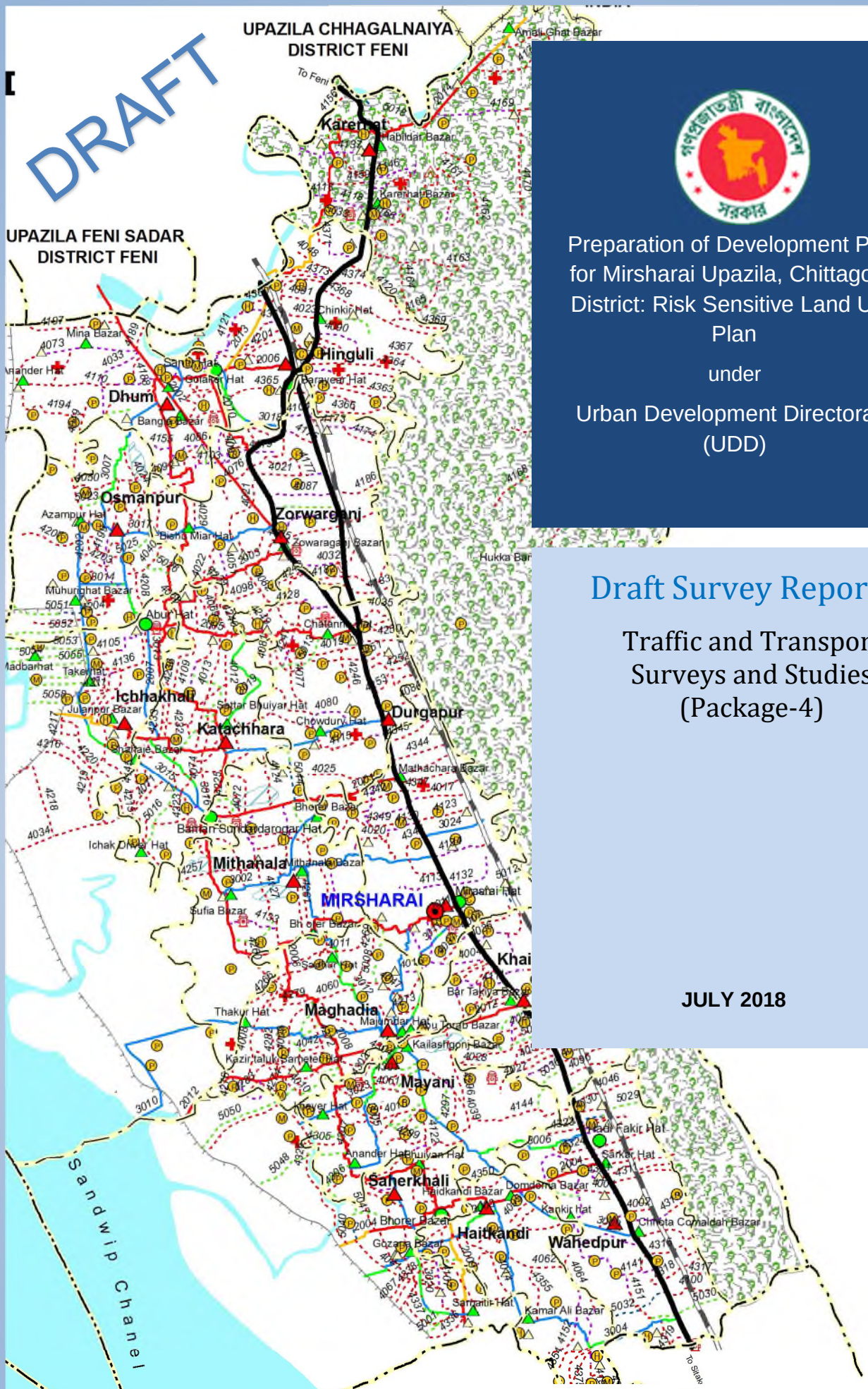

Preparation of Development Plan for Mirsharai Upazila, Chittagong District: Risk Sensitive Land Use Plan

under

Urban Development Directorate (UDD)

Draft Survey Report

Traffic and Transport Surveys and Studies (Package-4)

JULY 2018

DevCon
Leading Today for Tomorrow

DevConsultants Limited (DevCon)

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EXECUTIVE SUMMARY

Considering the challenge of developing Mirsharai as a tourist center and Special Economic Zone a thorough traffic study on the existing road network it is imperative to shed light on the recent state of transportation as well as to provide information about its pros and cons and possibilities for future development. Through this transportation survey and studies, an improved transport system will be proposed which will be efficient, affordable and sustainable for the growth of Mirsharai Upazila.

