343
Non-Government Services	7	0.024
Residential	25568	86.718
Service Activities	204	0.692
Transport & Communication	2	0.007
Under Construction	40	0.136
Total	29484	100.000

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-47 Structure Use



Map 4-30 Structure use Map

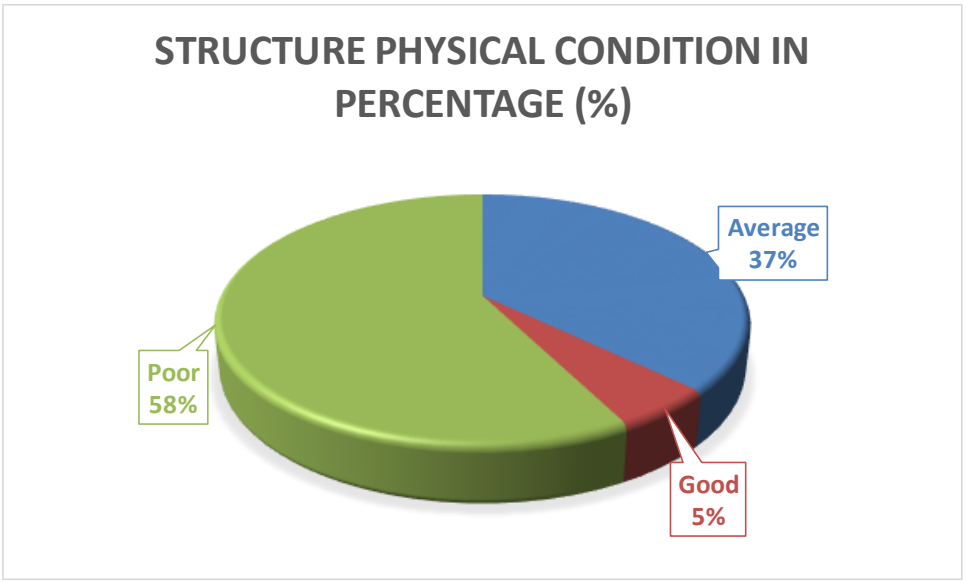
4.3.8 Structure Physical Condition:

In Rangabali Upazila, majority of the structures (57.59 %) are physically poor in condition, 37.13 percent are in average condition and only 5.28 percent are in good condition. See figure 7-48 for infographics and Map 7-31 for understanding from spatial perspective.

Table 4-43 Structure Physical Condition

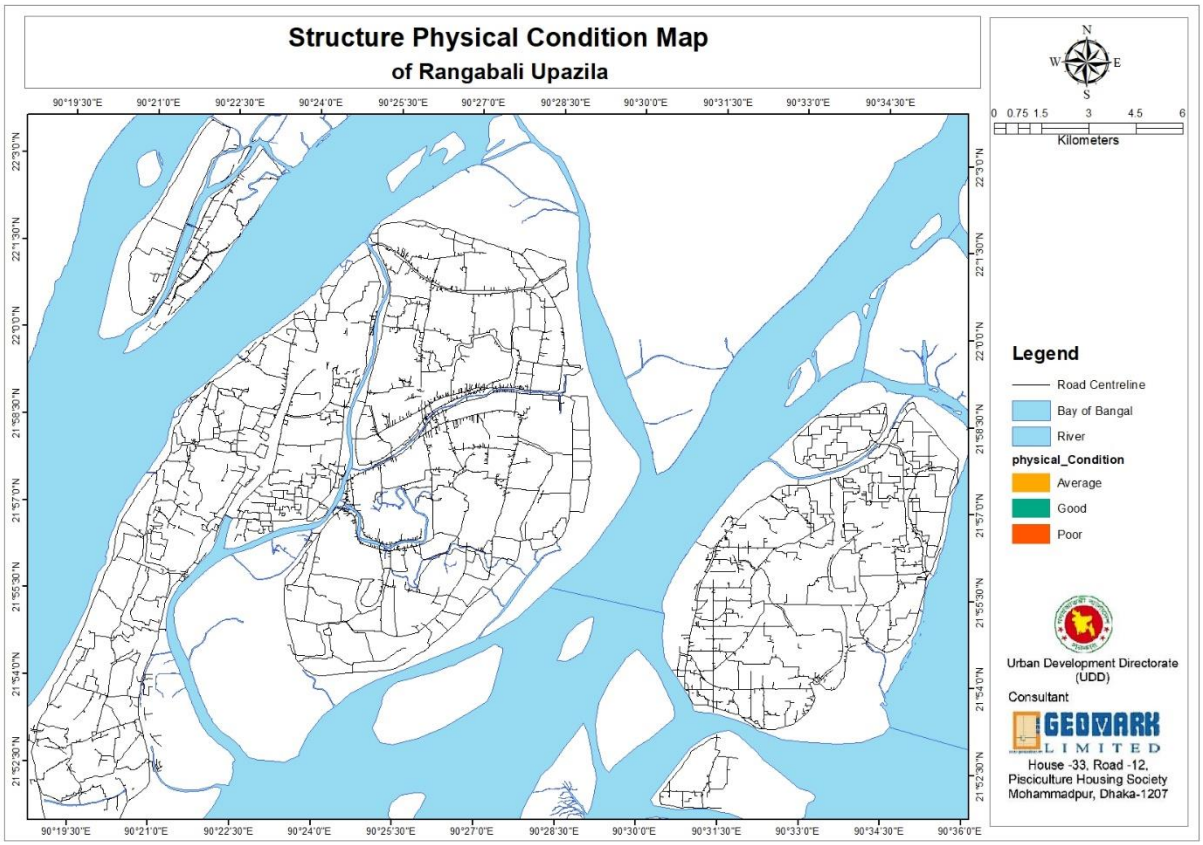
physical Condition	Frequency	Percentage
Average	10948	37.13
Good	1556	5.28
Poor	16980	57.59
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-48 Structure Physical Condition



Map 4-31 Structure Physical Condition Map

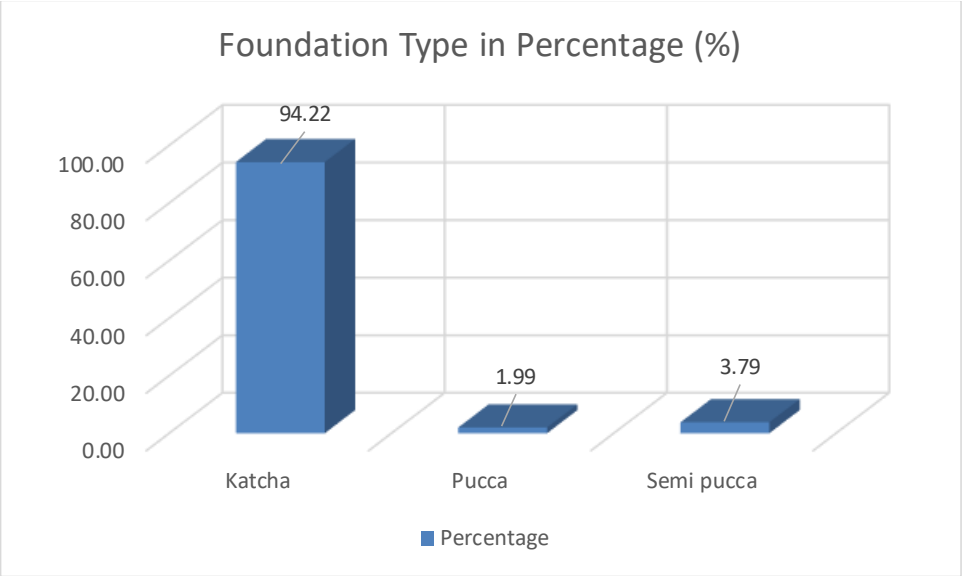
4.3.9 Foundation Type:

Majority of the structure foundations are Katcha (94.22 %). Semi-Pucca and Pucca are 3.79 % and 1.99 % respectively. See figure 7-49 for infographics and Map 7-32 for understanding from spatial perspective.

Table 4-44 Foundation Type

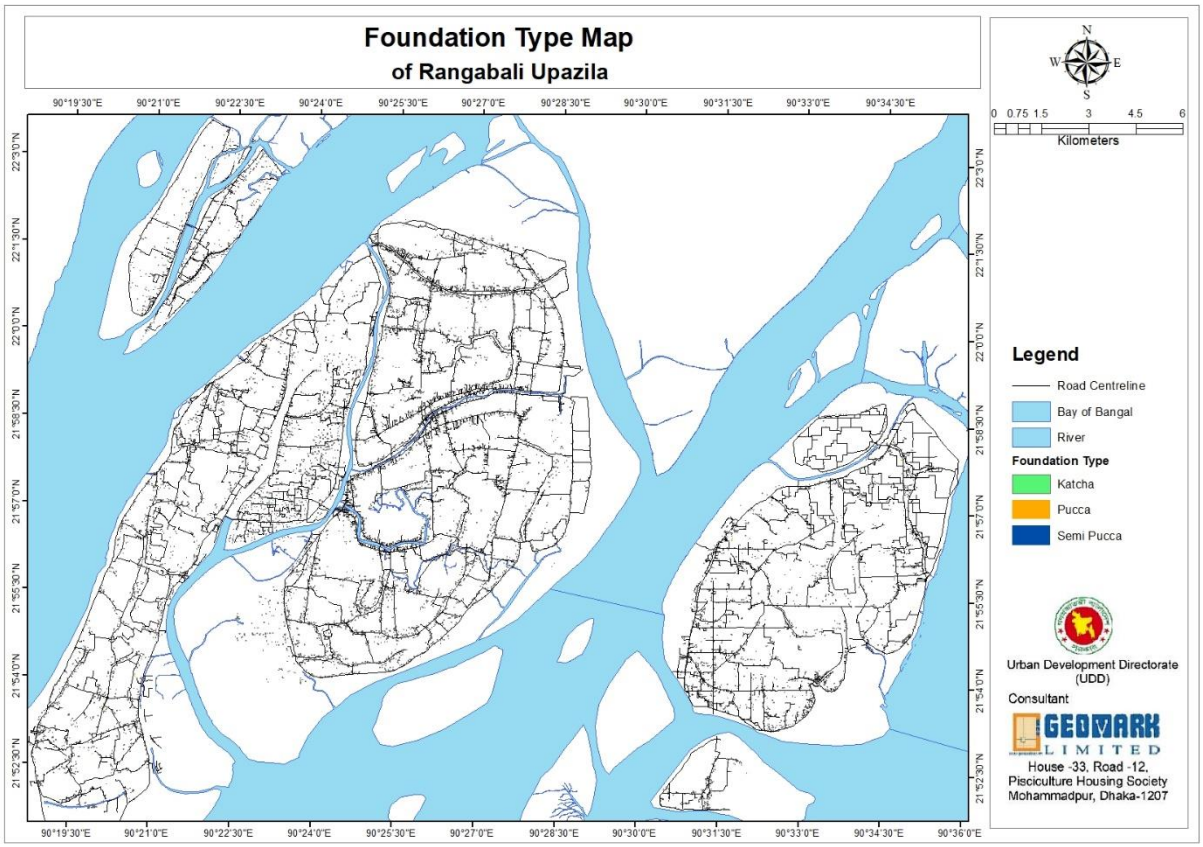
Foundation Type	Frequency	Percentage
Katcha	27780	94.22
Pucca	587	1.99
Semi pucca	1117	3.79
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-49 Foundation Type



Map 4-32 Foundation Type Map

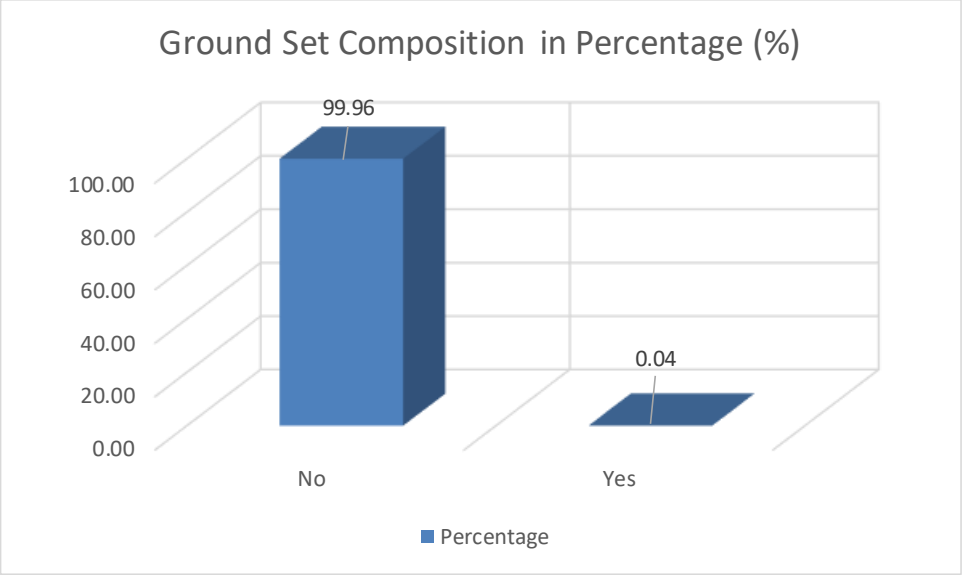
4.3.10 Ground Set:

Ground Set has not been detected for almost 99.96 percent of the structures. See figure 7-50 for infographics and Map 7-33 for understanding from spatial perspective.

Table 4-45 Ground Set

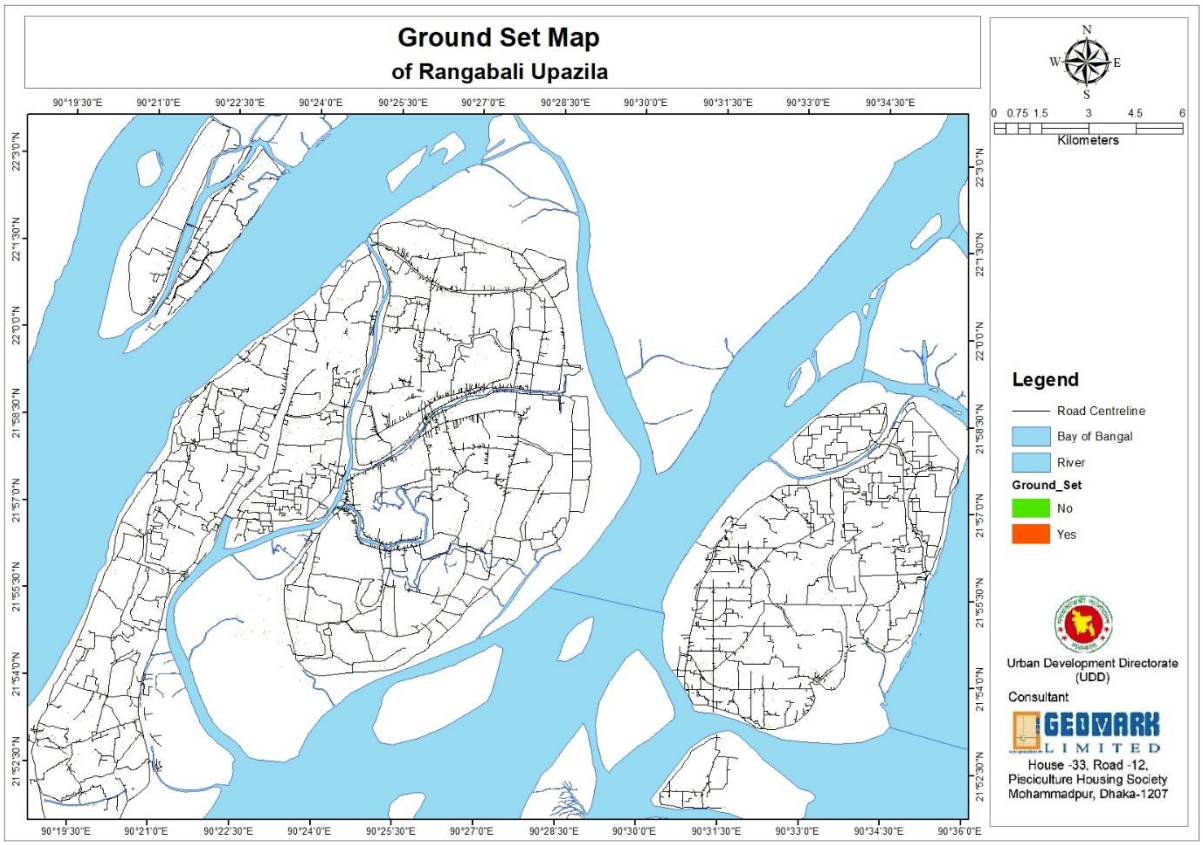
Ground Set	Frequency	Percentage
No	29472	99.96
Yes	12	0.04
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-50 Ground Set



Map 4-33 Ground Set Map

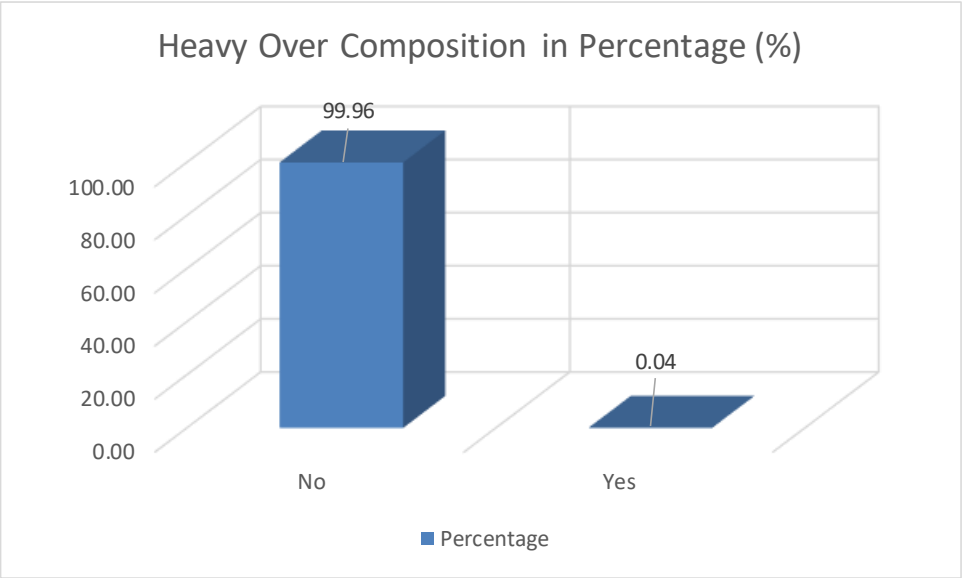
4.3.11 Heavy Over:

Heavy Over has not been detected for almost 99.96 percent of the structures. See figure 7-51 for infographics and Map 7-34 for understanding from spatial perspective.

Table 4-46 Heavy Over

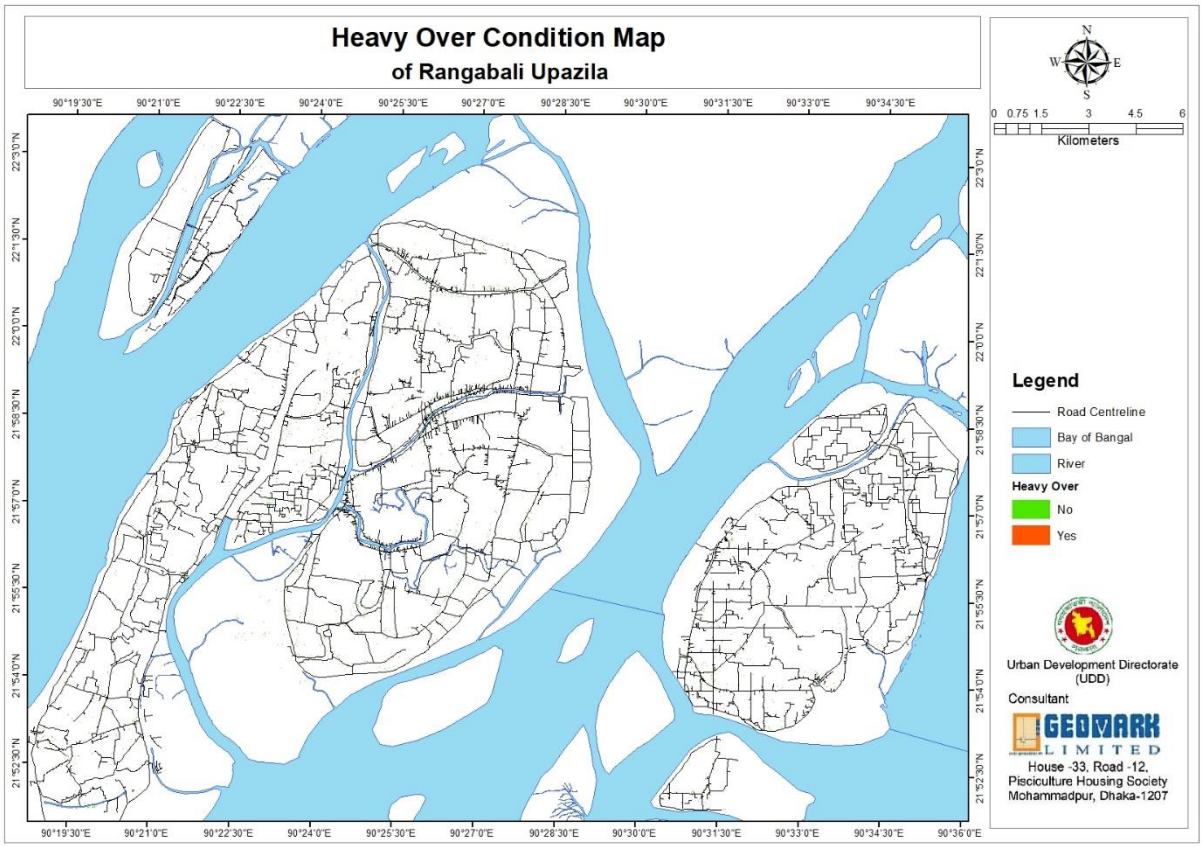
Ground Set	Frequency	Percentage
No	29472	99.96
Yes	12	0.04
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-51 Heavy Over



Map 4-34 Heavy Over Map

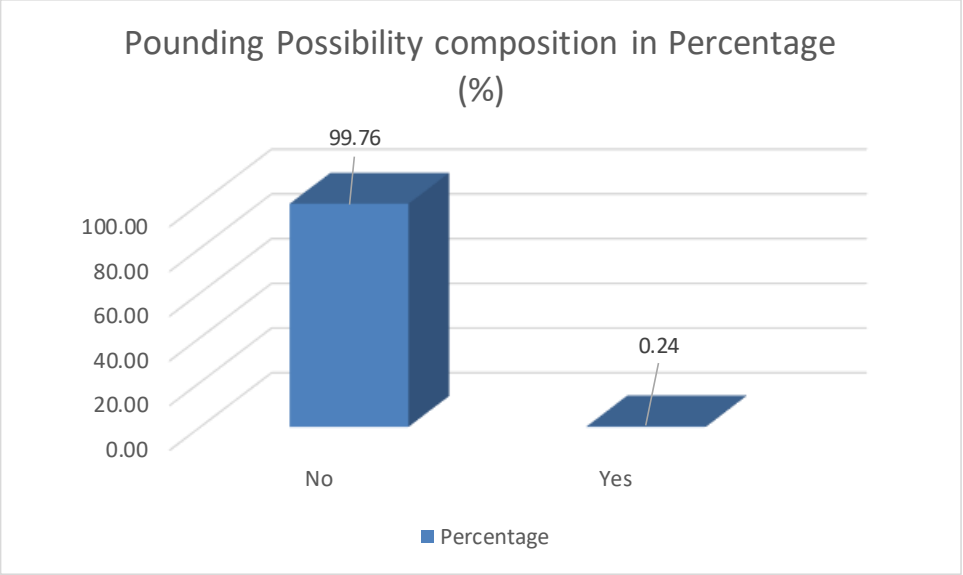
4.3.12 Pounding Possibility:

Pounding Possibility has not been detected for almost 99.76 percent of the structures. See figure 7-52 for infographics and Map 7-35 for understanding from spatial perspective.