Traffic Surveys

To fulfill this purpose the consultant team conducted five kinds of surveys:

- *Reconnaissance Survey:* As a specific requirement of the TOR, the consultants paid a thorough visit to the project area covering the critical locations of the existing transport network. The reconnaissance survey covered 7 major intersections, 6 growth centers and several large/ small bazars within the Mirsharai Upazila. The reconnaissance also identified major local stakeholders.
- *Production (Household Survey)-Attraction (commercial space) survey*: Household survey was conducted in 16 (sixteen) unions of Mirsharai upazila. More than 480 household sample data (30 samples from each union) were collected. Attraction survey was carried out at six growth centers and two Paurashavas. Data collected from various facilities: bazar, school, shop, offices etc.
- *Traffic Count Survey:* Two types of traffic count survey were conducted. One in Mirsharai to find the existing traffic scenario. From 10 (ten) survey stations, traffic count data were collected where four locations were external and other six were internal. The counting was done by 'video recording method'. The other survey was conducted at Dhaka EPZ to predict the traffic generated from the proposed economic zone. The count was done by video recording for 16 hours for both vehicle and pedestrian count.
- *Origin-Destination survey:* This survey was done at the same locations of roadside traffic count survey in Mirsharai. The household O-D information came along with the HIS.
- *Travel Time Survey:* Seven routes were considered to conduct travel time survey throughout the Mirsharai area. Average Car Method was used to conduct the survey.
- *Stakeholder interview survey*: Important stakeholders were interviewed: Mayors of two Paurashavas, BEZA and BEPZA Authority, Mohamaya Eco Park Authorities and overall local people of entire Mirsharai.

Survey Results

Reconnaissance Survey

From the reconnaissance survey, the consultant team identified existing problems in road network and reasons behind it and the scenario of public transport in Mirsharai; such as:

Congestion at Highways	Congestion at Local Roads	Other Problems	Public Transport Scenario
- Encroached service roads - Uncontrolled parking - Lack of law enforcement - Heavy truck traffic during peak hours - Lack of Public Bus, Leguna terminals	- Narrow roads - Uncontrolled parking - Roadside bazars - Lack of designated CNG Stands	- Narrow, zigzag local roads - Lack of foot over-bridge use - Vehicles taking wrong direction - Insufficient public transport	- Mainly used for long distance trips on National (N1) and Regional (R151) Highways - Other Public MUCM such as CNG, Auto-rickshaw/van ply on the internal roads

Household Survey

- *Average No. of trips per household*: 3.52 trips/ day
- *Modal Share*: **Walk (58%), Auto-Rickshaw/CNG (27%)**, Bus (5%), Motor-cycle (0.1%), Bi-Cycle (4%), Rickshaw (1%) and others (5%)
- *Purpose*: **Educational (21%), Work (18%),** Shopping (7%), others (9%) and **Home Base trip (44%)**
- *Travel cost:* Cost is lower in the zones where major modes of trips are walking and cycling though their travel time may be higher. In cases of Karerhat, Dhum, Durgapur and Khaiyachhara; the travel cost is higher because the inhabitants of these area depend on motorized modes (CNG or Bus etc.) and the travel distance is also high.
- *Ranking (top 5) of zones based on Intra-zonal trips*: Hinguli, Wahedpur, Mirsharai, Ichhakhali and Karerhat.
- *Ranking (top 5) of zones based on Inter-zonal trips*: Khaiyachhara, mayani, Dhum, Shaherkhali and Durgapur.
- *Major nodal area*: **Mirsharai, Hinguli and Zorwarganj.**

Attraction Survey

- Maximum number of trips attracted to Baraiyarhat and Mirsharai paurashavas
- Bazar, Administrative facility (offices) and shops attract more traffic.

Traffic Count Survey at Mirsharai

Peak Hour Vehicle Volume:

(i) National Highway (N1): 1000- 1250 veh; (ii) Regional Highway (R151): 600- 700 veh; (iii) Zila Road (Z1021): 170- 184 veh; and (iv) Upazila Road: 200- 600 veh.

Ranking of the survey sites based on the volume of traffic (top- 5):

- Sites #1 and #10 has the highest volume because of being on the national highway (N1).
- The site no. 2 was on the regional highway establishing main connectivity with Khagrachari District and adjacent to a major commercial hub in Hinguli intersection.
- The site no. 3 also connects Hinguli intersection with a major growth center, Shantir Hat and the condition of that newly improved connecting road is also very good thus making the number of local traffic higher.
- The site#4 is located on the old section of Dhaka-Chittagong highway and in the middle of a large bazar in Zorwarganj thana and adjacent to the Baraiyarhat Paurashava.

Traffic Count at Dhaka EPZ

The pedestrian volume in the peak hour is **25, 602** in total. However, the peaks for entry and exit for vehicular traffic varies depending on the shifting hours and the highest volume at the exit is 807 and 544 at the entry

Origin-Destination Survey

From Roadside OD it is observed:

- National Highway: mainly has **External-External trips**
- Regional highway (R151): highest trips are made **within the zone**.
- Zilla road (Z1021): serves very few external trips because of its **narrow width and congested opening** and restriction for heavy traffic.
- Internal trips are highest in Upazila Road

Travel Time Survey

Route No.	Total travel time (hour)	Total distance (km) (from GIS map)	Average Speed (km/ hr)
Route 1	2.20	43.39	20
Route 2	*Inaccessible via passenger car due to bad road condition*		
Route 3	0.28	4.54	16
Route 4	*Inaccessible via passenger car due to bad road condition*		
Route 5	1.23	14.39	12
Route 6	0.43	9.46	22
Route 7	0.38	7.42	19

Stakeholder Interview

The stakeholder interviews carried out so far have brought about a number of important findings those may be useful for the holistic transportation planning of Mirsharai Upazila. Most important such remarks are listed out in the Chapter 4 (Section 4.7).

Future Transport Network

The consultants broadly divided the study area into following four parts and proposed a tentative future transport network including public transport routes, stoppages and hubs:

- The BEZA Economic Zone,
- The Model Town to be proposed by UDD at the outskirt of BEZA with Mirsharai HQ on its east,
- The existing habitation of Mirsharai, and,
- The eco-tourism zone located at the east of the Dhaka-Chittagong highway.

Components of the network:

- Circular Road
- Interchanges/ Flyovers
- Network Connectivity with Economic Zone: road, rail, port connectivity
- Network Connectivity within Mirsharai
- Connectivity with Proposed Model Town
- Network Connectivity with Tourist Spots: vehicular access, pedestrian access, parking etc.
- Regional Connectivity
- Public Transport Network

Limitation in Data Collection

- From Dhaka EPZ data collected in the month of Holy Ramadan when shifting hours were slightly different from the regular ones. Also, monsoon rains interrupted the data collection.
- The consultants went through long process of getting permission from BEPZA HQ to conduct survey in the EPZ area.
- The tenure of the project was very short and a huge data were collected in tight schedules.

Data Arrangement

The collected survey and secondary data, analyses working papers, existing and proposed transport network and correspondences between consultants, client and other entities are arranged as per the schema shown in Chapter 6. A digital copy of the whole dataset (a portable hard drive) along with the analysis files are being submitted to the client herewith this draft final report.

Transport Model

As part of the activities of the 'Final Report', a travel demand forecasting model will be constructed after the completion of future land use plan by Urban Development Directorate (UDD).

Transport Planning Expert
(Team Leader)

1 INTRODUCTION

1.1 Brief Background of the Study

Mirsharai Upazila, located only 60km away from port city Chittagong, is a land of various development possibilities. It is surrounded by Feni District & the River Feni on the North, Sandwip Channel (connecting the Bay of Bengal) on West, Khagrachhari District on the North-East & Chittagong on the South. With smooth communication by all means of road, rail and waterways, it is a potential location for economic cum industrial development. In addition, Mirsharai is blessed with abundance of natural resources and scenic beauties having hilly forest areas, hill streams and waterfalls of Chittagong Hill Tracts on one side and the Bay of Bengal on the other. At the same time, Mirsharai is blessed with excellent geographical advantage making it a suitable location to establish a bay terminal for the Chittagong Port Authority. The work of establishing one of the largest Economic Zones (EZ) have also commenced in Mirsharai. These are the key drivers of change for the Upazila under study.

In tourism sector with holistic planning and establishment of easy accessibility, Mirsharai can be a great tourist attraction. Again the proposed Special Economic Zone would generate many industry related new activities including huge vehicular traffic on air, rail, road and water. This phenomenon would have both positive and negative impact on the socio-economic condition and existing land use pattern of the region. The proposed planning package would guide such probable changes in the socio-economic condition and land use pattern of the region and would also address the adverse impact of such changes by presenting a proposal for sustainable transportation system. Also, this project has been under taken to protect the region from depletion of its natural resources and character and for tourism development as well.

Furthermore, the success of developing Mirsharai as a tourist center and Special Economic Zone depends on the availability of modern amenities connected through a sustainable transportation system. For this, it is necessary to understand the present state of the transport system based on which a sustainable transportation system can be built for the future. Therefore, a thorough traffic study on the existing road network is imperative. This will shed light on the recent state of transportation as well as provide information about its pros and cons and possibilities for future development. Through this transportation survey and studies, an improved transport system will be proposed which will be efficient, affordable and sustainable for the growth of Mirsharai Upazila.