Table 4-47 Pounding Possibility

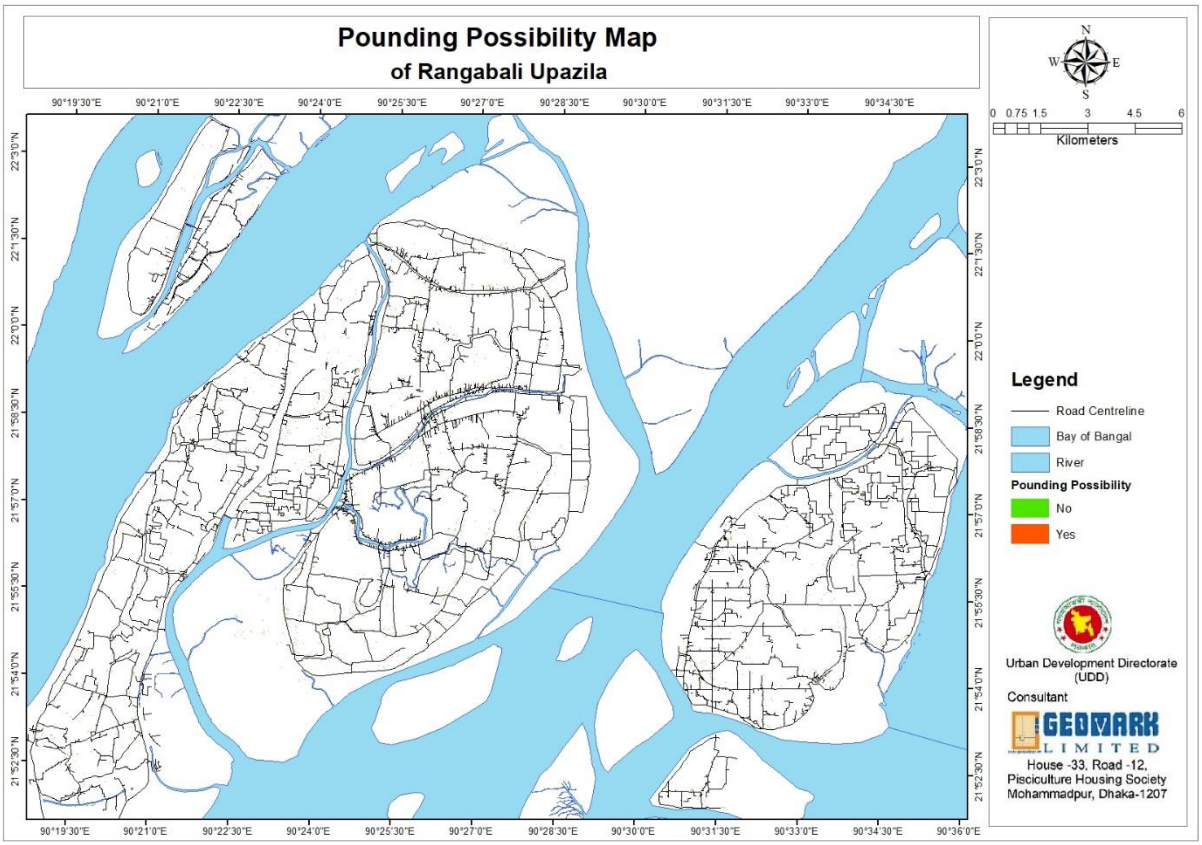
Pounding Possibility	Frequency	Percentage
No	29413	99.76
Yes	71	0.24
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-52 Pounding Possibility



Map 4-35 Pounding Possibility Map

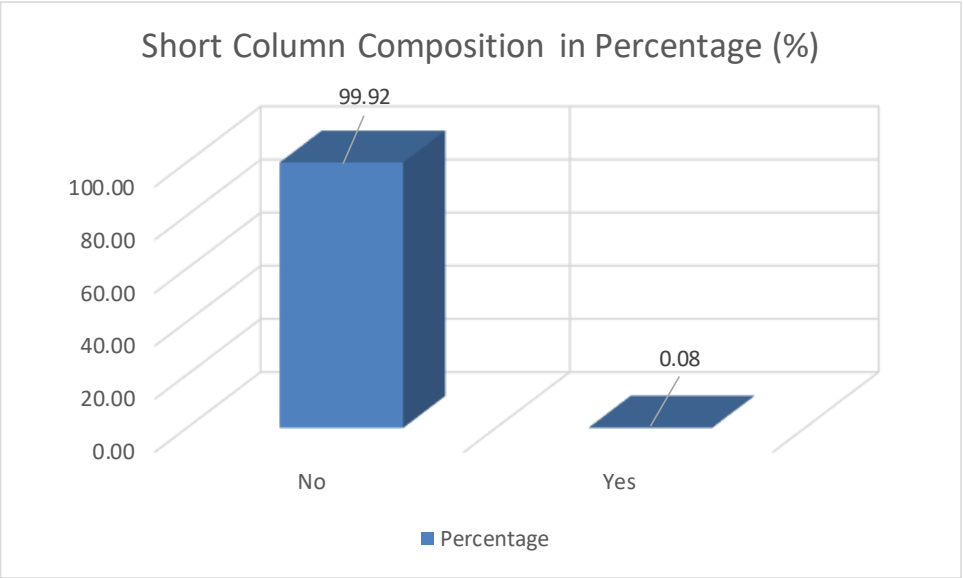
4.3.13 Short Column:

Short Column has not been detected for almost 99.92 percent of the structures. See figure 7-53 for infographics and Map 7-36 for understanding from spatial perspective.

Table 4-48 Short Column

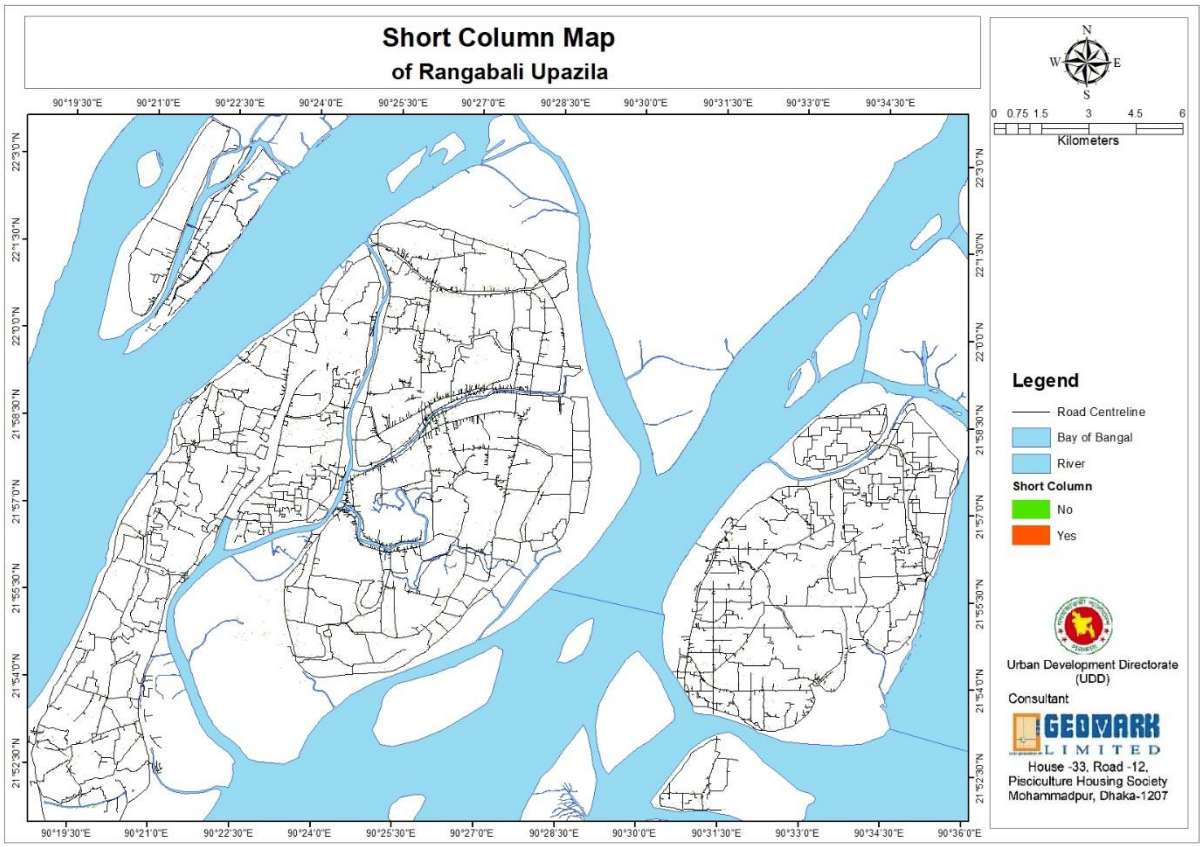
Short Column	Frequency	Percentage
No	29461	99.92
Yes	23	0.08
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-53 Short Column



Map 4-36 Short Column Map

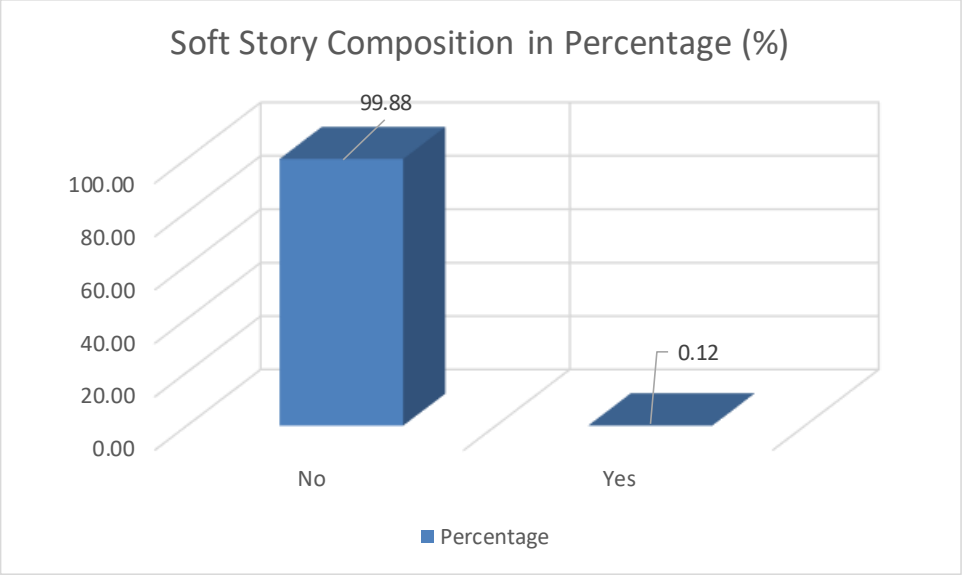
4.3.14 Soft Story:

Soft Story has not been detected for almost 99.88 percent of the structures. See figure 7-54 for infographics and Map 7-37 for understanding from spatial perspective.

Table 4-49 Soft Story

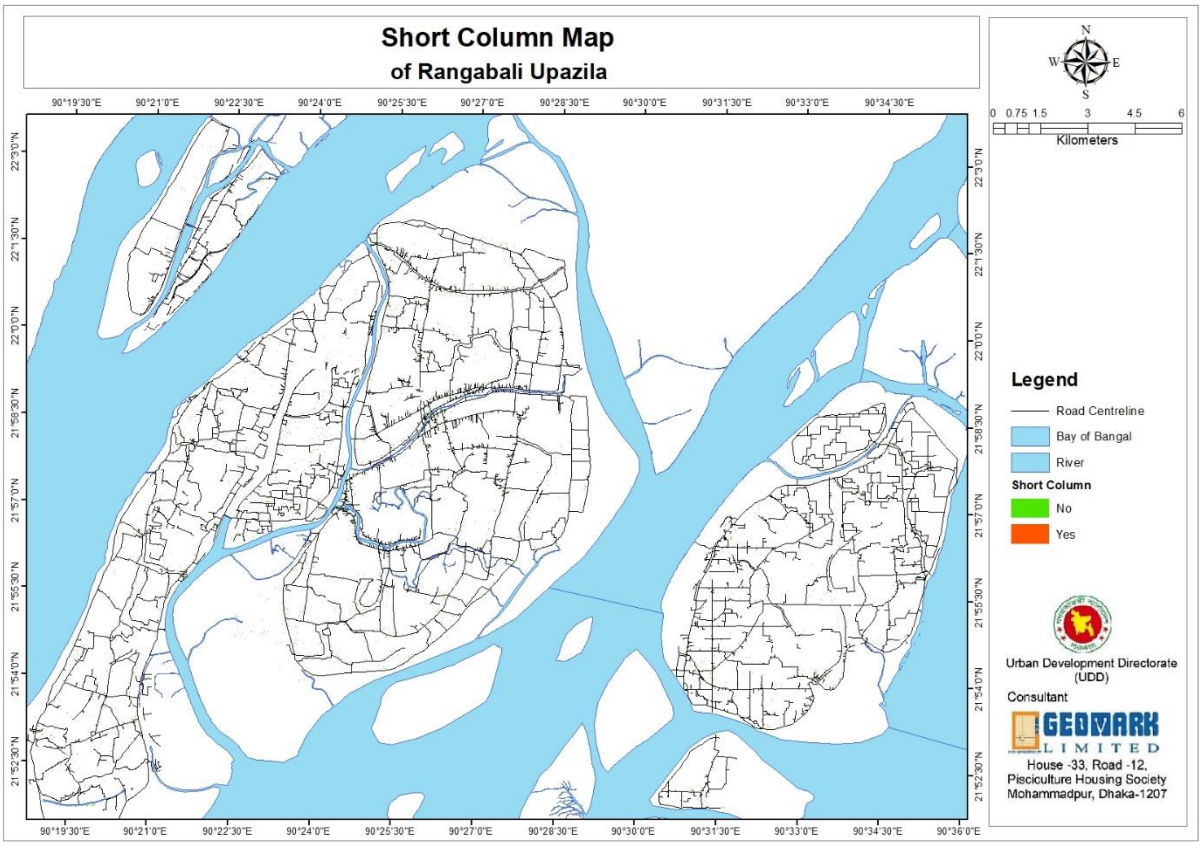
Soft Story	Frequency	Percentage
No	29448	99.88
Yes	36	0.12
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-54 Soft Story



Map 4-37 Soft Story Map

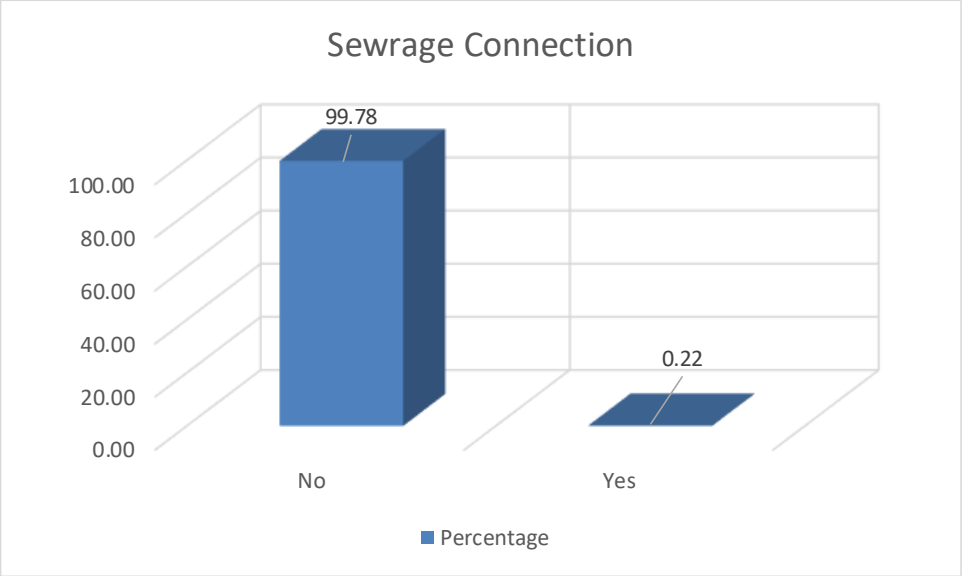
4.3.15 Sewerage Connection:

Almost 99.78 percent houses are not connected to Sewerage Connection. See figure 7-55 for infographics and Map 7-38 for understanding from spatial perspective.

Table 4-50 Sewerage Connection

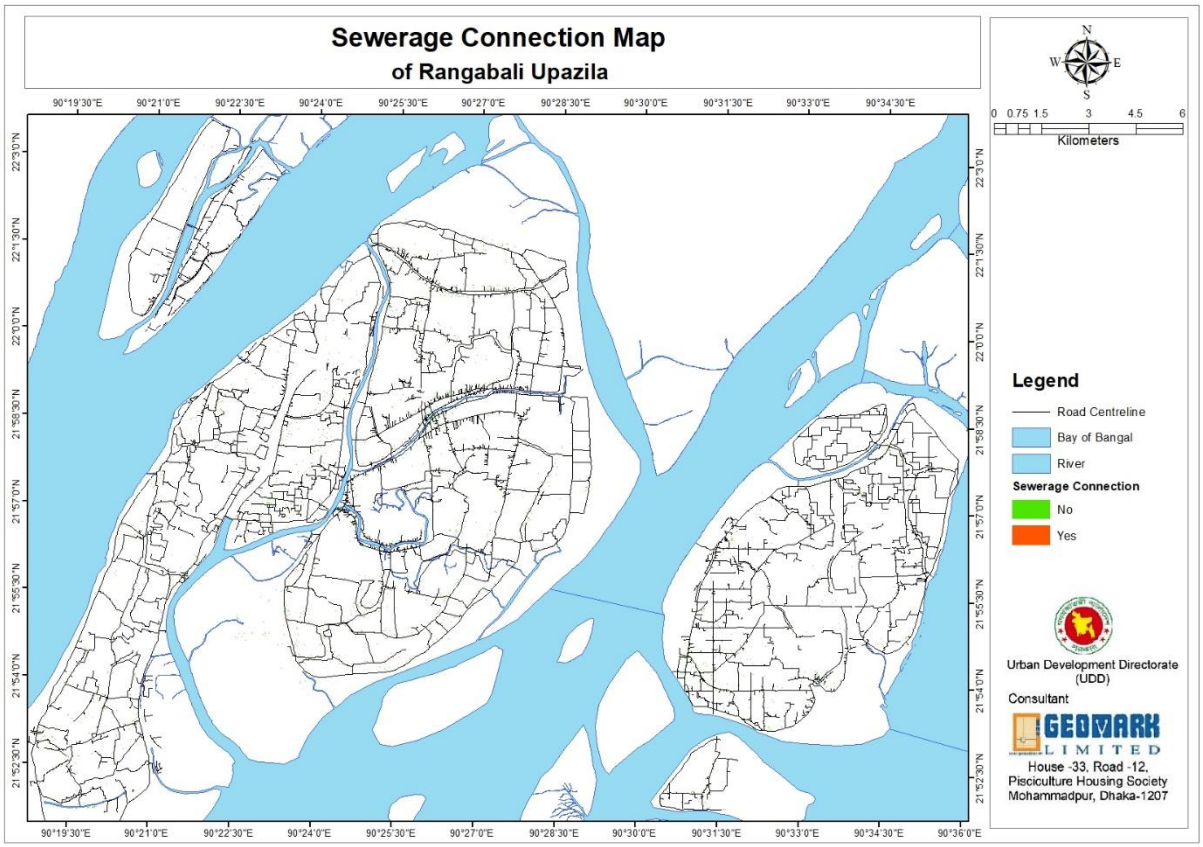
Sewerage Connection	Frequency	Percentage
No	29420	99.78
Yes	64	0.22
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-55 Sewerage Connection



Map 4-38 Sewerage Connection Map

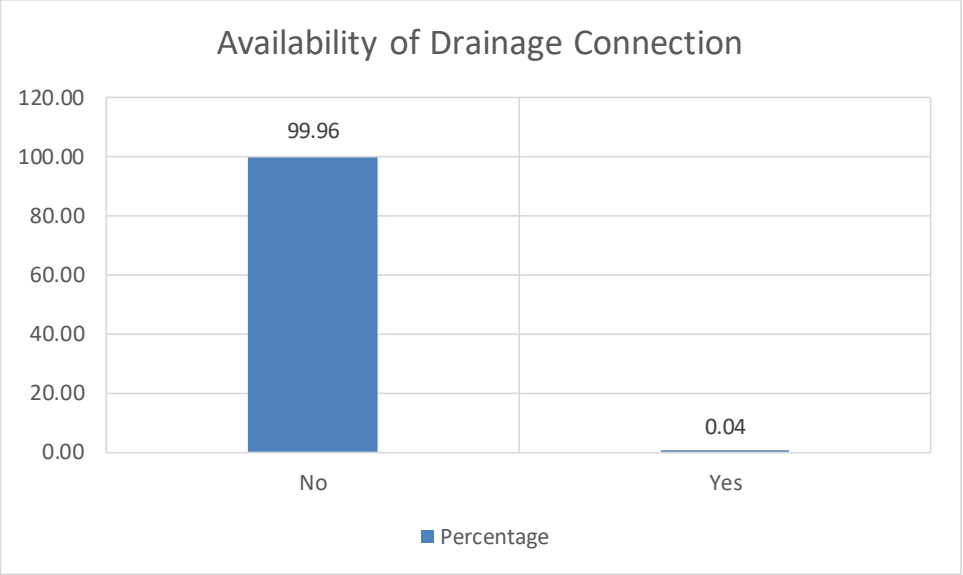
4.3.16 Drain connection:

Almost 99.96 percent houses do not have drainage connection. See figure 7-56 for infographics and Map 7-39 for understanding from spatial perspective.

Table 4-51 Drain connection

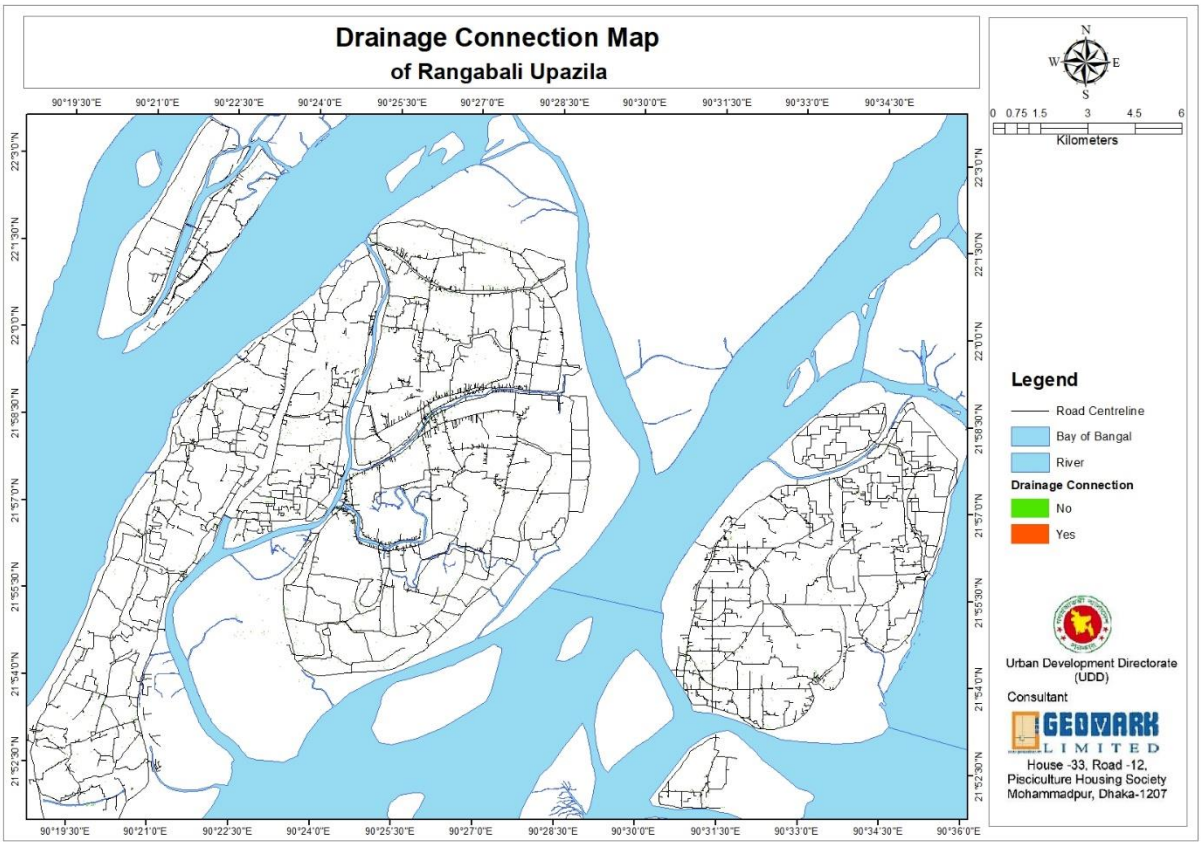
Drain Connection	Frequency	Percentage
No	29473	99.96
Yes	11	0.04
	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-56 Drain connection



Map 4-39 Drainage Connection Map

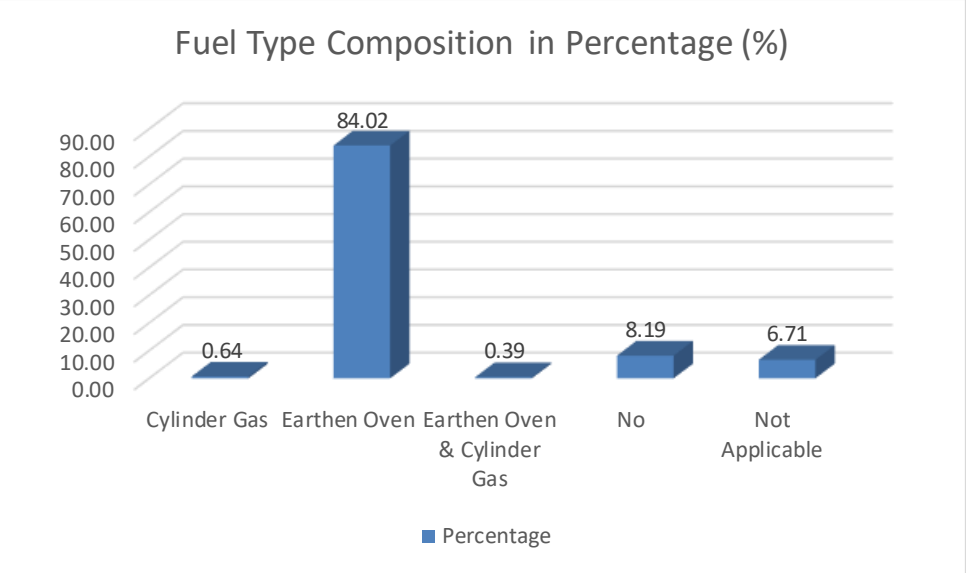
4.3.17 Source of Fuel:

In Rangabali Upazila, most of the people (84.02 %) use wood as the source of fuel in Earthen Oven. The second most popular fuel source is cylinder Gas, see figure 7-57 for infographics and Map 7-40 for understanding from spatial perspective.

Table 4-52 Source of Fuel

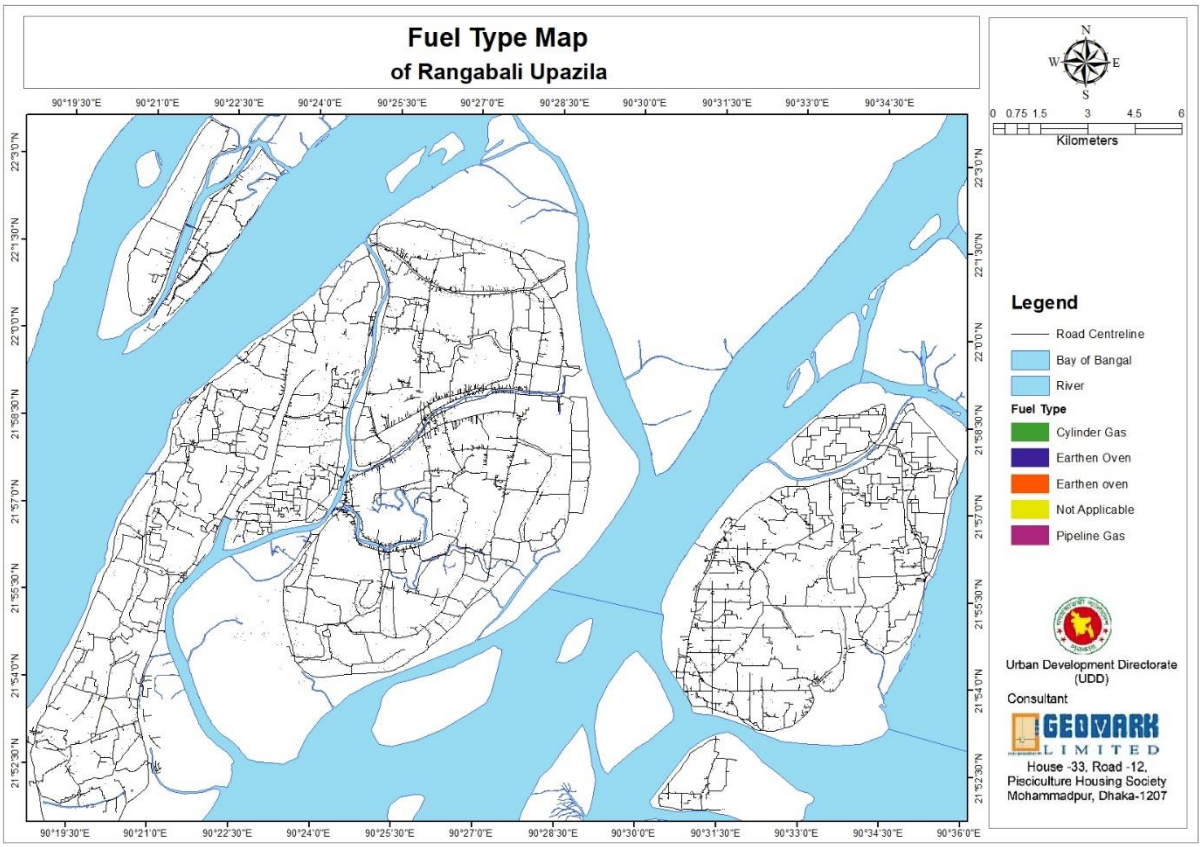
Fuel Type	Frequency	Percentage
Cylinder Gas	190	0.64
Earthen Oven	24772	84.02
Earthen Oven & Cylinder Gas	116	0.39
No	2416	8.19
Not Applicable	1979	6.71
Pipeline Gas	11	0.04
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-57: Source of Fuel



Map 4-40 Source of Fuel Map

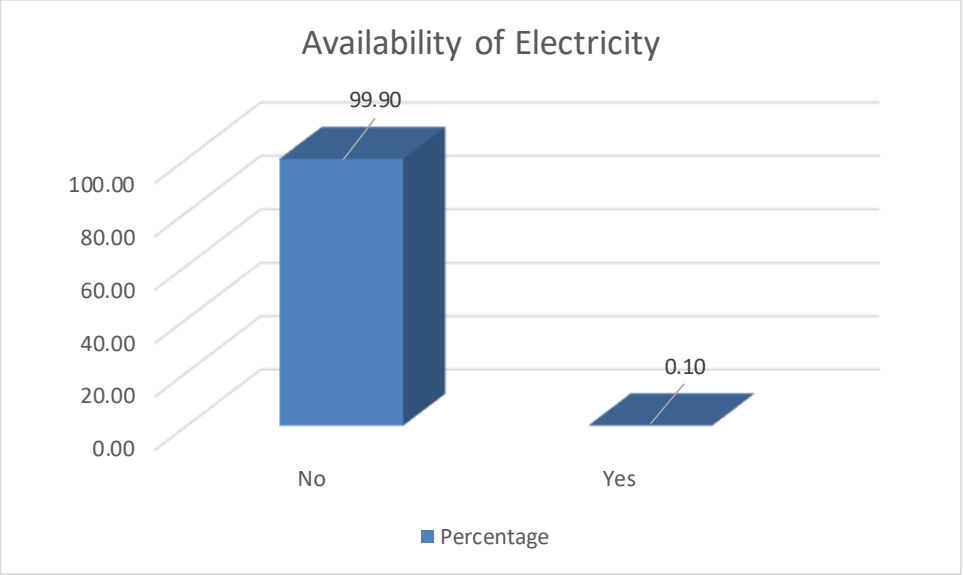
4.3.18 Availability of Electricity:

Almost 99.9 percent of the respondents do not have access to electricity. See figure 7-58 for infographics and Map 7-41 for understanding from spatial perspective.

Table 4-53 Availability of Electricity

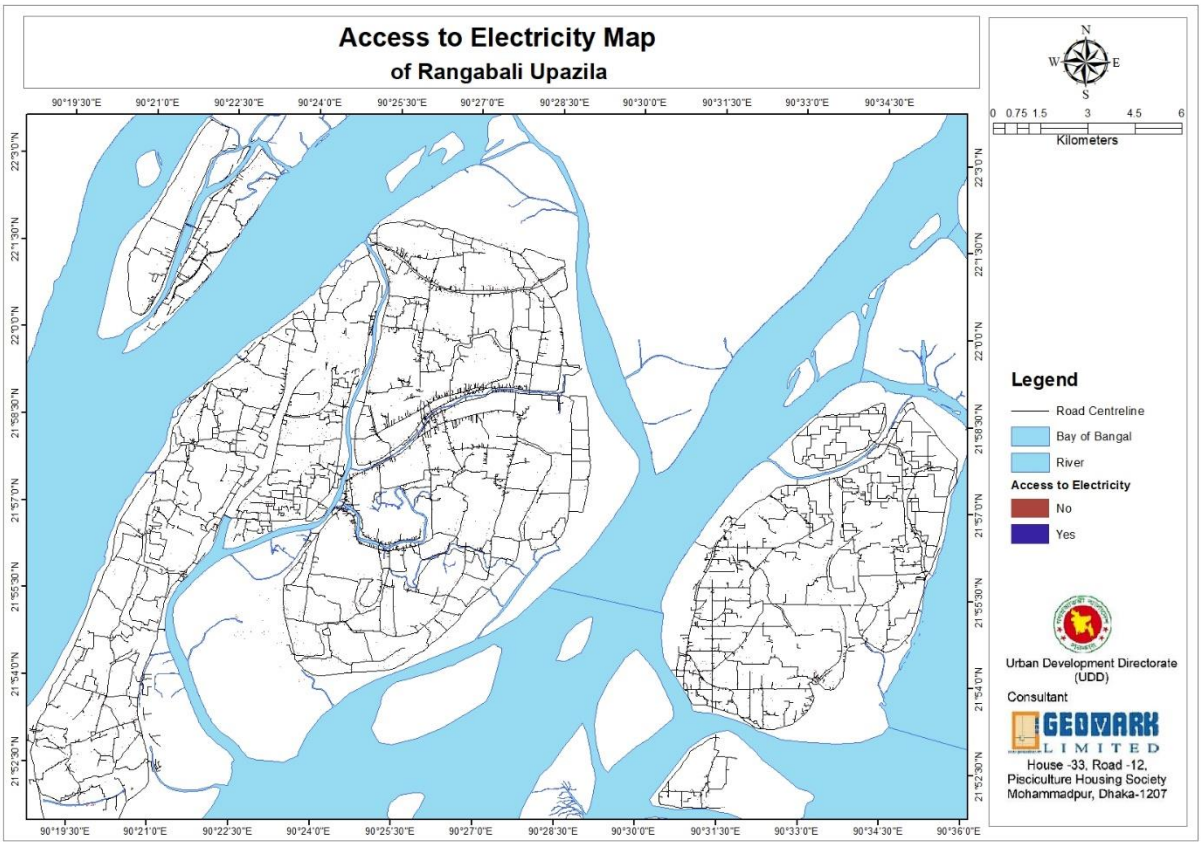
Availability of Electricity	Frequency	Percentage
No	29454	99.90
Yes	30	0.10
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 4-58: Availability of Electricity



Map 4-41 Access to Electricity Map

4.3.19 Waste disposal:

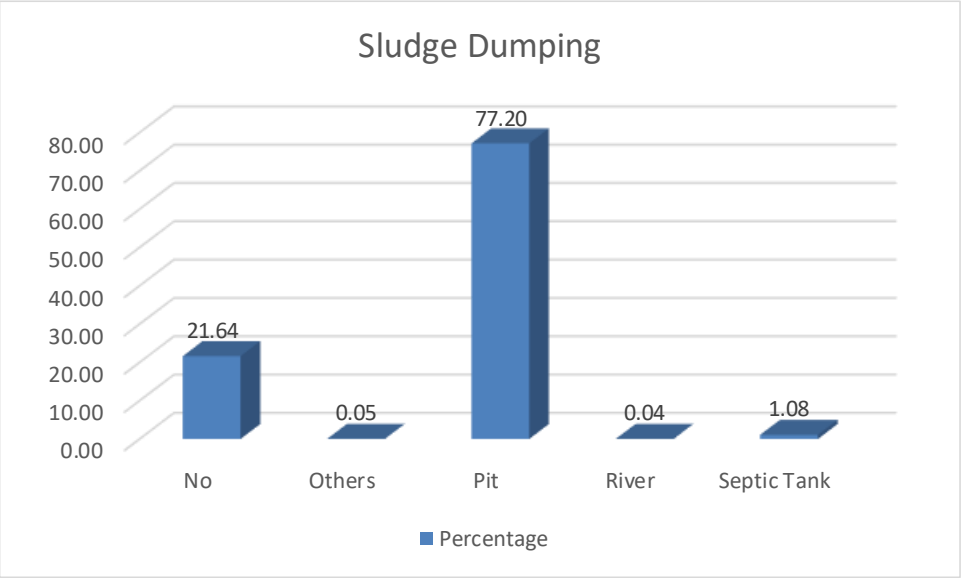
77.2 % residents use pit latrine and 1.08 % uses septic tank to dispose their fecal waste. Some of them dispose their waste in drain, river etc. and 21.64 % of the buildings do not

have any waste disposal facility. See figure 7-59 for infographics and Map 7-42 for understanding from spatial perspective.

Table 4-54 Waste Disposal location

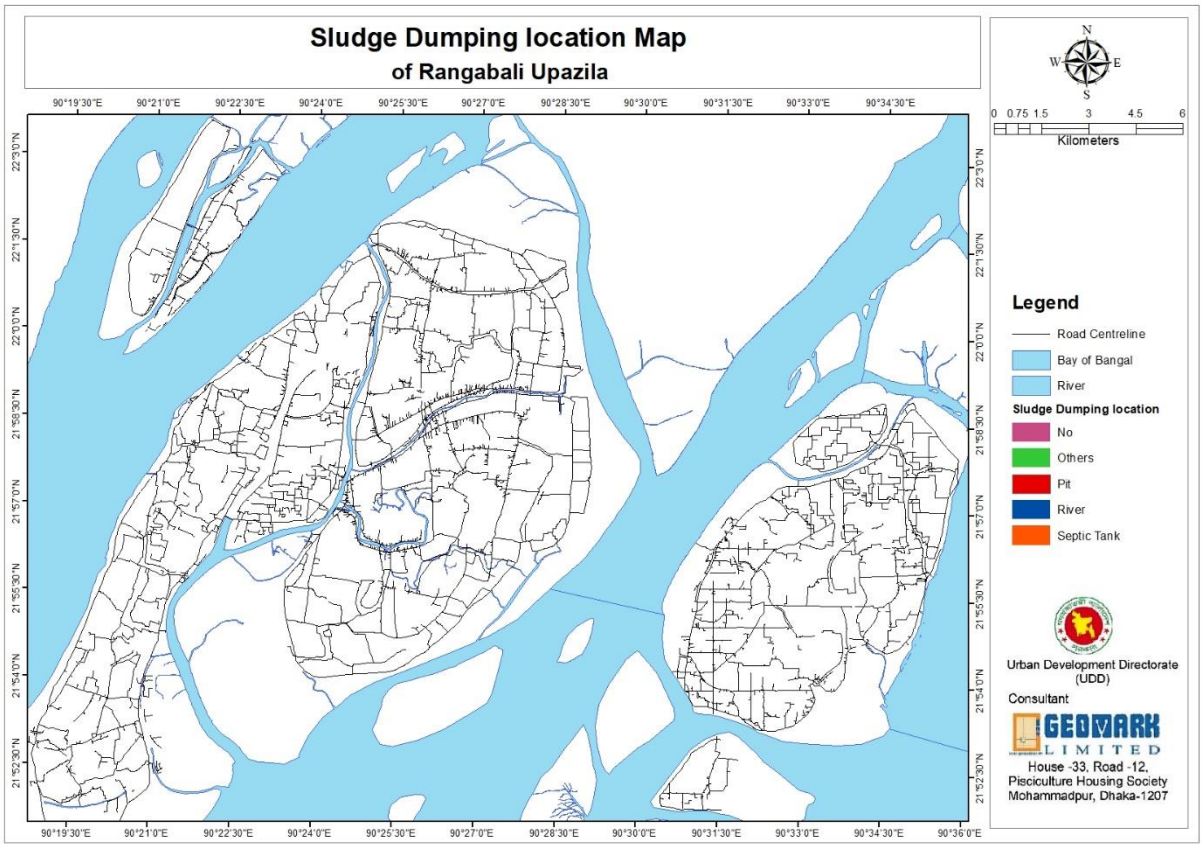
Sludge Dumping	Frequency	Percentage
No	6379	21.64
Others	15	0.05
Pit	22761	77.20
River	12	0.04
Septic Tank	317	1.08
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

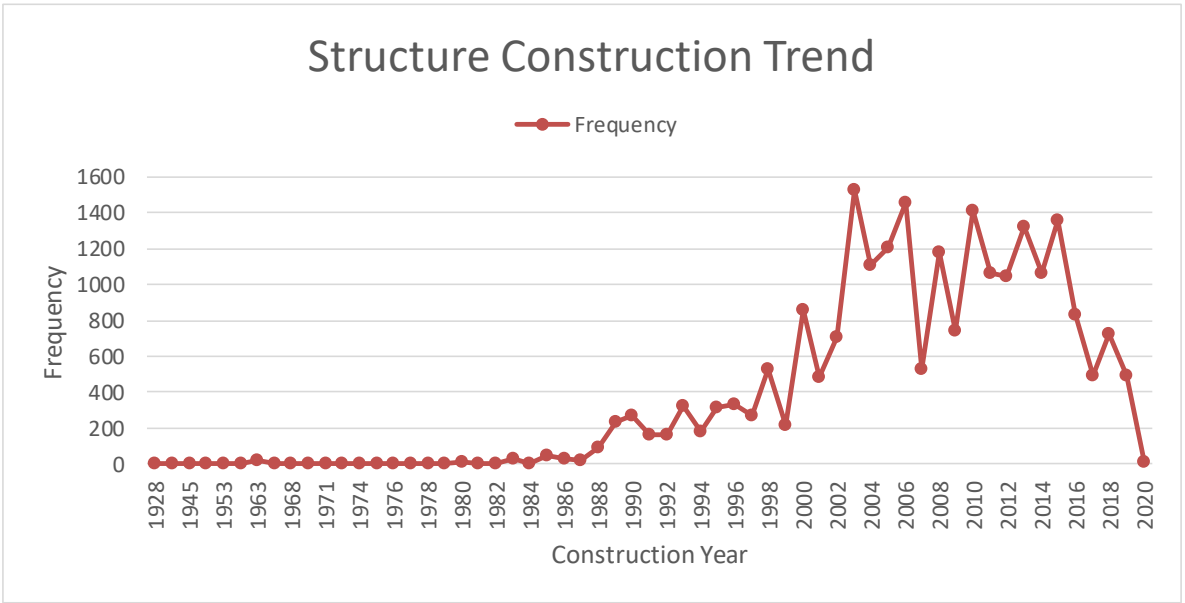
Figure 4-59: Waste Disposal location



Map 4-42 Sludge Damping Place Map

4.3.20 Structure Construction Trend:

From the structure construction trend (fig. 7-20), we can see that rapid growth in structure construction took place in the last 16 years (2000 to 2016) and the growth is significant. See figure 7-60 for infographics.