1.2 Purpose and Objectives

The main objective of the project package is to develop a comprehensive computerized transportation planning tool (model). This model will be used to:

- Prepare integrated land use and transportation model for Mirsharai.
- Prepare disaster management plan for Mirsharai from the perspective of transportation.
- Develop new and improved affordable and effective transportation network for Mirsharai Upazila.

1.3 Scope of Services

The goal of the project is to prepare a development plan for Mirsharai Upazila. For this, it is necessary to understand the transportation network in the study area to be achieved through various traffic and transportation surveys, which will eventually help to understand the transport network of the project area.

The survey firm is vested with the responsibility for the following activities:

- The firm shall conduct all necessary traffic and transport surveys and studies through digital system, collect all relevant data and information for the project, and upload the collected data to website instantly through online communication device.
- Survey firm shall prepare working paper on the relevant fields under study and at the end of each month submit a report containing all information to be uploaded to website and ensure that all data and information are accessible to viewer.
- The firm shall be responsible for quality of data and information collected, data processing, cleaning and editing and presentation into tabular form.
- The survey firm shall provide all necessary assistance in gathering and procuring all relevant traffic and transportation related attribute and spatial data of relevant features within the project area, GIS database operation and management, analysis and preparation of maps and reports till completion of the project.
- Shall deliver all raw and processed data along with working papers containing guidelines for preparing the planning package as required by PD.
- The survey firm shall assist the UDD team members in preparation of final and all relevant reports till completion of the project.

For achieving the goal and objectives, the following sub-objectives need to be fulfilled, (some of these will be the output of the other packages of the project running parallel to this package):

» To prepare a socio-economic geodatabase of the study area related to transportation modeling and land use planning.

» To prepare an inventory of existing land use of the study area using GIS and conduct survey to calculate the trip production-attraction rates for various land use.

» To prepare an inventory of road network as well as transportation system (road network, public transport facilities, options for non-motorized trips etc.) of the study area using GIS.

» To conduct a comprehensive household travel demand survey.

» To obtain values for various demographic and socio-economic indicators included in the model.

» To forecast the land value and land use as impacted by changes in transportation accessibility and policies.

» To collect detailed data on freight movement and develop travel demand forecasting models for freight.

» To simulate transportation operations in details at the project area.

» To simulate vehicular traffic flow to analyze and solve traffic bottlenecks.

» To estimate the risk, resilience and vulnerability of the network under general operating condition and even during extreme conditions.

1.4 Project Administration

1.4.1 Consultants' Organization

The consultant team has been formed keeping in mind the type of works to be performed under this project and the amount of relevant experience needed for the task. Dr. Moinul Hossain is vested with the responsibility of the Team Leader. He has 15 years of professional experience in transportation planning and traffic engineering. He has experience in transport modelling, traffic management planning, traffic simulation by using ArcGIS compatible Transport Planning Software. He is also the local representative of Citilabs, USA, the developer of Citilabs CUBE, which is one of the leading transportation planning software products available in the market.

The Team Leader will be assisted by the other 2 (two) professionals i.e., Transport Survey Expert, Mr. Mizanur Rahman and Transport Survey Supervisor, Sultana Rajia. They all have required experience in their respective line of work and are well capable of performing the duties assigned on them. Ms. Rajia has received training from Citilabs on transportation modelling. The team will be assisted by the administrative or other support staff for the project. According to the characteristics of the designed surveys, a number of survey teams and a data entry team will be formed to work under the direct supervision of Transport Survey Expert and Transport Survey Supervisor. The whole team will work with the close coordination of the Project Director and will be overall assisted by the project management and coordination team of DevCon.

The consultant's organization for the assignment can be presented with the following diagram:

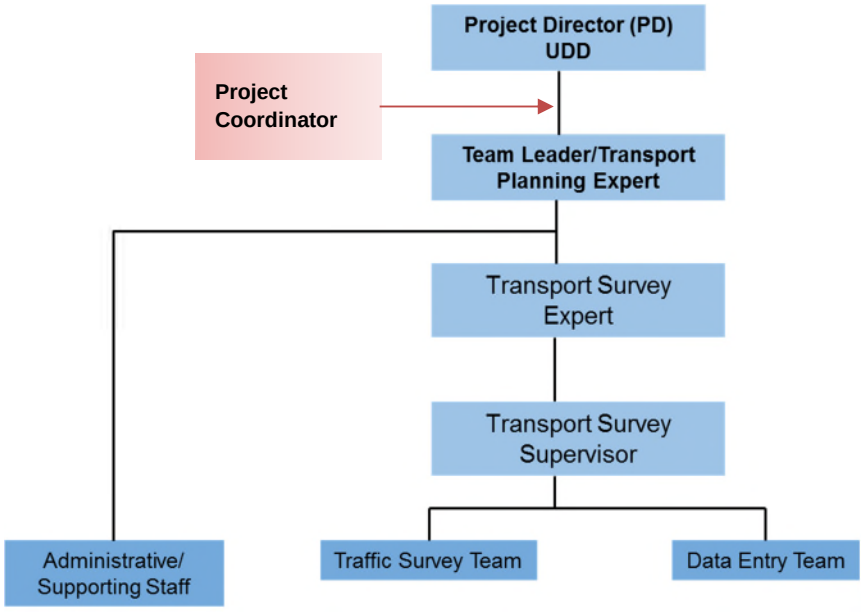


Figure 1-1: Consultant's Organization

1.4.2 Logistics and Support

In order to achieve the objectives as set out in the TOR and explained in the methodology of work, various logistics related to office accommodation, transport, computer facilities, and field survey equipment, support staff and various communication facilities are required. These facilities required for the project can be arranged for by DevCon. However, some counterpart facilities will essentially be ensured by the Client, such as-

- UDD will assist in communication and arrangement of meetings with various important stakeholders of the project
- UDD will issue letters for notice, permission and approval for performance of the survey and related field activities
- UDD will expedite collection of data from other government agencies as and when required

1.5 Work Plan

The consultants have been working as per the TOR scope of services and the work program suggested in the methodology. All measures have been taken to expedite the project activities and the first three reports have been submitted. However, all components of the traffic surveys required more time due to bad weather issues and additional surveys in Dhaka EPZ area, and the consultants requested a further 4 months' time extension for completion of necessary surveys and data analyses. The following bar diagram represents the original work schedule:

No.	Activity	Months					
		M1	M2	M3	M4	M5	M6
TASK 1: MOBILIZATION AND PLANNING OF THE PROJECT							
TASK 1.1	Mobilization of Activities						
TASK 1.2	Startup Meeting and Planning for Surveys						
TASK 1.3	Reconnaissance Field Survey						
TASK 1.4	Project Design						
TASK 1.5	Submission of Mobilization Report						
TASK 2: EXISTING DATA COLLECTION							
TASK 2.1	Geo-physical Maps and Report Collection						
TASK 2.2	Assessment of Present Transport System						
TASK 2.3	Socio-Economic Data Collection						
TASK 2.4	Preparation and Submission of Inception report						
TASK 3: SURVEY ACTIVITIES							
TASK 3.1	Survey Preparatory Activities						
TASK 3.2	Traffic Surveys						
TASK 3.3	Preparation of Database						
TASK 3.4	Preparation and Submission of Draft Survey Report						
TASK 4: TRAFFIC DATA ANALYSIS AND ASSISTANCE IN POLICY MAKING							
TASK 4.1	Preparation of Working Paper						
TASK 4.2	Assistance to Project Team/Project Implementation Committee						
TASK 4.3	Submission of Interim Report						
TASK 5: ASSISTANCE IN OVERALL PLANNING FROM TRANSPORTATION PERSPECTIVE							
TASK 5.1	Preparation of 20 years Travel Demand Model						
TASK 5.2	Assistance in Overall Planning						
TASK 5.3	Preparation and Submission of Draft Final Survey Report						
TASK 6: REPORTING AND PRESENTATION							
TASK 6.1	Presentation to the Client and Obtaining Approval						
TASK 6.2	Preparation and Submission of Final Survey Report with Necessary Modification						
TASK 6.3	Progress Reporting						
TASK 6.4	Assistance in Publication and Web Development						

Continuous Task Intermittent Task Submission of Deliverables

1.6 Staffing Schedule

The project staffs have been mobilized right after the contract signing and the project activities were commenced along with the staff mobilization. The professionals engaged in the project worked in the following schedule and for an additional 4-month period:

No	Name of Staff	Position		Staff-month input by month					Total staff-month input		
				M-1	M-2	M-3	M-4	M-5	Home	Field	Total
1	Dr. Moinul Hossain	Transport Planning Expert (Team Leader)	*[Home]*						-		4.00
			[Field]							4.00	
2	Md. Mizanur Rahman	Transport Survey Expert	*[Home]*						-		3.00
			[Field]							3.00	
3	Sultana Rajia	Transport Survey Supervisor	*[Home]*						-		3.00
			[Field]							3.00	
										TOTAL	**10.00**

2 LITERATURE REVIEW & SECONDARY DATA COLLECTION

2.1 Review of National Policies and Reports

After discussion with UDD, the consulting team has identified the following documents to be relevant and required to be reviewed for this project:

Reports	*Published By*
Seventh Five Year Plan (FY2016 – FY2020): Accelerating Growth, Empowering Citizens	General Economics Division (GED) Planning Commission Government of the People's Republic of Bangladesh, Published in December 2015
Perspective Plan of Bangladesh (2010-2021): Making Vision 2021 a Reality	General Economics Division Planning Commission Government of the People's Republic of Bangladesh, Published in April 2012
Integration of Sustainable Development Goals into the 7th Five Year Plan	Support to Sustainable and Inclusive Planning (SSIP) Project General Economics Division (GED) Planning Commission Published in February 2016

The following sections present the excerpts from these reports that will have influence in proposing the road network as well as developing the travel demand forecasting model. It is to be mentioned that some parts of the text have been written in RED or ORANGE or have been *EMPHASIZED*. These parts of the review are to arrest the attention of the readers as they highly influence this Project.

2.1.1 Seventh (7TH) Five Year Development Plan

The Seventh Five Year Plan was prepared by General Economics Division (GED) under Planning Commission of Bangladesh. The Plan was published in December of 2015.

A major strategic challenge for the Seventh Five Year Development Plan of Bangladesh is to set investment priorities in a way that Bangladesh gets best results from its limited resources. This is an issue not only for optimally prioritizing public investment needs but also in picking right PPP friendly projects.

The transport infrastructure strategy for the Seventh Five Year Development Plan has been built on the lessons learned and experience gathered from the implementation of the Sixth Five Year Plan. There are some priorities in the plan as illustrated by Figure 2-1.

Figure 2-1: Priorities of Seventh Five Year Plan

From the above figure, it is clearly evident that Priority 2 and 3 will have direct impact on the project as Chittagong port is constructing a new terminal in Mirsharai. In addition, the Dhaka Chittagong 4-lane highway dissects the study area and this highway will provide connectivity to the Trans-Asian Highway project.

The key elements of the transport sector development for the Seventh Five Year Plan are:

Focus on Transformational Project and Timely

Reinvigorating the Public-Private Partnership (PPP)

Procurement Reforms

Operational Efficiency

Pricing Policies

Transport Infrastructure Financing Strategy

Institutional Reforms in Transport

2.1.1.1 Government's Project in Seventh Five Year Plan

The Government has already identified the following high-priority projects for the transport sector. The projects marked with RED will have high influence and the ones marked with ORANGE will have moderate to high influence on this project:

- *Continue to repair, maintain, improve and expand existing roads on a priority basis*
- Construction of Padma Multipurpose Bridge to be completed by 2018
- Construction of a multi-lane tunnel underneath the river Karnaphuli in Chittagong
- *Conversion of nationally important highways into four lanes gradually*
- *Connect important economic activity hubs such as Payra Port and Economic Zones to National Highways.*
- *Continuation of investment to reform and modernise railways.*
- Construction of circular rail road track around Dhaka city.
- Construction of the 3rd Sea port at *Payra* in Patuakhali.
- Construction of a sea port and an LNG terminal at Moheshkhali
- Construction of third terminal at Hazrat Shah Jalal International Airport (HSIA)
- Construction of a new airport named Khan Jahan Ali Airport
- Feasibility study for construction of Bangabandhu Sheikh Mujib International Airport.
- Feasibility study for construction of a road-rail tunnel underneath the river Jamuna.
- Feasibility study for construction of Sub-way (underground railway) in Dhaka city
- Strengthen Fleet capacity while making Biman a profitable organisation by improving its management and enhancing the capacity of passenger transport.

While the Government has already identified the above high priority projects and initiated implementation, the following priorities are also considered as *transformational investments* for taking Bangladesh to a higher growth trajectory:

- *The development of a balanced 3R (Rail, River & Road) based multimodal transport infrastructure system.*
- Timely completion of critical transport links (roads, bridges, railways and river waterways) related to regional and multi-regional connectivity.
- *Provision of access controlled 'Backbone Road Network' considering strategically important national highways.*

- Combining inland water transport with the existing road transport system as well as ensuring a healthy road alignment.
- *Give priority to regional transport connectivity*
- *Improving on transport safety standards to reduce incidence of accidents by implementing safety audit periodically.*
- *Promoting and revitalizing tourism industries, an integrated land use and transport planning for all the potential water front sites viz. Cox's Bazar, Jaflong, Kuakata etc. should be adopted in an urgent basis.*
- *Reduction of maintenance frequency and thereby recurring cost of roadways, utmost attention should be given to make road infrastructure durable.*
- *Development of middle-income enabled quality infrastructures with high-speed mobility facilities.*
- *Strengthening Planning Commission's sectoral institutional capacity with strong planning wings in key infrastructure Ministries having highly qualified professional planners.*

2.1.1.2 Transport Infrastructure Strategy for the Seventh Five Year Plan

Roads, Highways and Bridges

The Road Transport and Highways Division has a vision to build sustainable, safe & quality road infrastructure and integrated modern mass transport system for achieving desired socio-economic development in the country. The targets of RHD has given in the following table.

Table 2.1: RHD Targets for the 7th Five-Year Plan

Physical Activities	7th FYP Targets (FY2016-FY2020)
Construction of 4 lane roads	300 km
Construction of roads other than 4 lane	340 km
Improvement/ Rehabilitation of roads	2, 500 km
Construction of Flyover/ Overpass	7, 000 meter
Construction of Bridges/ Culverts	14, 800 meter
Reconstruction of Bridges/ Culverts	6, 800 meter

Regarding highways, the topmost priority is to convert important national highways *into four lanes.* The initial effort will focus on completing the ongoing highway projects; especially the u*pgrading of the Dhaka-Chittagong Highway* (*along with the double tracking of the railway connection*) *is of utmost importance*. The project has already been almost completed except for the three bridges along the way namely Kanchpur, Meghna and Gumti Bridges. The other strategies are:

- Improve road safety situation in the country by achieving 50 per cent reduction in road traffic accident fatalities by 2020.
- Gradually developing the *existing interrupted highways to uninterrupted arterial roads by adopting two-tiered access controlled layout configuration* for segregating mobility and accessibility functions of highways.
- *As at-grade junctions' dictates constructing interchange facility* that should increase overall capacity of the highways, besides highway widening at the major-major junctions.
- Towards achieving arterial roadway configuration by reducing carriageway side-frictions and conflicting usages of highway, strict roadside land use development and right of way (ROW) control policies should be adopted.
- Instead of raising the height of road network in coastal districts against sea level rise (SLR), better strategy would be developing coastal embankment/polder infrastructures as "Climate resilient" to save all sorts of assets within the protection area.
- Address the issue of road damage from overloading, the implementation of road damage monitoring system will be strengthened with enforcement of penalties for violation.

Urban Transport

The top priority is to lower urban road network congestion through appropriate investments as well as transport management. Like other successful metropolitan mega cities of the world, infrastructural development, maintenance, traffic enforcement, public transport operation, public utilities etc. there needs to be active consideration for bringing those under a strong unitary metropolitan authority.

For coordinated development of metropolitan cities and urban areas, like other countries consideration was given in the Plan to establishing an autonomous urban development authority (UDA). It was mentioned that in the absence of this type of development authority, major cities and urban areas of Bangladesh are growing unsustainably and haphazardly without any planned mass-transit infrastructure and mainly based on smaller sized vehicles. It is understood from this Plan that UDD can play an important role in filling up the gap and the success of Mirsarai project will bolster this claim.

The strategies of Seventh Plan regarding urban transport improvement are:

- *Developing a balanced multimodal system*.
- Adopting decentralization policy; it can be started with the gradual shifting of Garment Industries from the core areas.
- Emphasis should be placed on *efficient traffic management* to ease congestion.
- Mass transit oriented land use and transport development policies
- Focus needs to be on the development of signal free road network and *public transport infrastructures* (viz. dedicated bus lanes, passenger transfer facilities, bus bays, turnaround facilities, stopover terminals etc. which are now grossly missing)
- Besides reclaiming footpath, *adequate pedestrian friendly walking and crossing infrastructures* should be developed.

Rural Transport

The strategies for the development of the road system include updating of a Road Master Plan, adoption of a Rural Roads & Structures Maintenance Strategy, maintenance plan and according higher priority to maintenance over new construction, exploring technological options to construct quality roads with available construction materials, introduction of measures to stop overloading, adoption of procedures to maximize generation of employment for the poor, ensuring quality of construction, more involvement of Local Government Institutions (LGI) and ensuring utilization and maintenance of constructed facilities. All these strategies will be reflected in this Project.

Strategic Priorities of LGED for Rural Transport Development and Management

The First Priority will be to Double lane/Upgrade and maintain selected busier Upazila Roads (a list will be provided in this Project suggesting which roads should fall under this category to have a sustainable transportation system for Mirsharai), Union Roads that are being used by a large number of commercial vehicles including maintenance/rehabilitation of bridges/culverts in these roads. At the same time, connection with rural roads with railway and waterways will be given priority in order to promote and integrate multimodal transport system. Proper maintenance of the existing paved rural network will also be included in priority. **The Second Priority** will be to improve Upazila Roads, Union Roads and prioritized Village Roads including culverts/bridges which have strategic importance to connect road network, railway and waterway. Preparation of a Land Use Map to initiate planned development will also be included in the second priority. **The Third Priority** will be to improve Growth Centres and construction of 'ghat' facilities at Growth Centres located on the bank of inland waterways to ensure better integration of road and water ways and thereby stimulating the rural transport and trading system. Also, development of rural waterways will be included in the third priority. It is relevant to mention here that this Project will include plan on how to improve road facilities within or adjacent to the Growth Centres.