Data source: UDD Field Survey, 2019

Figure 4-60 Structure Construction Year

4.4 Challenges and way out during the survey:

- ✓ In most of the areas in Rangabali rural area, electricity is not available yet. So, charging the electric equipment for the survey was a big challenge. To solve the issue, Geomark limited provided solar electricity system for the survey team.
- ✓ During the rainy season, it becomes hard to reach remote rural areas because of bad road condition. Most of the roads are katcha type and sticky clay forms everywhere in rural areas during the rainy season. But despite this issue our surveyors continued their work.
- ✓ The entire project area is extremely prone to cyclones and other natural calamities. During cyclone Amphan, Geomark Limited ensured safety and secure accommodation for all the survey teams working in the field.
- ✓ Accommodation facility was another big challenge. In some extreme isolated areas like islands of Bay of Bangal, secure accommodation facilities can hardly be found.

Chapter 5

5.1 Data Presentation

All the physical feature surveyed from the field has been digitized and linked with collected attribute. Then the GIS Shapefile of the physical feature has been overlayed on digital Mouza map which collected from UDD office. Finally, important thematic maps related to planning has been prepared from the combined database.

Galachipa Upazila Thematic Maps

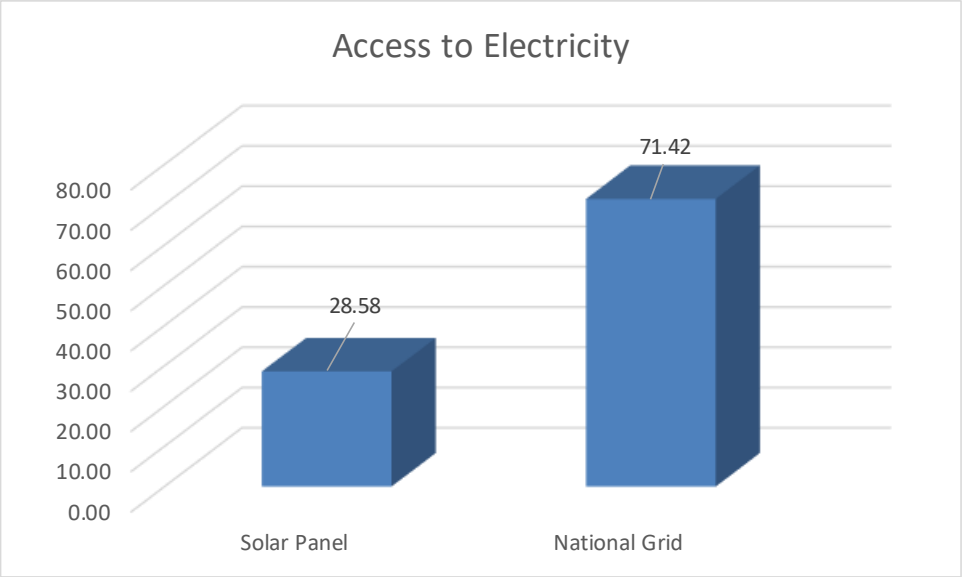
5.1.1 Access to Electricity

In Galachipa Upazila, majority of the people have access to electricity from the national grid. Almost 71.42 percent of the respondents have access to electricity from National Grid. The remaining portion avail electricity from solar panel. Thematic Map 5-1 is showing the scenario from spatial perspective.

Table 5-1 Access to Electricity

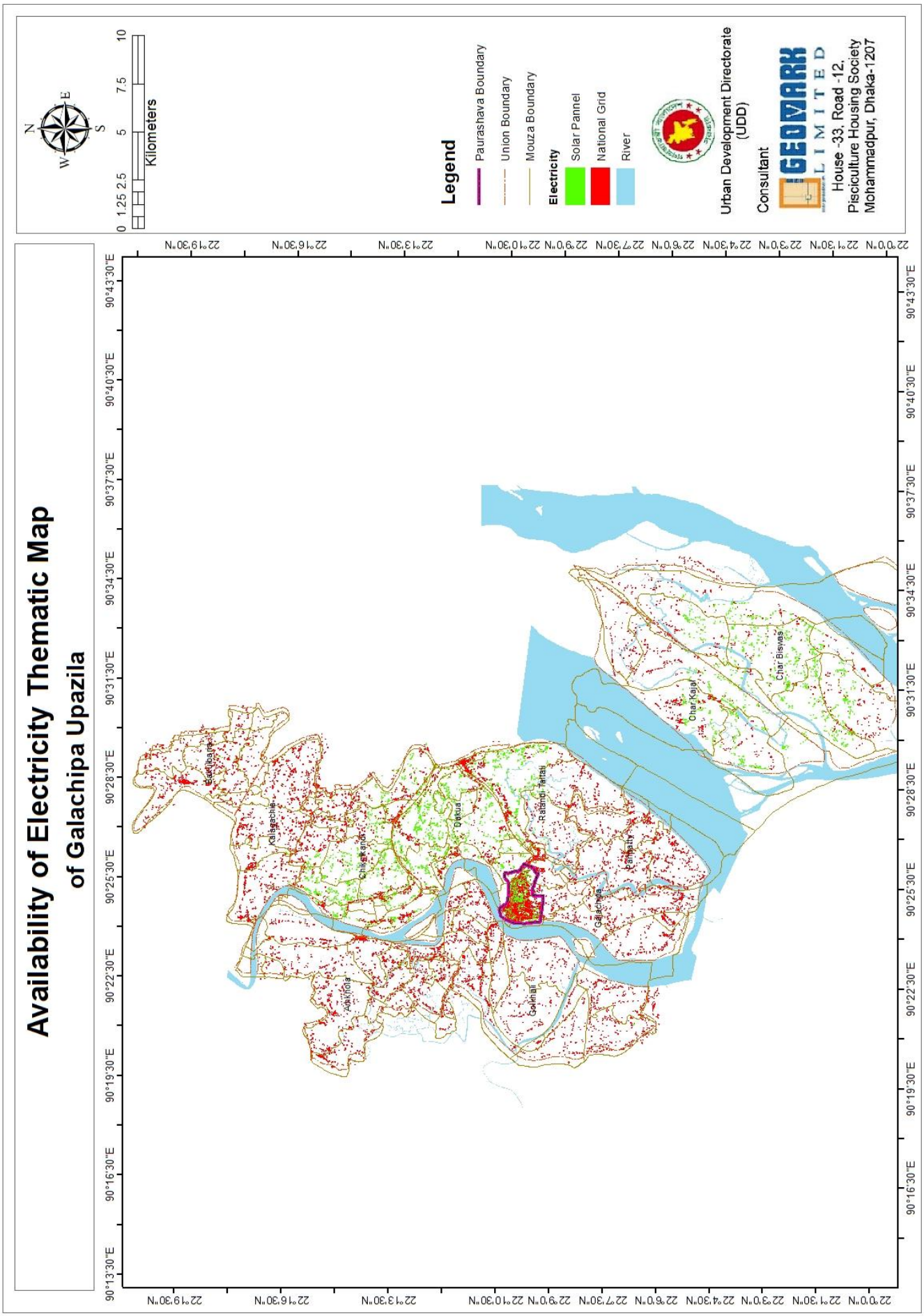
Electricity	Frequency	Percentage
Solar Panel	17077	28.58
National Grid	42682	71.42
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-1: Access to Electricity



Map 5-1: Availability of Electricity Thematic Map

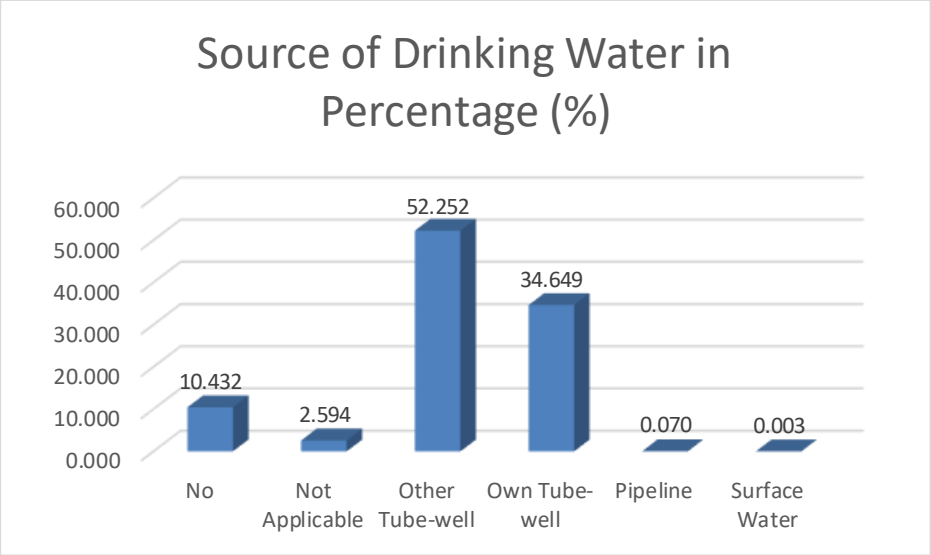
5.1.2 Drinking Water Source

In Galachipa Upazila, majority of the people collect their drinking water from Tube well. The remaining portion avail drinking water from various sources like pond, river, pipeline water etc. most of the people (52.25 %) use Tube-well (Other) water as their drinking water source. 34.64 % of the residents uses water from their own Tube-well and 0.07 % uses pipeline water and a few of them uses common tube well water. Thematic Map 5-2 is showing the scenario from spatial perspective.

Table 5-2 Source of drinking water

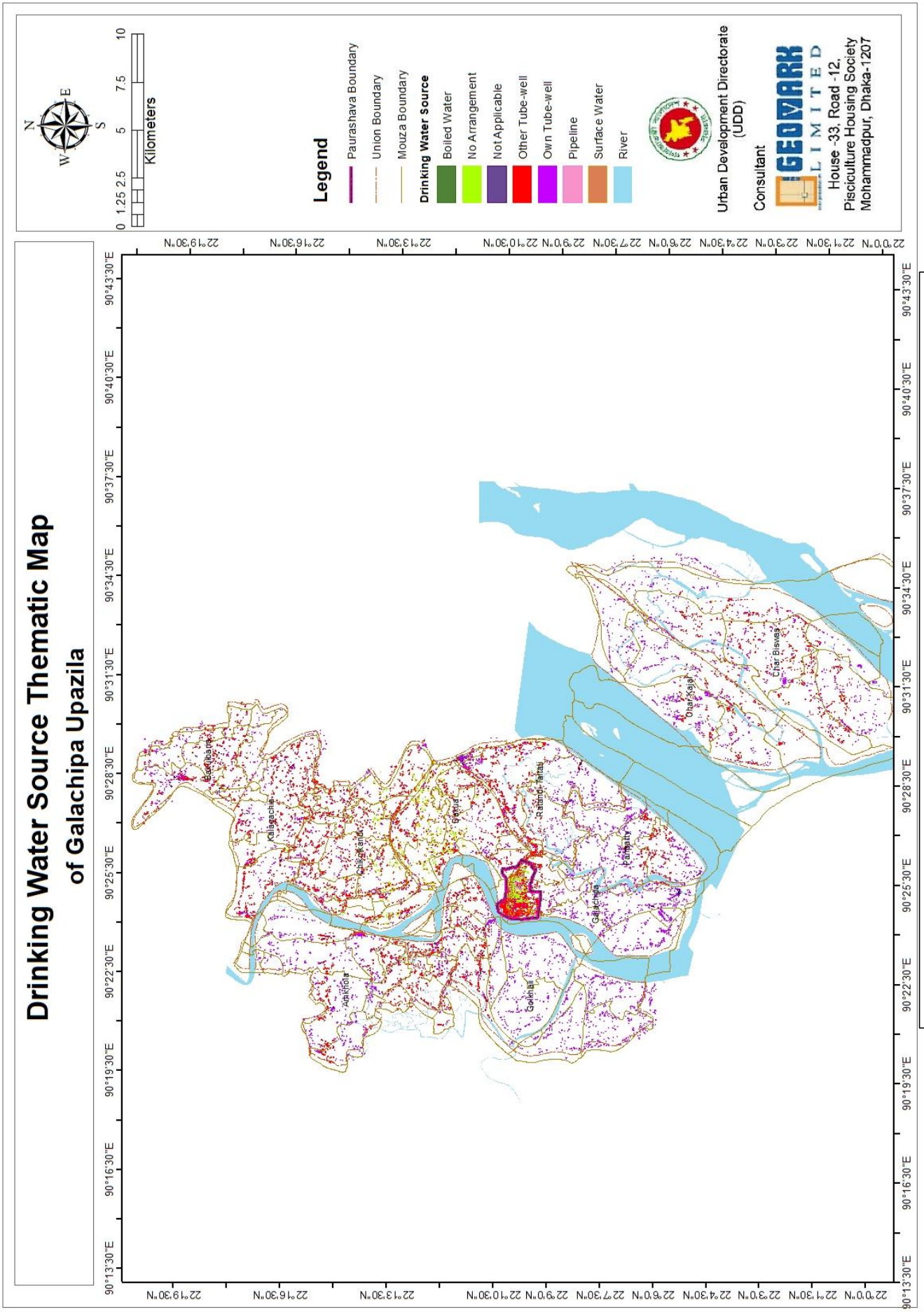
Source of Drinking Water	Frequency	Percentage
No	6234	10.432
Not Applicable	1550	2.594
Other Tube-well	31225	52.252
Own Tube-well	20706	34.649
Pipeline	42	0.070
Surface Water	2	0.003
Total	59759	100.000

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-2: Source of drinking water



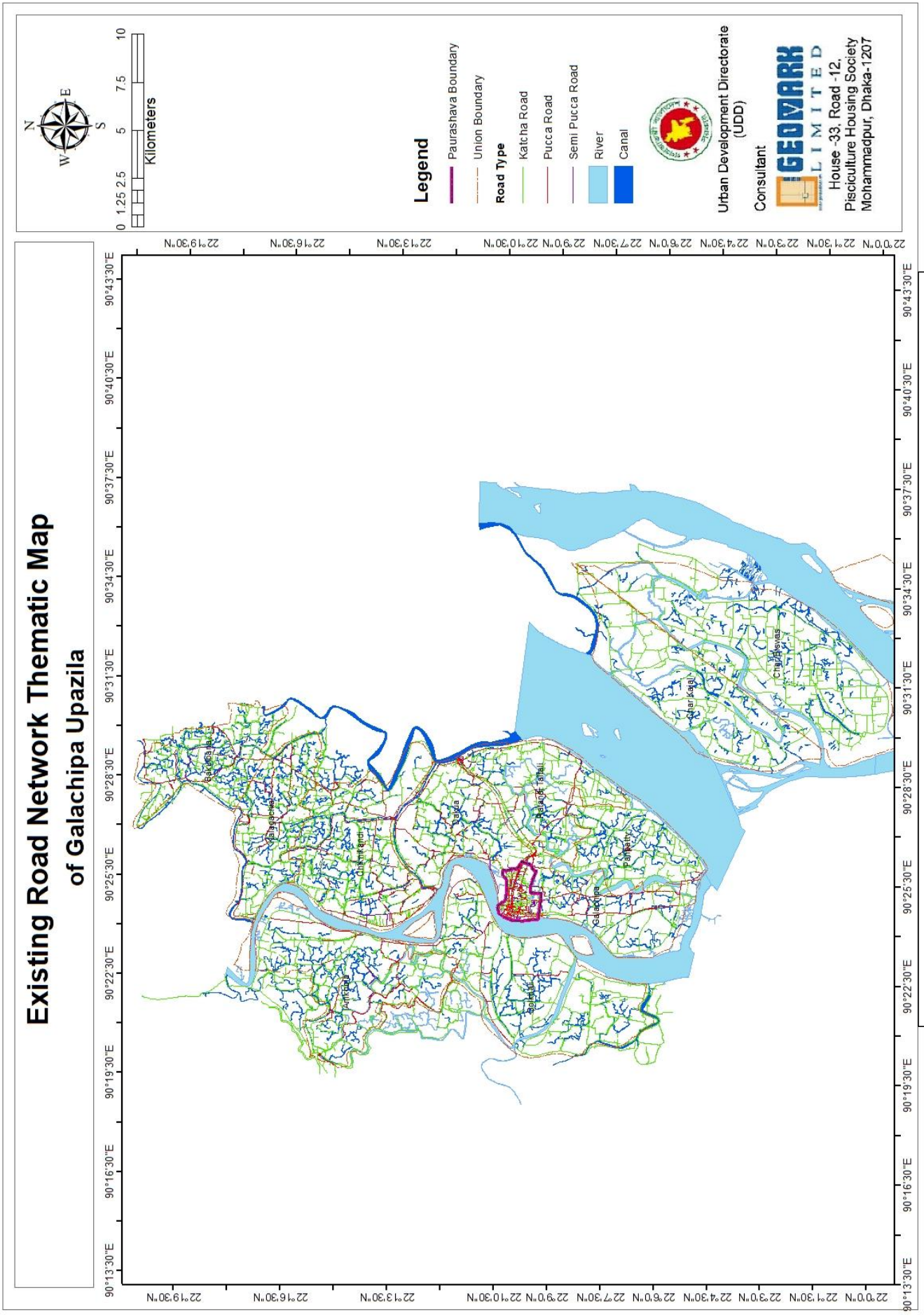
Map 5-2: Drinking water Source Thematic Map

5.1.3 Existing Road Network

In Galachipa Upazila, majority of the roads are katcha road but upazila roads and in growth centers Pucca roads can be seen. Road lengths are, Katcha Road 1359.78 km, Pucca Road 269.11 km and Semi Pucca 38.43 km. Thematic Map 5-3 is showing the scenario from spatial perspective.

Table 5-3 Road Information

Road Type	Length in km
Katcha Road	1359.78
Pucca Road	269.11
Semi Pucca	38.43



Map 5-3: Existing Road Network Thematic Map

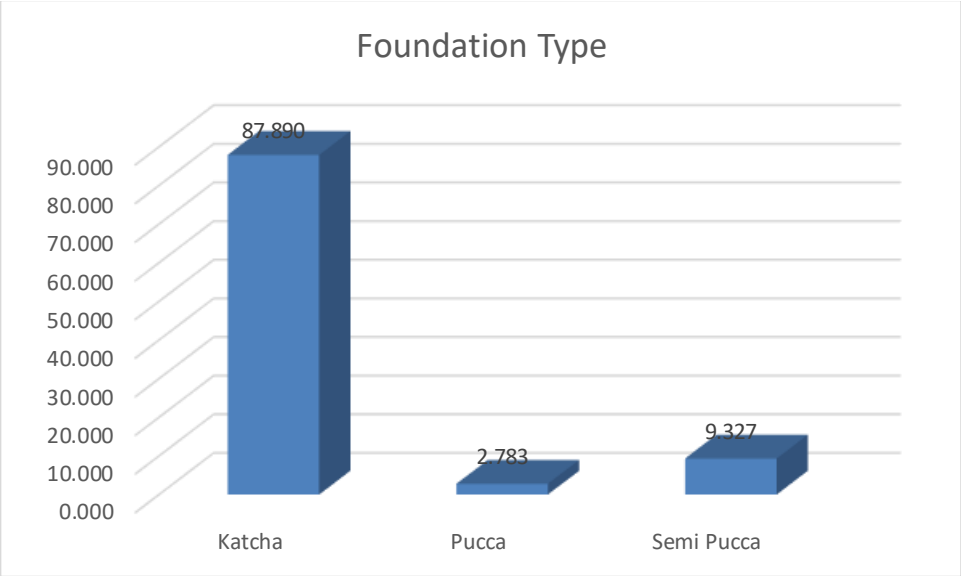
5.1.4 Foundation Type

In Galachipa Upazila, majority of the structures are Tin Shed with mud floor therefore have katcha foundation. Majority of Pucca foundation structures are from Galachipa Paurashava and union growth centers. majority (57.04 %) of the structures are physically average in condition, 36.78 percent are in Poor condition and only 6.19 percent are in good condition. Thematic Map 5-4 is showing the scenario from spatial perspective.

Table 5-4 Foundation Type

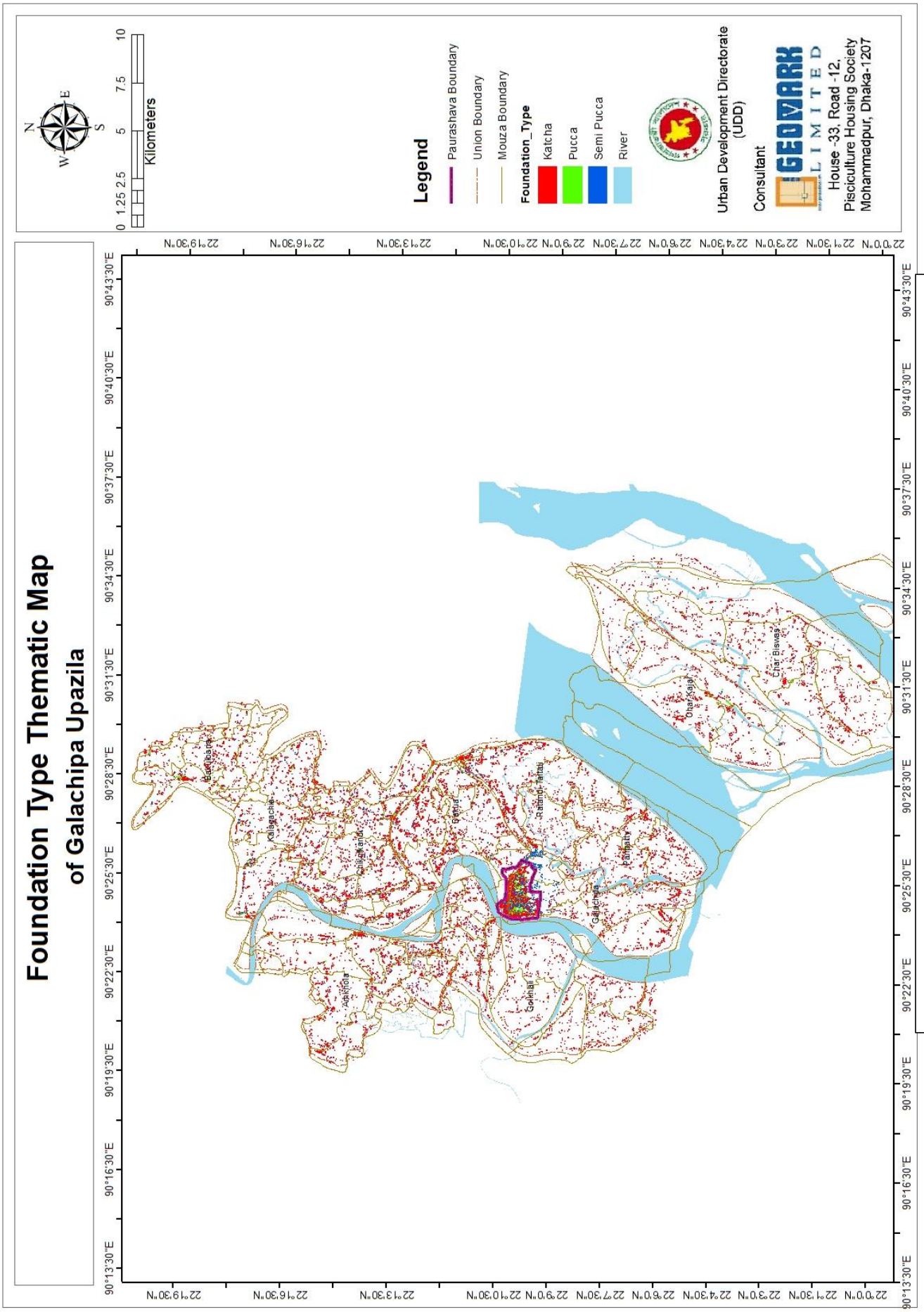
Foundation Type	Frequency	Percentage
Katcha	52522	87.890
Pucca	1663	2.783
Semi Pucca	5574	9.327
Total	59759	100.000

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-3 Foundation Type



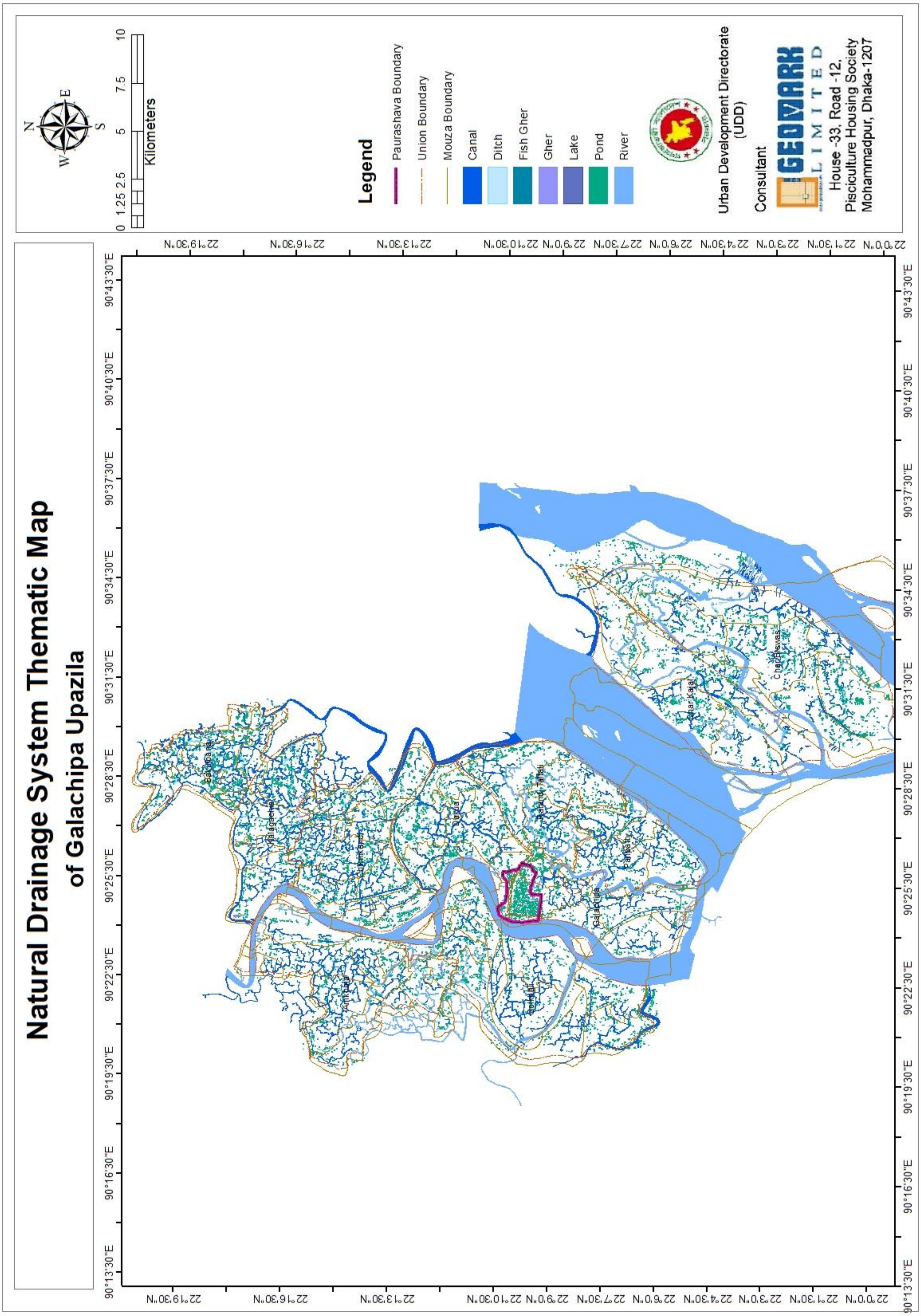
Map 5-4: Foundation Type Thematic Map

5.1.5 Natural Drainage System

Galachipa is a coastal uapzila. There are a lot of natural water flow system like river and canals can be seen all over the place. In rainy season, even small depth canals are become visible. Ponds and fisheries are also common in this area. Tentulia River, Galachipa River; Rabnabad Channel are notable water features of Galachipa Upazila. Thematic Map 5-5 is showing the scenario from spatial perspective.

Table 5-5 Waterbody Types

Type	Area in Acres
Bay of Bengal	88719.94
Canal	2609.06
Ditch	175.49
Fish Gher	3.85
Gher	248.63
Lake	0.15
Pond	1658.86
River	59144.04



Map 5-5: Natural Drainage System Thematic Map

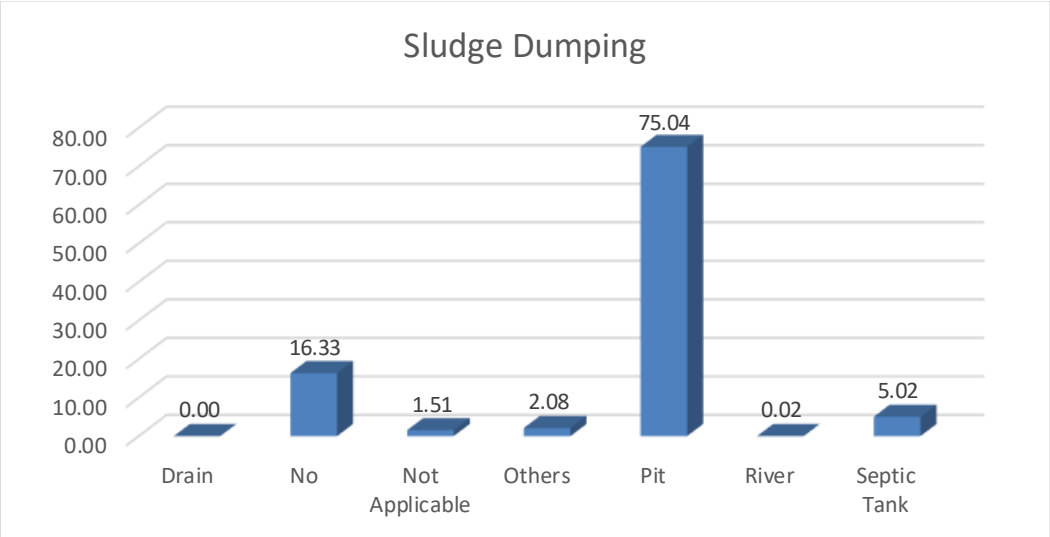
5.1.6 Sanitation Scenario

The most modern system septic tanks are being used mostly in Galachipa Paurashava. In most of the rural part, pit latrines are the most common ones. 75.04 % residents use pit latrine and 5.02 % uses septic tank to dispose their fecal waste. Some of them dispose their waste in drain, river etc. Thematic Map 5-6 is showing the scenario from spatial perspective.

Table 5-6 Waste Disposal location

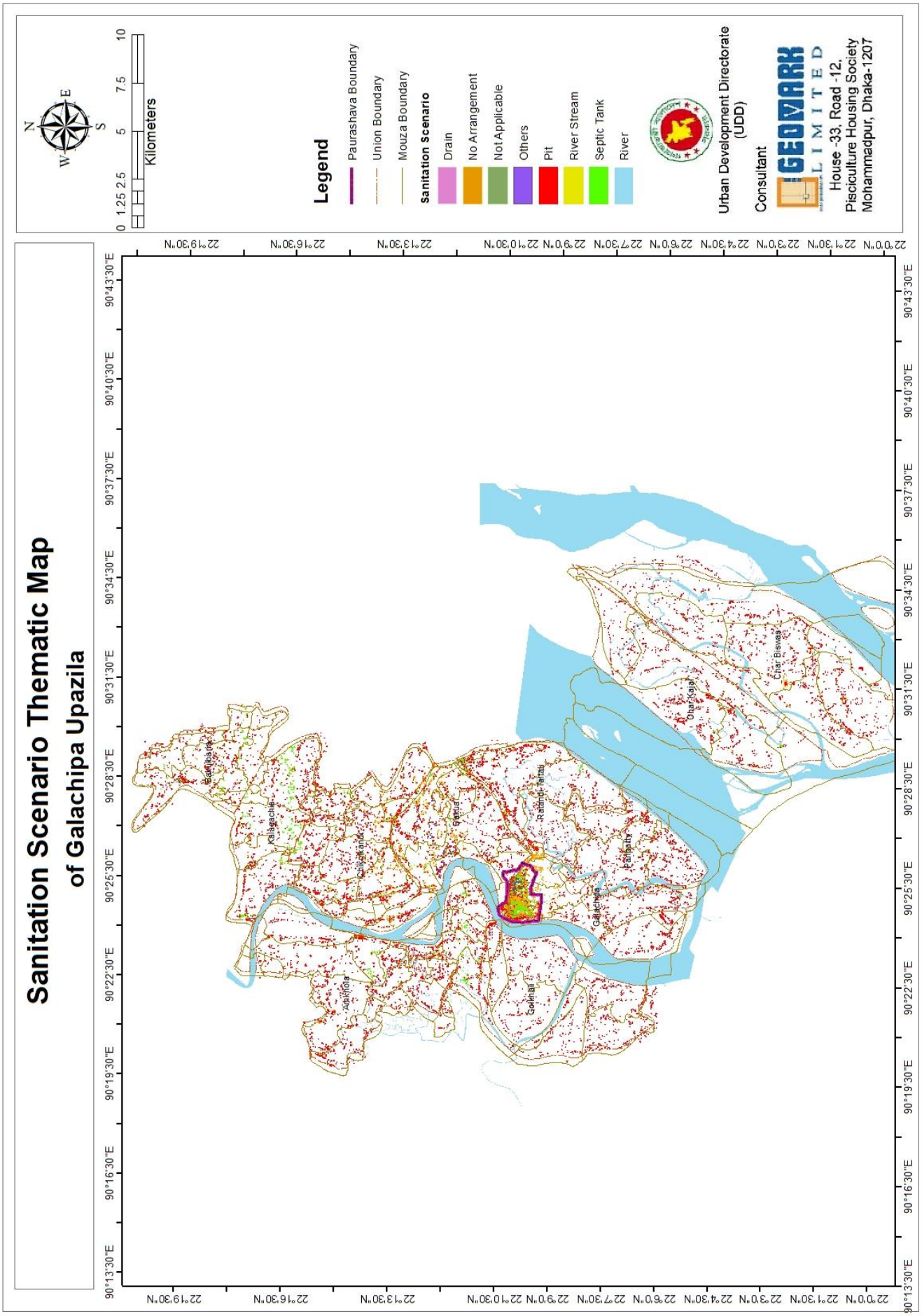
Sludge Dumping	Frequency	Percentage
Drain	1	0.00
No	9756	16.33
Not Applicable	903	1.51
Others	1242	2.08
Pit	44845	75.04
River	14	0.02
Septic Tank	2998	5.02
Total	59759	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-4: Waste Disposal location



Map 5-6: Sanitation Scenario Thematic Map

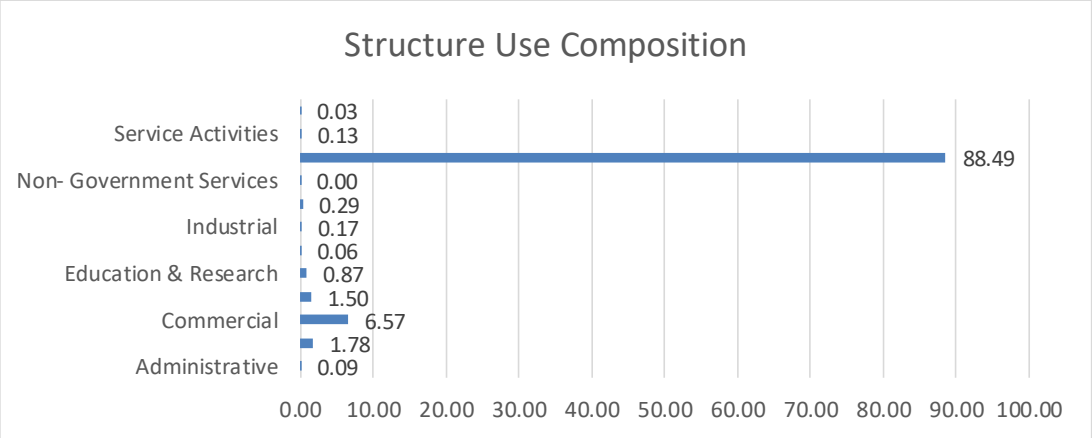
5.1.7 Structure Use

In Galachipa Upazila, like most of the rural areas of the country, residential use is the most common use for the structures. Almost 88.49 percent of the structures are being used as residential purpose. In Galachipa Paurashava and growth centers, the scenario is different. In those areas, lots of commercial buildings can be seen. Other uses such as community services, administrative and healthcare facilities are also get concentrated in those growth centers and hat bazars. Thematic Map 5-7 is showing the scenario from spatial perspective.

Table 5-7 Structure Use

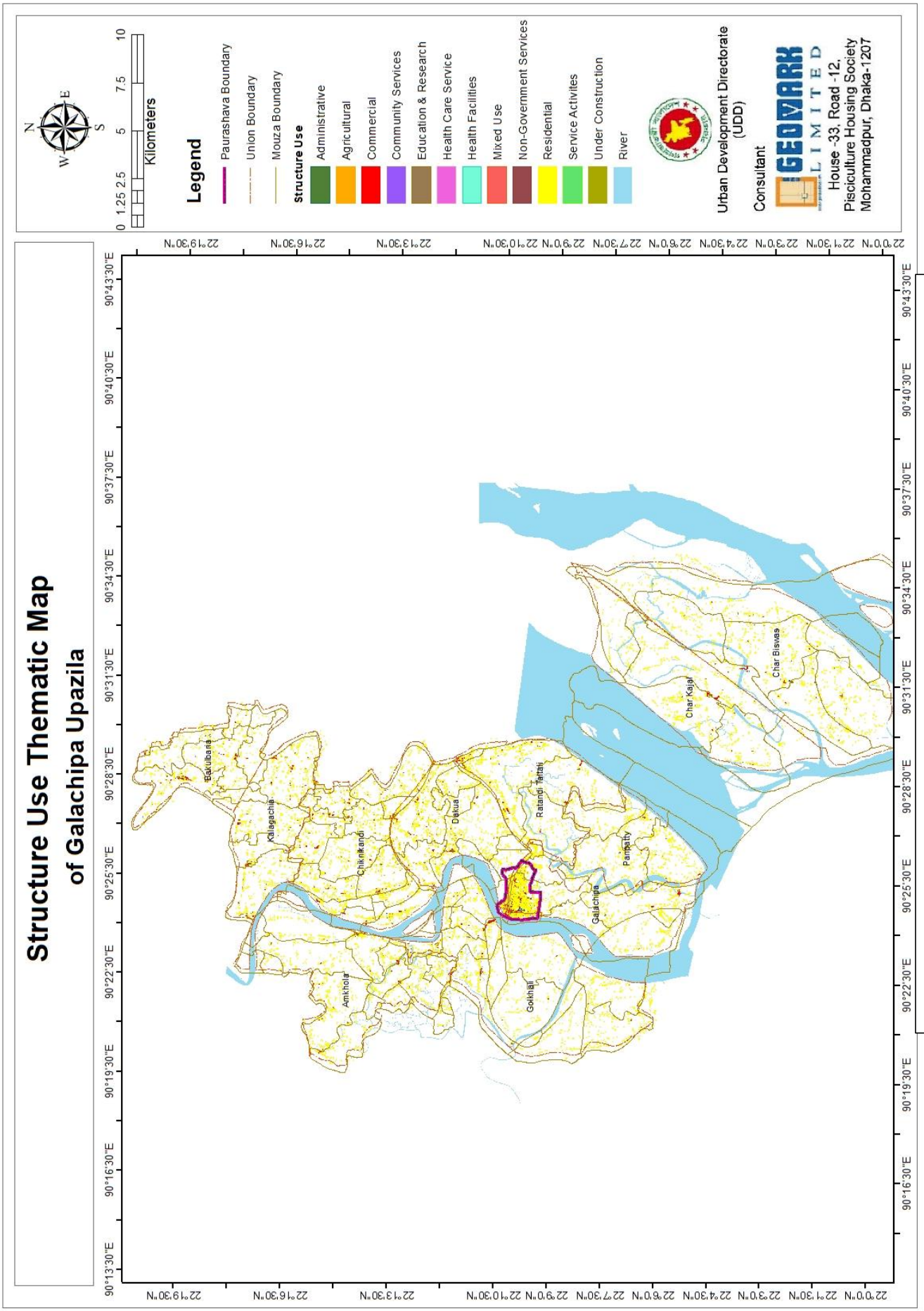
Structure Use	Frequency	Percentage
Administrative	53	0.09
Agricultural	1065	1.78
Commercial	3929	6.57
Community Services	899	1.50
Education & Research	518	0.87
Healthcare Services	35	0.06
Industrial	99	0.17
Mixed Use	176	0.29
Non- Government Services	1	0.00
Residential	52878	88.49
Service Activities	76	0.13
Transport & Communication	16	0.03
Under Construction	14	0.02
total	59759	100

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

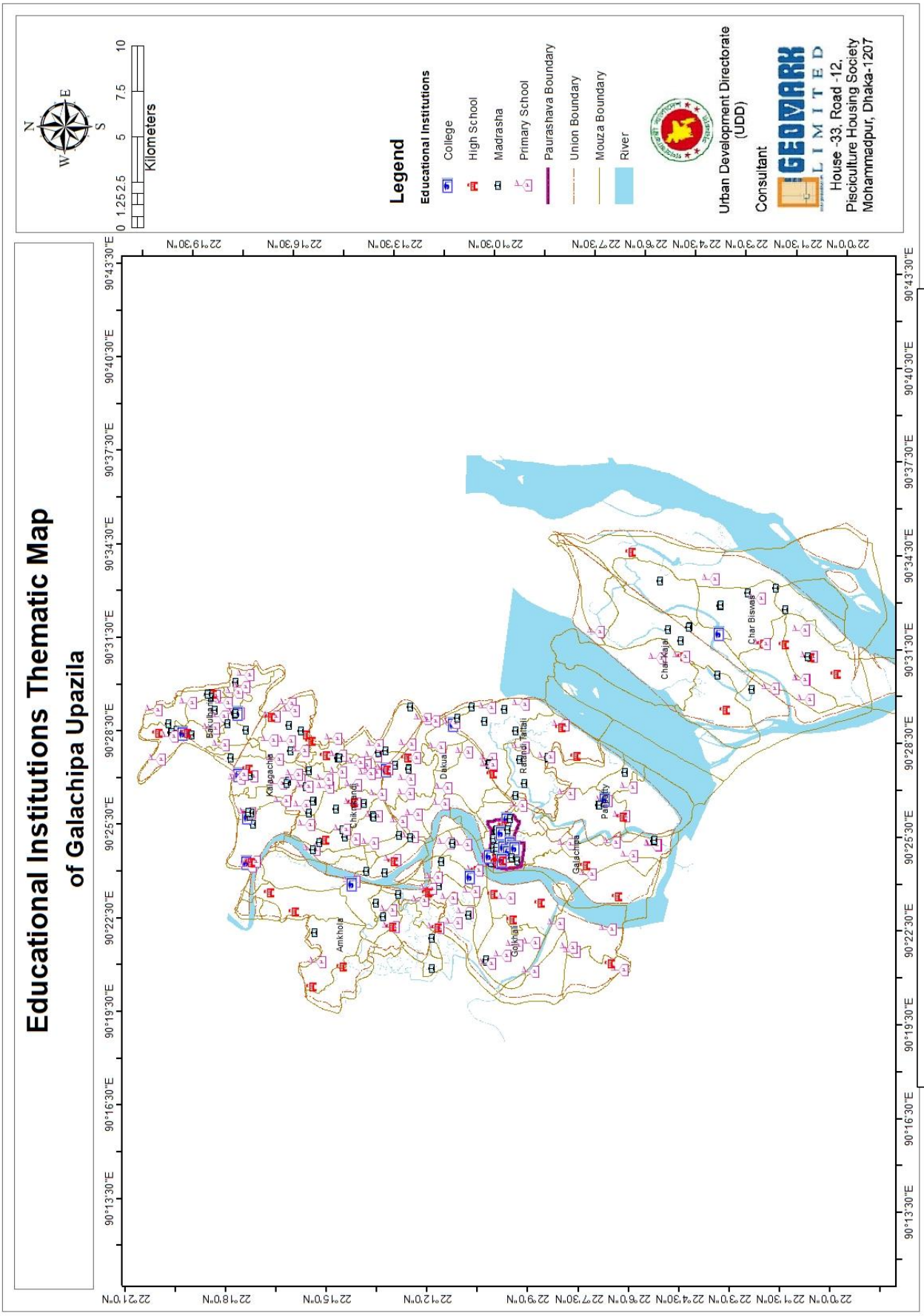
Figure 5-5 Structure Use



Map 5-7: Structure Use Thematic Map

5.1.8 Educational Institution

In Galachipa Upazila, number of educational Institutions are as follows; College 09, High School 46, Madrasha 37. Govt. Primary School 88, and Non-Govt. Primary School 86. Thematic Map 5-8 is showing the scenario from spatial perspective.



Map 5-8: Educational Institution Thematic Map

Rangabali Upazila Thematic Maps

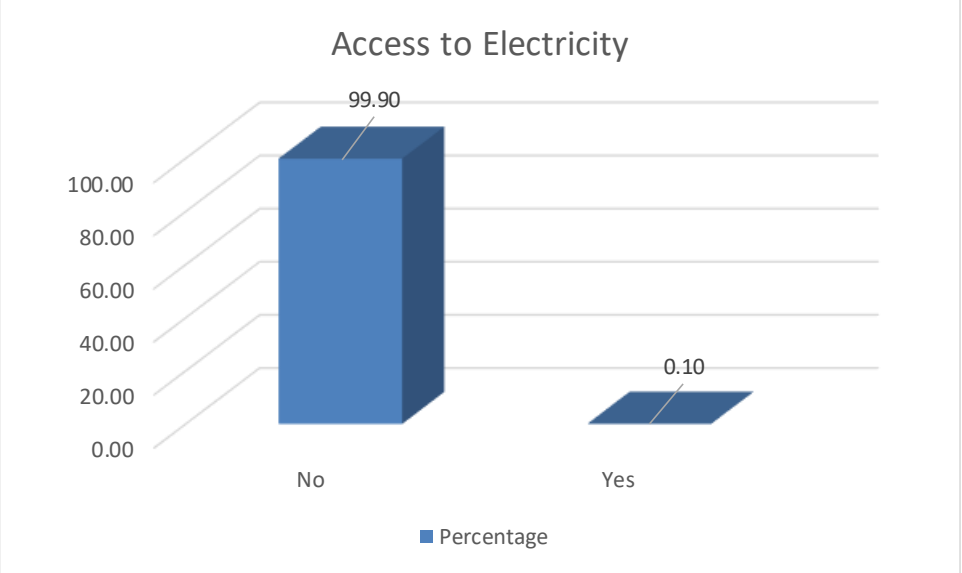
5.1.9 Access to Electricity

In Rangabali Upazila, majority of the people have to avail electricity from solar panel. There are a very few people who has access to electricity from the national grid. Almost 99.9 percent of the respondents have access to electricity from Nation Grid and they use solar Panel as their source of electricity. Thematic Map 5-9 is showing the scenario from spatial perspective.

Table 5-8 Access to Electricity

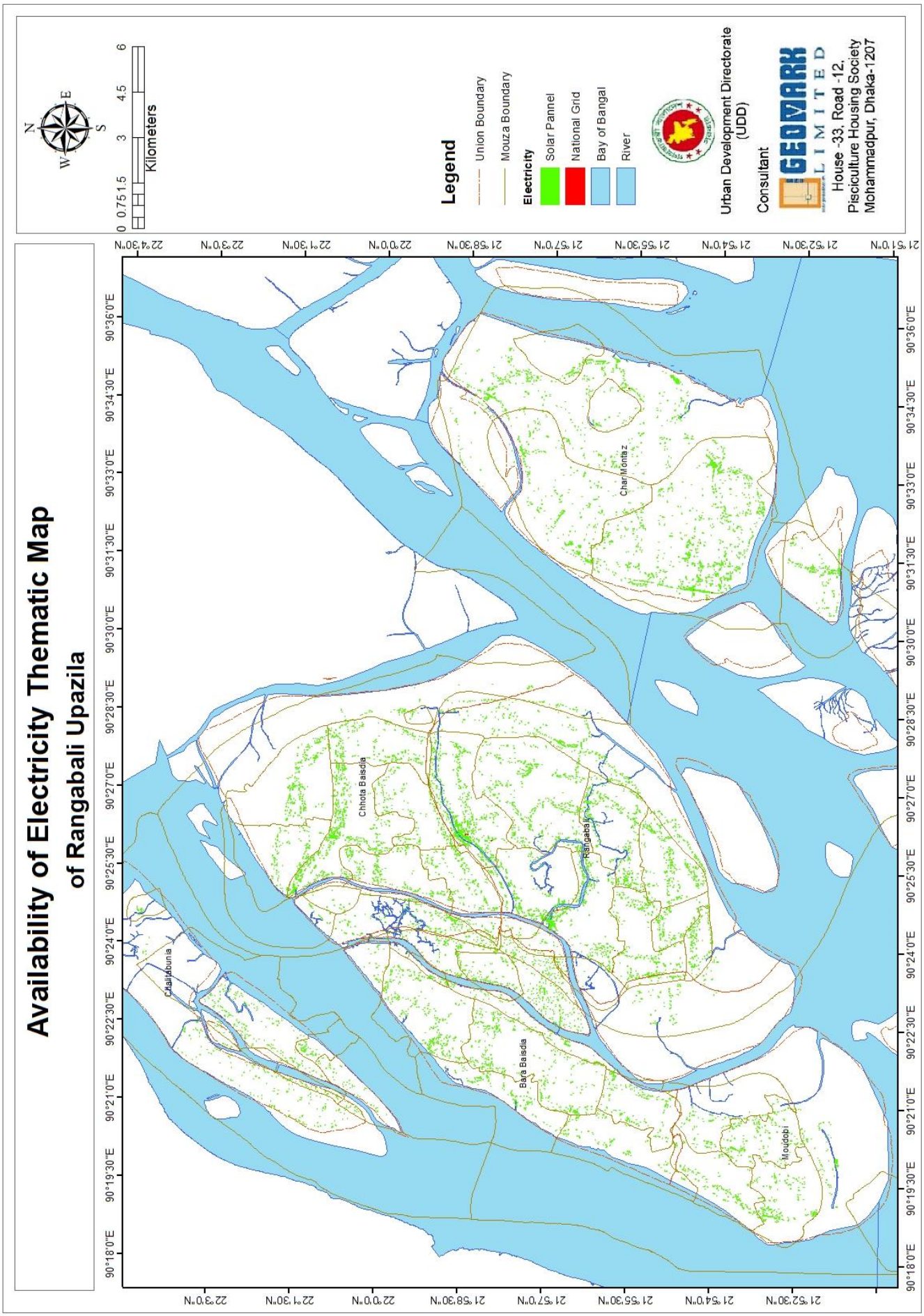
Access to Electricity	Frequency	Percentage
Solar Panel	29454	99.90
National Grid	30	0.10
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-6: Access to Electricity



Map 5-9: Availability of Electricity Thematic Map

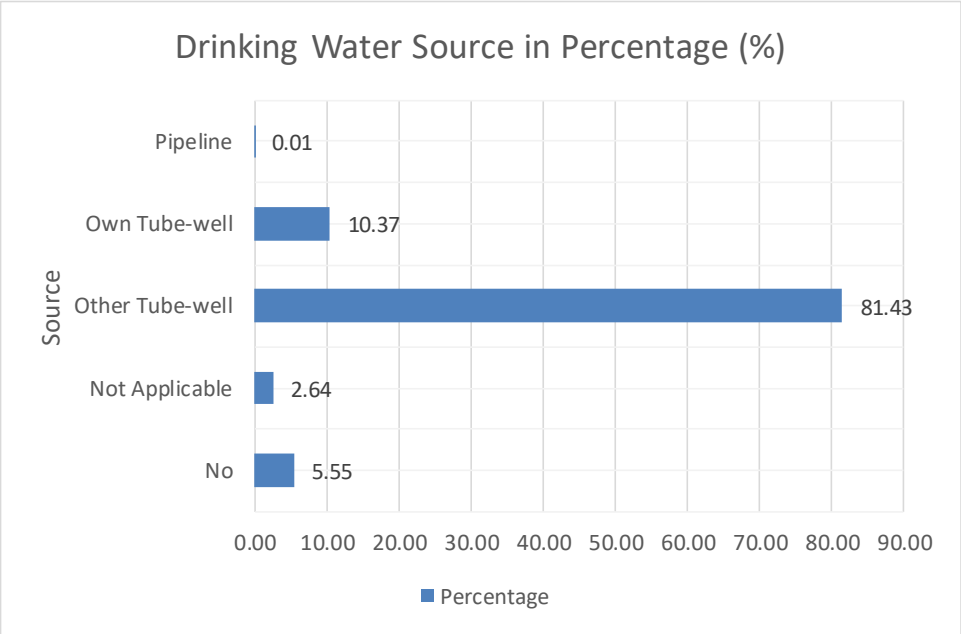
5.1.10 Drinking Water Source

In Rangabali Upazila, majority of the people collect their drinking water from Tube well. The remaining portion avail drinking water from various sources like pond, river, pipeline water etc. most of the people (81.43 %) use others Tube-well water as their drinking water source. 10.37 % of the residents uses water from their own Tube-well and only 0.01 % uses pipeline water and a few of them uses Surface Water. Thematic Map 5-10 is showing the scenario from spatial perspective.

Table 5-9 Source of drinking water

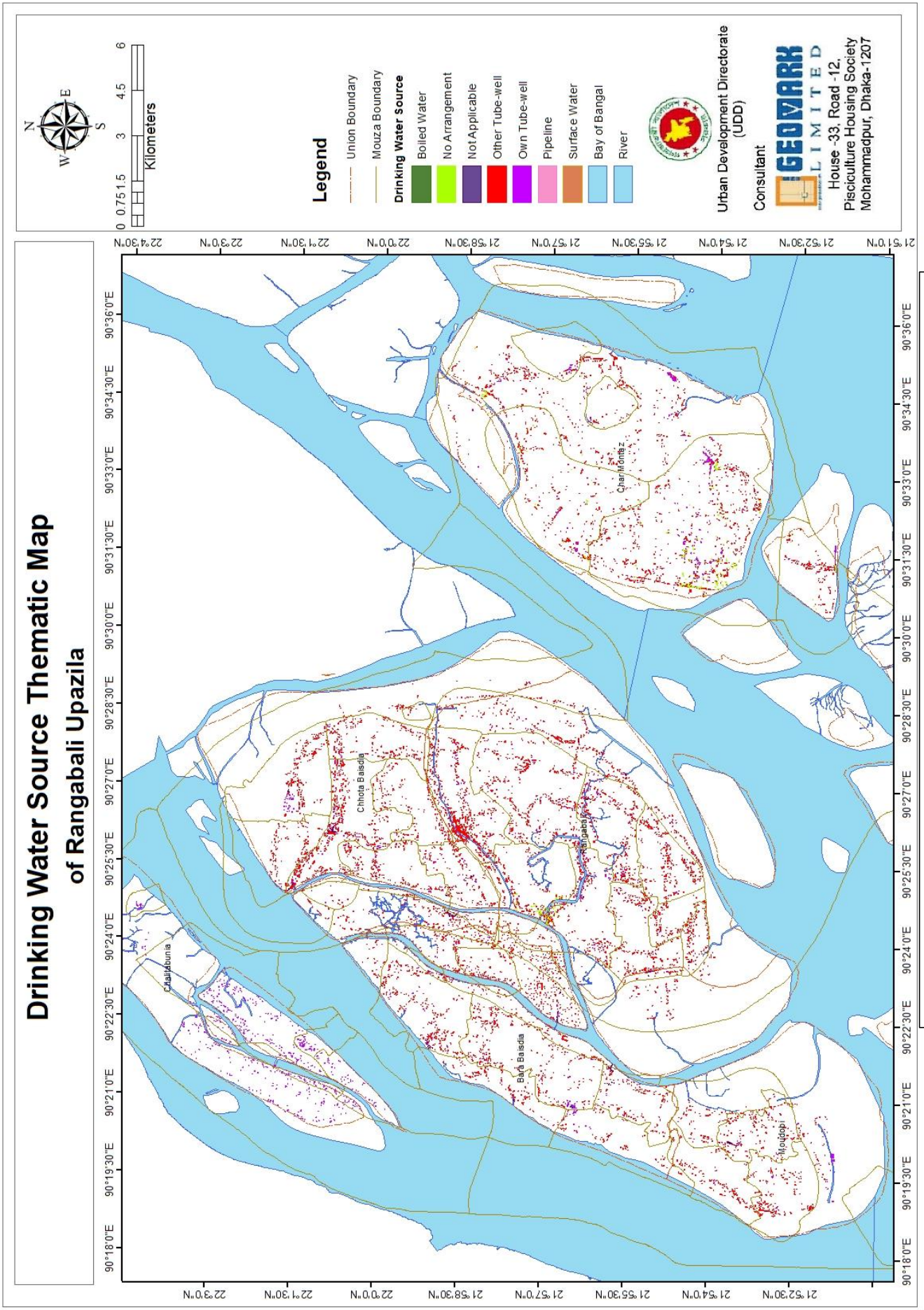
Drinking Water	Frequency	Percentage
No	1637	5.55
Not Applicable	777	2.64
Other Tube-well	24009	81.43
Own Tube-well	3057	10.37
Pipeline	4	0.01
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-7: Source of drinking water



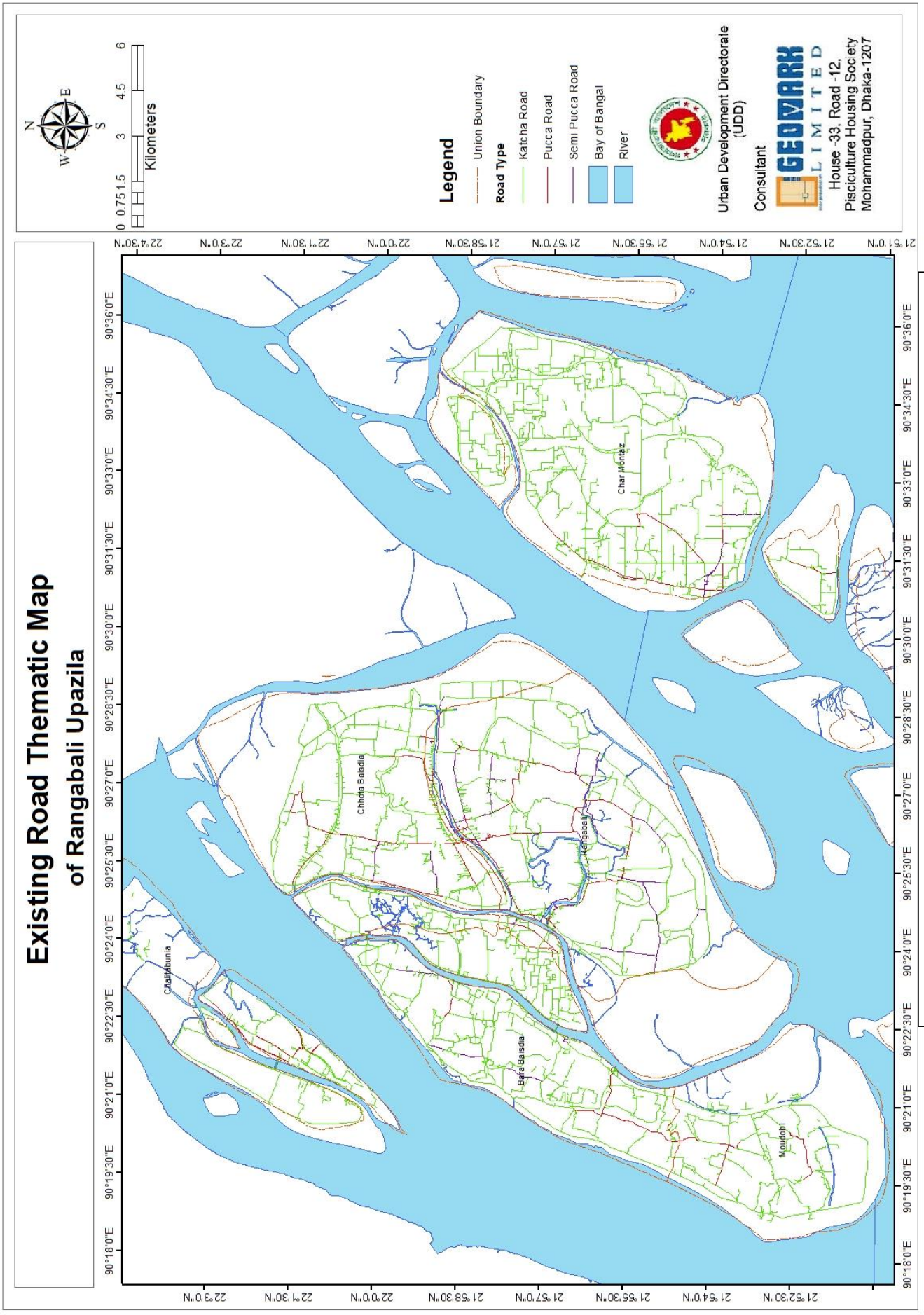
Map 5-10: Drinking water Source Thematic Map

5.1.11 Existing Road Network

In Rangabali Upazila, majority of the roads are katcha road but upazila roads and in growth centers Pucca roads can be seen. In char areas, pucca roads can hardly be seen. Road lengths are, Katcha Road 777.22 km, Pucca Road 81.12 km and Semi Pucca 42.08 km. Thematic Map 5-11 is showing the scenario from spatial perspective.

Table 5-10 Road Information

Road Type	Length in km
Katcha Road	777.22
Pucca Road	81.12
Semi Pucca	42.08



Map 5-11: Existing Road Network Thematic Map

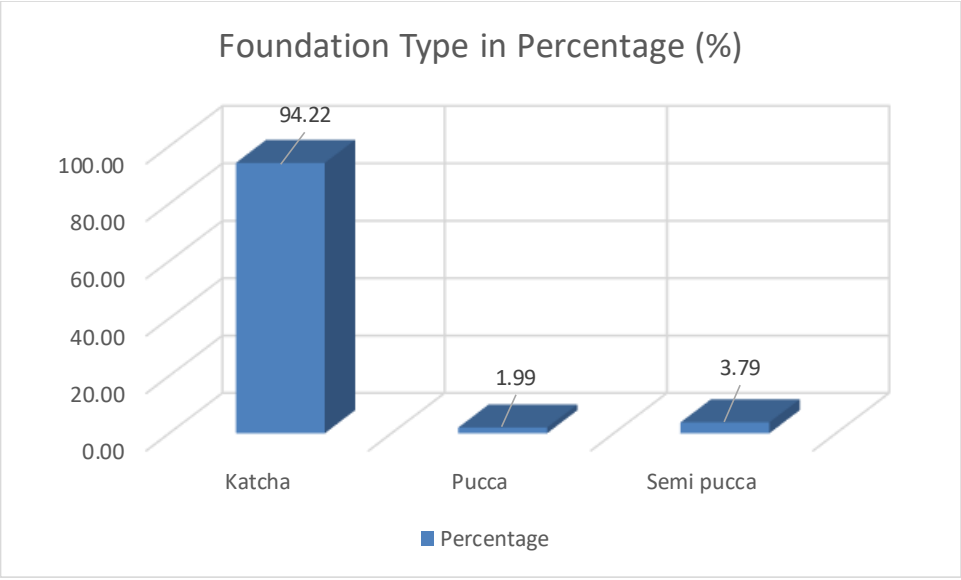
5.1.12 Foundation Type

In Rangabali Upazila, majority of the structures are Tin Shed with mud floor therefore have katcha foundation. Majority of Pucca foundation structures are from union growth centers and government facilities. A number of Cyclone shelters are there which also have pucca foundation. Majority of the structure foundations are Katcha (94.22 %). Semi-Pucca and Pucca are 3.79 % and 1.99 % respectively. Thematic Map 5-12 is showing the scenario from spatial perspective.

Table 5-11 Foundation Type

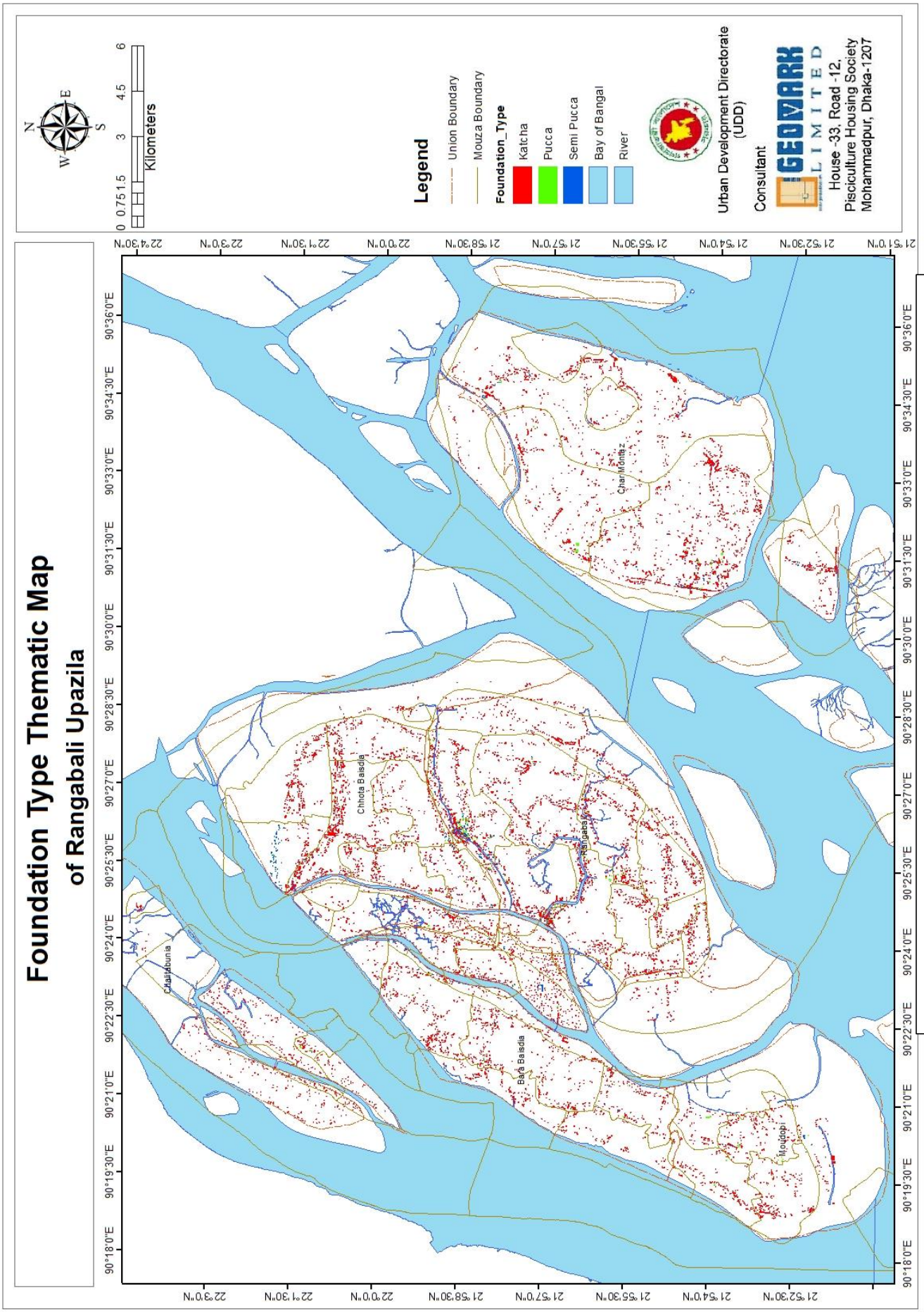
Foundation Type	Frequency	Percentage
Katcha	27780	94.22
Pucca	587	1.99
Semi pucca	1117	3.79
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-8 Foundation Type



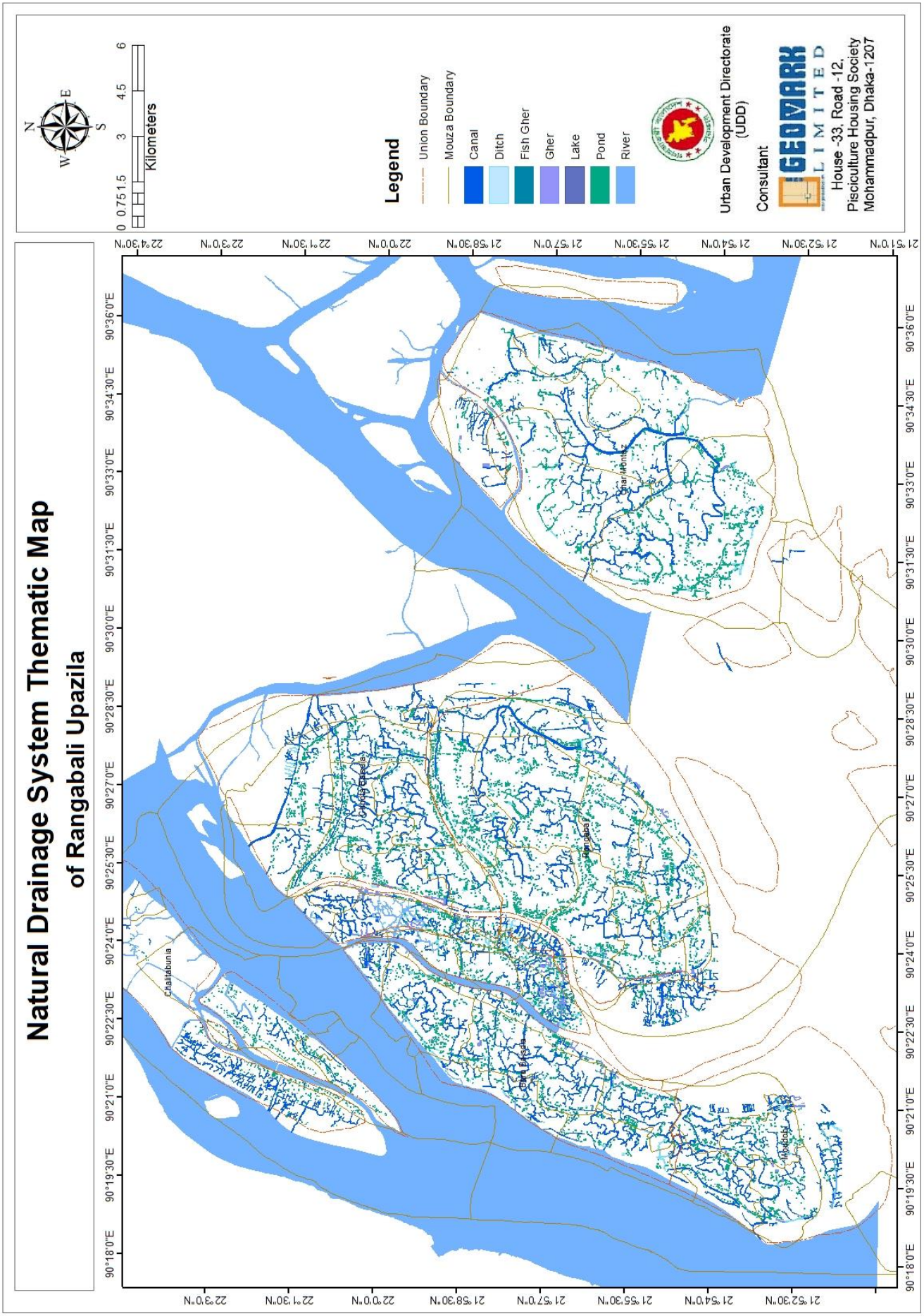
Map 5-12: Foundation Type Thematic Map

5.1.13 Natural Drainage System

Rangabali is a coastal uapzila. There are a lot of natural water flow system like river and canals can be seen all over the place. There are a number of islands like Char Montaz, Char Hare, Char Kashem, Sonar Char etc. are surrounded by the Bay of Bengal. In rainy season, even small depth canals are become visible. Ponds and fisheries are also common in this area. Agunmukha and Kajal; Rabanabad and Char Kalmi channels are notable water features in Rangabali. Thematic Map 5-13 is showing the scenario from spatial perspective.

Table 5-12 Waterbody Types

Type	Area in Acres
Canal	4899.27
Ditch	180.34
Gher	54.32
Pond	2406.52
River	41674.65



Map 5-13: Natural Drainage System Thematic Map

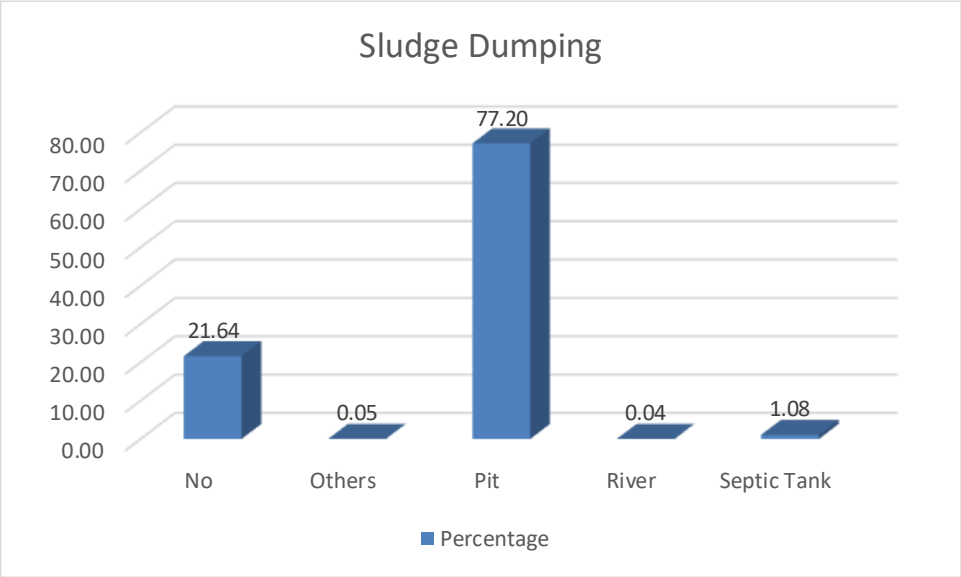
5.1.14 Sanitation Scenario

The most modern system septic tanks are not usually seen in Rangabali upazila mostly consist of rural area (except some medium and large growth centers, hat- bazar) where, pit latrines are the most common ones. 77.2 % residents use pit latrine and 1.08 % uses septic tank to dispose their fecal waste. Some of them dispose their waste in drain, river etc. and 21.64 % of the buildings do not have any waste disposal facility. Thematic Map 5-14 is showing the scenario from spatial perspective.

Table 5-13 Waste Disposal location

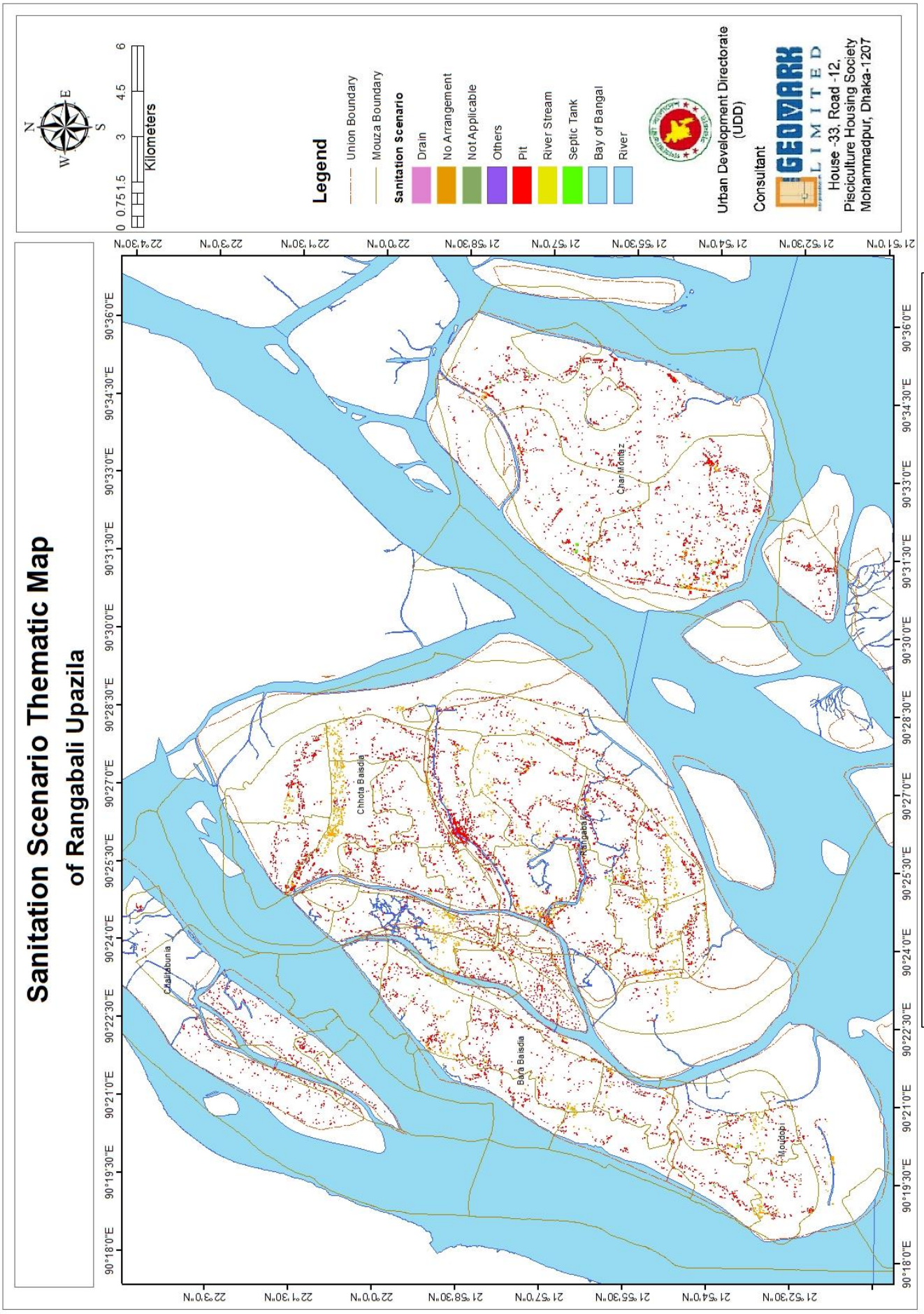
Sludge Dumping	Frequency	Percentage
No	6379	21.64
Others	15	0.05
Pit	22761	77.20
River	12	0.04
Septic Tank	317	1.08
Total	29484	100.00

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

Figure 5-9: Waste Disposal location



Map 5-14: Sanitation Scenario Thematic Map

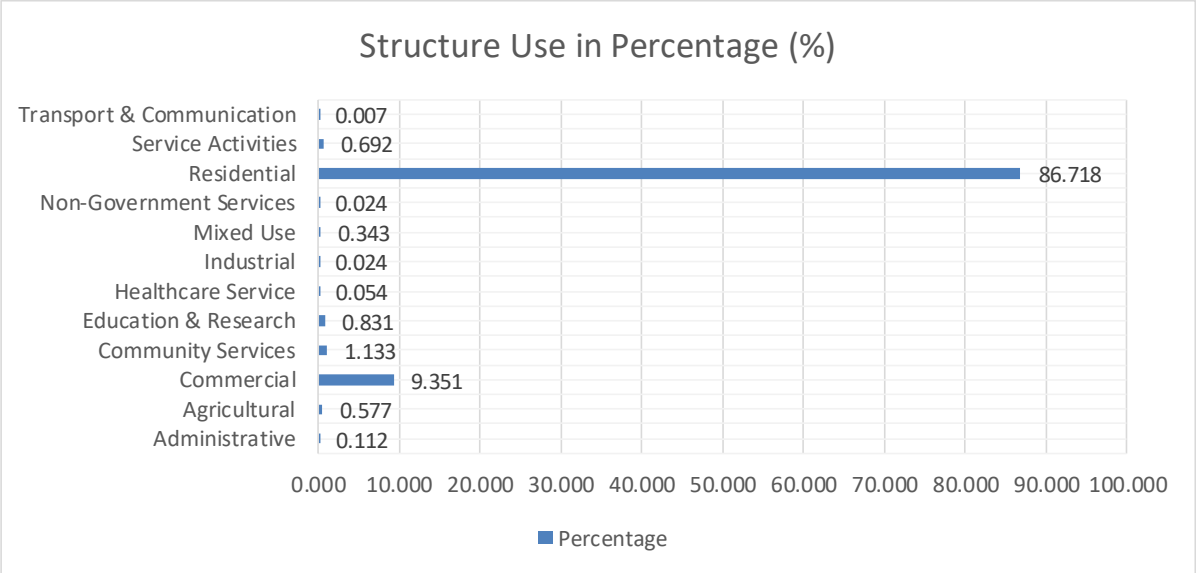
5.1.15 Structure Use

In Rangabali Upazila, residential use is the most common use for the structures. In growth centers, the scenario is different. In those areas, lots of commercial buildings can be seen. Other uses such as community services, administrative and healthcare facilities are also get concentrated in those growth centers and hat bazars. Almost 86.7 percent of the structures are being used as residential purpose. The second dominating use is commercial use (9.35 %). Thematic Map 5-15 is showing the scenario from spatial perspective.

Table 5-14 Structure Use

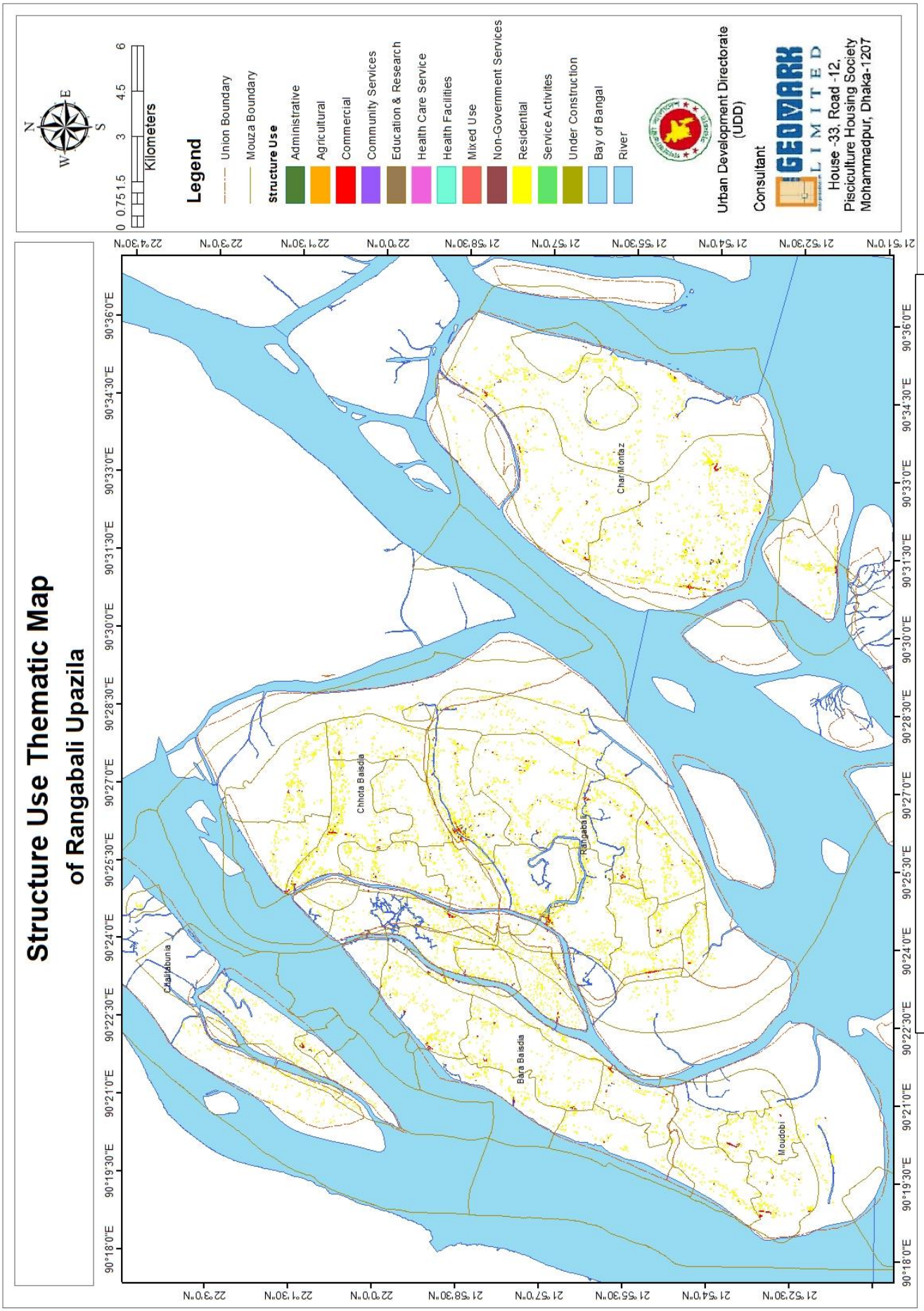
Structure Use	Frequency	Percentage
Administrative	33	0.112
Agricultural	170	0.577
Commercial	2757	9.351
Community Services	334	1.133
Education & Research	245	0.831
Healthcare Service	16	0.054
Industrial	7	0.024
Mixed Use	101	0.343
Non-Government Services	7	0.024
Residential	25568	86.718
Service Activities	204	0.692
Transport & Communication	2	0.007
Under Construction	40	0.136
Total	29484	100.000

Data source: UDD Field Survey, 2019



Data source: UDD Field Survey, 2019

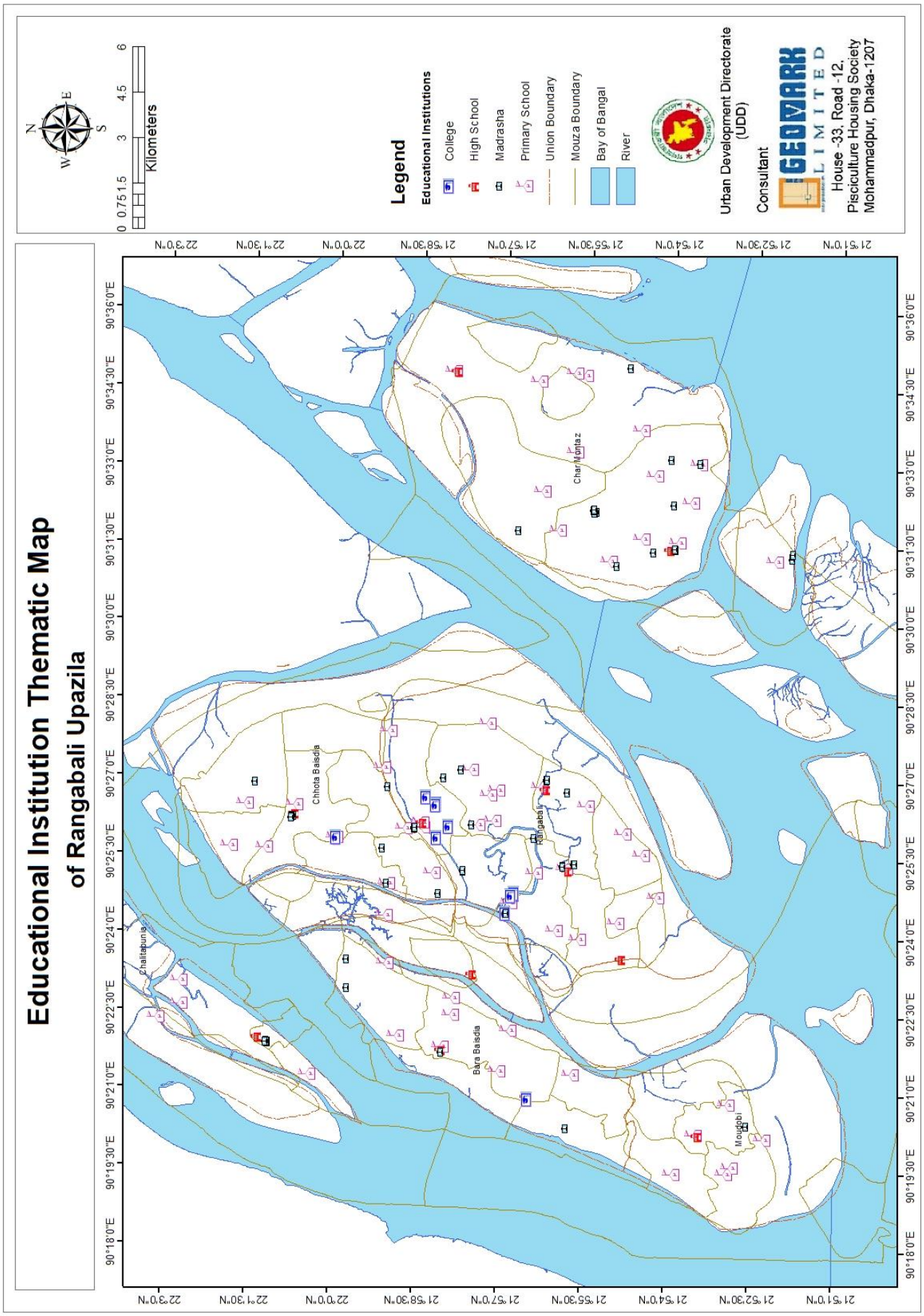
Figure 5-10 Structure Use



Map 5-15: Structure Use Thematic Map

5.1.16 Educational Institution

In Rangabali Upazila, number of educational Institutions are as follows; College 04, High School 12, Madrasha 11, and Govt. Primary School 71. See Map 5-16. Thematic Map 5-8 is showing the scenario from spatial perspective.



Map 5-16: Educational Instituation Thematic Map

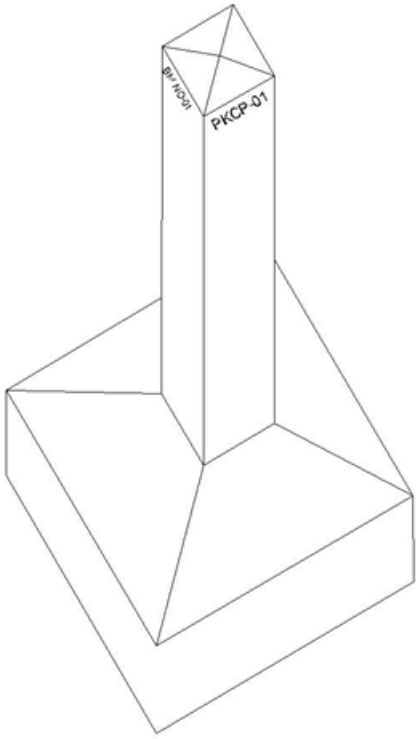
Chapter 6

6 Conclusion

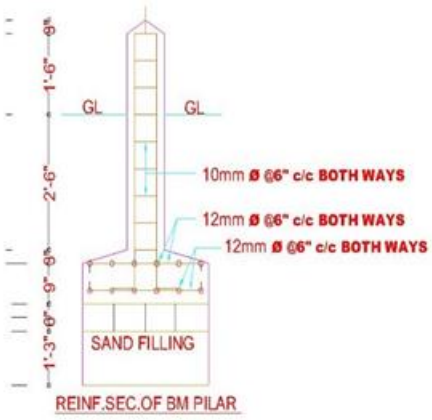
Establishment of BM Pillars, Physical Features, Land use and Topographical Survey data collection progress has been clarified in this progress report along with some analysis based on collected data. This project works program and time schedule have been developed based on ToR. Modern tools and technologies have been included for establishment of BM Pillars, Physical Features, Land use and Topographical Survey to deliver the data in a comfortable format for data analysis and visualization.

Chapter 7 Annexure

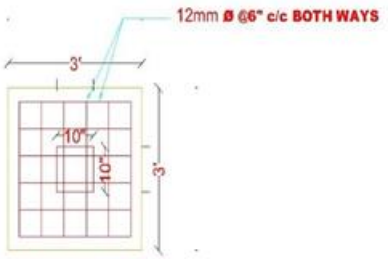
7.1 Annex 1. Bench Mark (BM) Design and Plan



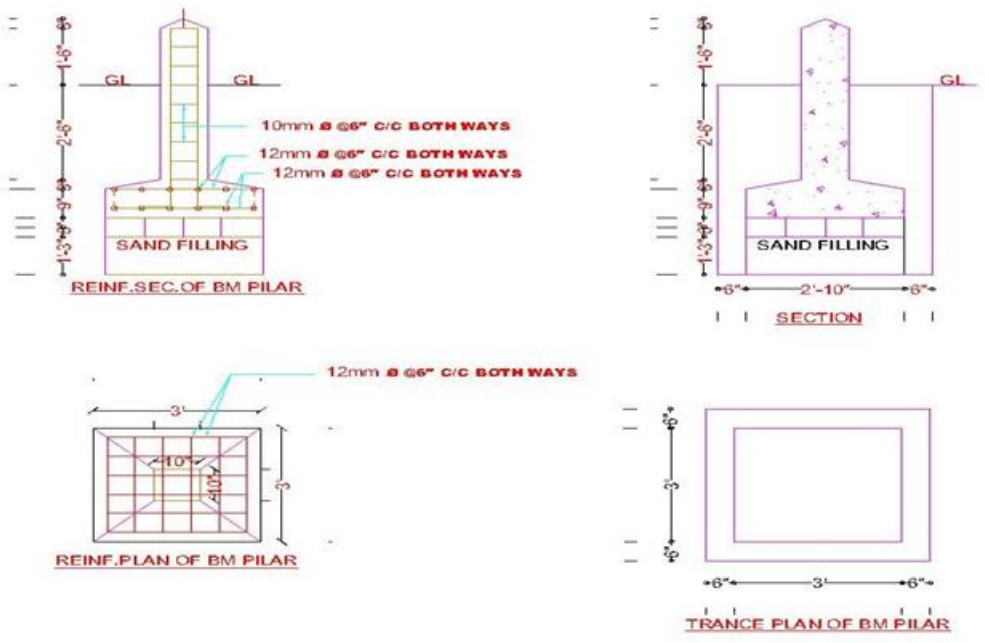
ELEVATION OF BM PILAR

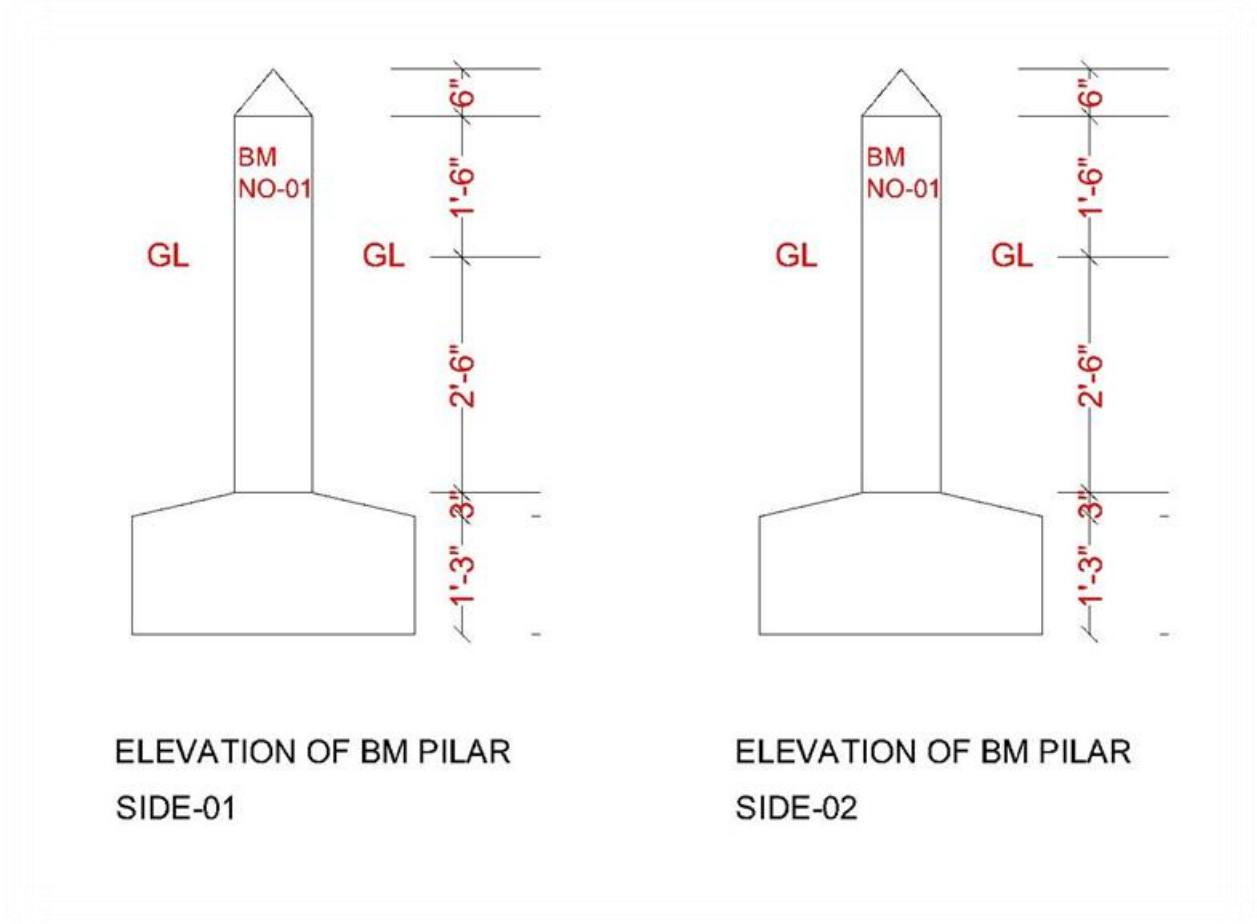


REINF.SEC.OF BM PILAR



REINF.PLAN OF BM PILAR


GL
GL
10mm ø @6" C/C BOTH WAYS
12mm ø @6" C/C BOTH WAYS
12mm ø @6" C/C BOTH WAYS
SAND FILLING
REINF.SEC.OF BM PILAR
GL
SAND FILLING
6"
2'-10"
6"
SECTION
12mm ø @6" C/C BOTH WAYS
3'
10"
40"
3'
REINF.PLAN OF BM PILAR
6"
3'
6"
TRANCE PLAN OF BM PILAR


BM
NO-01
GL
GL
6"
1'-6"
2'-6"
3"
1'-3"
ELEVATION OF BM PILAR
SIDE-01
BM
NO-01
GL
GL
6"
1'-6"
2'-6"
3"
1'-3"
ELEVATION OF BM PILAR
SIDE-02

7.2 Annex 2 Physical Infrastructure Survey Format

Survey Format According to ToR

Sl. No	Physical Feature Name	Data Type			Z Value (Z measurement level)			Description
		Point	Line	Polygon	On Top	On Ground/level	Not Required	
1A. Water bodies								
1	1. River Edge			x		x		
2	2. Khal Edge			x		x		
3	3. Drainage Channels			x		x		Name, width
4	4. River/khal centerline		x			x		Name, width
5	5. Flow direction	x					x	
6	6. Ponds/Tanks/Diches			x		x		
7	7. Coastline		x			x		
B. Building/Structure		Pucca / Semi pucca / stories, building area>15 sqm (Depending on map Scale)						
8	1. House			x	x			Residential Building
9	2. Industry			x	x			Industrial Building
10	3. Commercial			x	x			Commercial Building
11	4. Mixed			x	x			Mixed Use
12	5. Boundary Wall		x		x			Wall use as boundary
C. Roads								
13	1. Road Pucca		x	x		x		Ashphalt Road
14	2. Road HBB		x	x		x		HBB Road
15	3. Road Katcha		x	x		x		Katcha Road
16	4. Path Pucca		x	x		x		Pucca Path
17	5. Path Katcha		x	x		x		Katcha Path

18	6. Traffic Island/ Divider		**x**	**x**		**x**		
19	8. Road/Path Centerline		**x**			**x**		Name, width
D. Railways								
20	1. Railway Row Line		**x**			**x**		
21	2. Railway centerline		**x**			**x**		
22	3. Railway Junction Points	**x**				**x**		
E. Other Structure and Flood works				Length, width, condition of abutments and wing-walls				
23	1. Bridge / Culverts			**x**	**x**			Type, area, Name
24	2. Embankments			**x**	**x**			Name, length
25	3. Pump Station for Flood			**x**		**x**		Name
26	4. Sluice Gates		**x**		**x**			Name
27	5. Bus/Trucks Terminals			**x**		**x**		Indicate right way and areas
28	Harbor/ Bathing/boat Jetty		**x**		**x**			Harbor, Boat jetty
F. Natural Features								
29	1. Forest			**x**	**x**			Area > 2500 Sqm
30	2. Group of trees			**x**	**x**			Area < 2500 Sqm
31	3. Group of Trees Point	**x**			**x**			
32	4. Wetlands / Bog/ Marshland/ Flood prone area			**x**		**x**		Area > 2500 Sqm
33	5. Sand/Sand Dunes			**x**		**x**		Area > 2500 Sqm
34	Significant Single Tree	**x**				**x**		Easily identified single tree
E. Utility Services								
35	1. High voltage Electric Line		**x**		**x**			National/regional grid

36	2. Telephone Line		**x**		**x**			
37	3. Gas Line		**x**			**x**		
38	4. Utility Substation	**x**				**x**		Electric, Telephone exchange, Gas
39	5. Overhead Water Tank			**x**	**x**			Name, Capacity
40	4. Waste disposal and treatment points	**x**				**x**		A dustbin of municipality and other informal points
41	3. Water work			**x**		**x**		
42	5. Deep Tube well Stations	**x**				**x**		R.C.C EPHE and other deep tube well stations and output
F. Area Polygon								
43	Residential Area			**x**		**x**		Planned, Unplanned, Density (High, Middle, Low)
44	Commercial Area			**x**		**x**		Established markets with ancillary shop, groups of shops including small workshops
45	Institutional, Educational, Health Govt office			**x**		**x**		School/college/madrasa, clinics, hospital, govt office
46	Industrial (as classified by acts and rules)			**x**		**x**		Main activity, type of waste effluent

47	Agricultural Area			**x**		**x**		All types of agricultureal uses
48	Recreation / sports			**x**		**x**		Parks/play/sports ground, indoor facilities, zoological garden. Stadium area
49	Religious / cemetery			**x**		**x**		Mosques, Temples, Church, Mazar and others
49	Graveyard. Cemetery			**x**		**x**		Sites
51	Historic Place			**x**		**x**		Sites
52	Borrow Pits			**x**		**x**		Areas cut for filling material
53	Vacant Land			**x**		**x**		Vacant land with no apparent use
54	Public gathering			**x**		**x**		Place of public meeting, open-air cultural performance and religious gathering
55	Garden			**x**		**x**		Indication Rea, pineapple etc
56	Disaster prone areas			**x**		**x**		Flood, (indicating the flood affected area in 1998) Earthquake and fault line

Spot Level Survey Format

Sl. No		**Survey Item**	**Illustrated**			
		Special DEM Object	**Map object which may be used if registered with a view to DEM use**			
			As break line	**As terrain points**	**For delimitation of unsurveyed**	**For Mask Areas**
		Spot height	Road Pucca		Coastline	Building
		Special elevation point	Road Katcha		Pond	Pond
		Contour line	Path Pucca			Wetland/bog/marsh land
		Break line	Path Katcha			
		Mask Area	River Edge			
		Unsurveyed Area	Khal Edge			
		DEM Boundary	Pond			
			Drain channel			

Note: Name of settlements, village, roads, khals, markets, etc. must be clearly indicated in the physical feature maps.

Occupancy Type and Use Class

Occupancy Type		Code	Nature of Use or Occupancy
A:	Residential	A1	Detached single family dwelling
		A2	Flats or apartments
		A3	Mess, boarding house dorms, hostels
		A4	Minimum standard housing
		A5	Hostels & lodging hours
B:	Educational	B1	Educational facilities
		B2	Pre-school facilities
C:	Institutional	C1	Child care Institutional
		C2	Custodial institutions for physically handicapped
		C3	Custodial institutions for physically capable
		C4	Penal mental institutions
D:	Health care	D1	Normal medical facilities
		D2	Emergency medical facilities
E:	Assembly	E1	Large assembly with fixed seat
		E2	Small assembly with fixed seat
		E3	Large assembly with fixed seat
		E4	Small assembly with fixed seat
		E5	Sports facilities
F:	Business Mercantile	F1	Offices
		F2	Small shops & markets
		F3	Large shops & markets
		F4	Garages & petrol stations
		F5	Essential services
		F6	Footloose business/ mechanism
G:	Industrial	G1	Low hazard industries
		G2	Moderate hazard industries
H:	Storage	H1	Less fire risk storage
		H2	Moderate fire risk storage
J:	Hazardous	J1	Explosion hazard buildings
		J2	Chemical hazard buildings
K:	Misc.	K1	Private garages & special structures

		K2	Fences, tanks & towers
L:	Open Space	L1	Cropping including forestry
		L2	Fishing
		L3	Livestock
		L4	Recreational
		L5	Reserved
M:	Mixed use	M1	As applicable

7.3 Summary of Permitted and Conditional Uses

LEGENDS **PERMITTED USE O** **CONDITIONAL USE C** **PLAN REVIEW REQUIRED P** **NOT PERMITTED N**	**PLANNING ZONES**	MAIN FLOOD FLOW	SUB FLOOD FLOW	WATER SUPPLY PROTECTION	MIXED USE-PLANNED	MIXED USE-SPONTANEOUS	INDUSTRIAL-LOW HAZARD	INDUSTRY-MODERATE HAZARD	OPEN SPACE	RESTICTED-AIRPORT	RESTRICTED-FLOOD PROTECTION	RESTRICTED-MILITARY/PUBLIC	RESTRICTED-ROAD/UTILITY	RESTRICTED SPECIAL
LAND USES														
AGRICULTURE, FORESTRY & GRAZING		O	O	O	N	N	N	N	O					
AQUACULTURE & FISHERIES		O	O	O	N	N	N	N	O					
BRICKFIELDS		O	O	O	N	N	N	N	N					
CAUSEWAYS: ROAD, RAILWAY		O	O	O	O	O	O	O	C					
CEMETARIES / GRAVEYARD		N	N	N	C	C	C	C	C					
CINEAMAS		N	N	N	C	C	N	N	N					
CLINICS, MEDICAL		N	N	N	O	O	O	C	N					
CLUBS, PRIVATE		N	N	N	O	O	C	N	O					
COLLEGES & UNIVERSITIES		N	N	N	P	P	N	N	N					
DOCKS & JETTIES		O	O	O	O	O	O	O	N					
DWELLINGS, FARM		N	O	O	O	O	N	N	O					
DWELLINGS, MINIMAL HOUSING		N	C	N	O	O	C	N	N					
DWELLINGS, SINGLE/MULTI FAMILY.		N	C	N	O	O	N	N	N					
EMBASSIES, HIGH COMMISSIONS		N	N	N	O	O	N	N	N					
EXPLOSIVES MANUFACTURE & STORAGE		N	C	N	N	N	N	C	N					
FLOOD MANAGEMENT STRUCTURES		O	O	O	O	O	O	O	O					
GOLF COURSES		P	P	P	N	N	N	N	P					
HOSPITALS (WITH MORGUE)		N	N	N	P	P	N	N	N					
HOTEL GUEST HOUSE		N	N	N	O	O	N	N	N					
HOTEL INTERNATIONAL CLASS		N	N	N	P	P	N	N	N					
INDUSTRIAL CLASS 2		N	N	N	C	C	O	O	N					
INDUSTRIAL CLASS 3		N	C	N	N	N	C	O	N					
INDUSTRIAL CLASS 4		N	N	N	N	N	N	O	N					
INSTITUIONS		N	O	N	O	O	O	N	N					
MAJOR DEVELOPMENT		N	N	N	C	C	C	C	N					
OFFICES / SERVICES		N	N	C	O	O	C	C	N					
PARKING FACILITIES, COMMERCIAL		N	N	N	C	C	O	O	N					
PETROL STATIONS		N	C	N	C	C	O	O	N					
PRISONS		N	P	N	P	P	P	N	N					
PUBLIC USES & STRUCTURES		N	O	O	O	O	O	O	N					
RECREATION FACILITIES, OUTDOOR		O	O	O	O	O	O	N	O					
RELIGIOUS USES & STRUCTURES		N	O	O	O	O	O	N	O					
REPAIR SHOPS, MAJOR		N	N	N	N	N	O	O	N					
REPAIR SHOPS, MINOR		N	O	N	O	O	O	O	N					

RETAIL SHOPS & RESTAURANTS		N	C	N	O	O	C	C	N					
RETENTION PONDS		N	N	N	O	O	O	O	O					
SALVAGE, SCRAP STORAGE & PROCESSING		N	N	N	N	N	C	C	N					
SCHOOLS, PRIVATE		N	N	N	C	C	N	N	N					
SCHOOLS: GOVERNMENT, RELIGIOUS		N	N	N	O	O	N	N	N					
SHIP & BOAT SERVICING		N	O	N	N	N	O	O	N					
SHOPPING CENTRES / LARGE MARKETS		N	N	N	P	P	N	N	N					
STADIUM, SPORTS		N	N	N	P	P	N	N	N					
TERMINALS. TRAIN, BUS, FREIGHT		N	P	N	P	P	P	P	N					
TRADE CENTRES		N	N	N	P	P	N	N	N					
UTILITY INSTALLATIONS TYPE A		N	O	O	O	O	O	O	N					
UTILITY INSTALLATIONS TYPE B		O	O	O	P	P	P	P	N					
WAREHOUSING & DISTRIBUTION		N	N	N	C	C	O	O	N					
WASTE DISPOSAL & PROCESSING/MINARATOR		N	N	N	N	N	P	P	N					

7.4 Annex 3. Structure's attribute data collection format

Grid Name	Structure ID	Upazila / Paurasava	Union Name / Paurasava	Maholla/Village	Road Name	Owner Name	Structure Name	Ward Number	Holding Number	Structure Type	Roof Material	Wall Material	Floor Material	Structure Construction	Floor Number	Floor Wise Use	Structure Use	Household Number (Total Household)	Physical Condition	Heavy Over	Foundation Type	Pounding Possibility	Soft Story	Short Column	Ground Set	Fuel Type	Electricity	Source of Drinking	Sludge Dumping Place	Sewerage Connection	Drain Connection

7.5 Annex 4. Photograph of Physical Feature Survey by Online Mobile Application

Galachipa Paurashava

Photo01: Location: Galachipa Paurashava,Ward No: 2

Photo 02: Location: In front of the freedom fighters market, Galachipa Paurashava, Ward No-1

Photo 03: Galachipa Paurashava,
Ward No-3

Photo 04: Location: Galachipa Paurashava,
Ward No-5

Photo 05: Location: Galachipa Paurashava,
Ward No-7

Photo 06: Location: in front of Galachipa Paurashava office, Ward No-9

UNION WISE DATA COLLECTION PICTURE
GALACHIPA UPAZILA

Photo 01: Location: Amkhola Union

Photo 02: Location: Bakulbaria Union

Photo 03: Location: Char Biswas Union

Photo 04: Location: Char Kajal Union

Photo 05: Location: Chiknikandi Union

Photo 06: Location: Dakua Union

UNION WISE DATA COLLECTION PICTURE
GALACHIPA UPAZILA

Photo 07: Location: Galachipa Union

Photo 08: Location: Gazalia Union

Photo 09: Location: Golkhali Union

Photo 10: Location: Kalagachia Union

Photo 11: Location: Panpatti Union

Photo 12: Location: Ratandi Taltoli Union

UNION WISE DATA COLLECTION PICTURE
RANGABALI UPAZILA

Photo 01: Location: Bara Baisdia Union

Photo 02: Location: Chhoto Baisdia Union

Photo 03: Location: Char Montaz Union

Photo 04: Location: Rangabali Union

Photo 05: Location: Chalitabunia Union

Photo 05: Location: Moudobi Union

7.6 Annex 5. Photograph of BMP

Photo 01: BMP 01, Location: Amkhola Union

Photo 02: BMP 06, Location: Bakulbaria Union

Photo 03: BMP 12, Location: Char Biswas Union

Photo 04: BMP 11, Location: Char Kajal Union

Photo 05: BMP 05, Location: Chiknikandi Union

Photo 06: BMP 04. Location: Dakua Union

Photo 07: BMP 03, Location: Galachipa

Photo 08: BMP 08, Location: Gazalia Union

Photo 09: BMP 02, Location: Golkhali Union

Photo 10: BMP 07, Location: Kalagachia Union

Photo 11: BMP 10, Location: Panpatti Union

Photo 12: BMP 09, Location: Ratandi Taltoli Union

Photo 01: BMP 15, Location: Bara Baisdia Union

Photo 02: BMP 13, Location: Chhoto Baisdia Union

Photo 03: BMP 17, Location: Char Montaz Union

Photo 04: BMP 14, Location: Rangabali Union

Photo 05: BMP 16, Location: Chalitabunia Union