The major strategies suggested by the Seventh Five Year Plan are as follows:

- The rural infrastructure development/improvement will be planned and implemented based on the findings of Effect/Benefit/Impact/feasibility studies carried out in respect of rural infrastructure development projects of LGED
- A guideline for investment prioritization and selectivity will be developed and calculation of economic rate of return will be adopted to guide the major investment decisions.
- Rural Road Master Plan of LGED will be updated. The updated Master Plan will be followed for infrastructure development projects covering Upazila and Union roads including bridges/culverts, bridges/culverts on village roads and development of growth centres/markets, ghats and Union Parishad HQ etc.
- For sustainability of rural infrastructure, adequate maintenance system and a viable funding mechanism based on local resources and emphasizing local participation and ownership will be arranged
- Since the requirements for maintenance are increasing, the Government and the local bodies will make special efforts to fully fund these needs and LGED will make continuous efforts to improve maintenance efficiency and ensure local participation.

The main targeted priorities for rural road development and maintenance during the 7th Plan will include the following:

- Improvement of the Upazila Road (5000 Km).
- Double lane/Widening/ Up gradation/Rehabilitation of selected Upazila /Union Roads that needs up-gradation being used by a large number of commercial vehicles (10000 Km)
- Improvement of road safety engineering at junctions of LGED roads with National Highways
- Improvement of the selected Union Road. (8000 Km)
- Improvement of prioritized Village Road (12000 Km)
- *Re-construction/Double lane* of Bridges and Culverts on *Upazila Road*, *Union Roads* (12000 Meter) being used by a large number of commercial vehicles
- Construction of Bridges and Culverts on Upazila Road, Union Roads (140000 Meter)
- Construction of Bridges and Culverts on prioritized Village Road (50000 M)
- *Development of Growth Centres and Rural Markets* -1200 Nos
- Construction of all remaining Union Parishad Complexes (1900 Nos)
- Extension of Upazila Complexes (400 Nos)
- Construction and rehabilitation of Cyclone Shelters and killas (1238 Nos)
- Land Use Planning and Management Project in the Upazillas of Bangladesh
- Development of Growth Centre centric Urban centres in selected Upazillas of Bangladesh-300 Nos
- Improvement of road safety engineering in rural roads to minimize road accidents.
- Periodic and Routine maintenance of Paved and Herring Bone Bond (HBB) roads & structures on rural roads

Strategies for Improvement in Rural Transport

The strategies to meet the above priorities include the following:

- The development strategy for the rural transport will be reoriented for efficient external access through optimal integration of road and inland water transport and off-road internal accesses;
- Improvement in resource mobilization will be made through introduction of user charges and fees by the agencies in all areas of transport and for all use of transport network;
- Provision of required incentive packages for the private sector for greater participation will be ensured, not only in transport services, but also for infrastructure building

- Identification and implementation of preventive, emergency and post-disaster mitigation measures will be made.
- Adequate care will be taken while developing transport network and service so that these do not cause environmental pollution and affect ecological balance.
- Attention will be given to improve transport safety standards including specific attention to women safety in all means of transportation with a view to substantially reducing the incidence of accidents.
- National standard for road design, geometry and loading capacity will be set, especially for the rural roads connecting the upazilas with zila.

Hence, it can be observed that the suggestions for a new road network and improvements of the existing one for Mirsharai, as supposed to be proposed by the Project, will need to be coordinated with LGED, RHD and the City Authorities as the outcome needs to be reflected on Rural Road Master Plan, the plans for RHD to improve connectivity with LGED roads and the existing master plans of the cities.

Railways

The Government places special emphasis on railway communication, as it is cheaper, safer and fuel-efficient and this will continue in future. The core objectives and targets for the railway sector for the Seventh Plan are summarized in Table 2.2.

Table 2.2: Seventh Plan Railway Objectives and Targets

Goal/ Objectives	***Actions***	***Specific targets***
Expand and improve railway system to provide safer, better, environment friendly & less expensive transport facilities to the national and international traffic to increase its market share. Increase its market share from 4% to 15% in freight transport, 10% to 15% in container transport between Dhaka-Chittagong Port and 4% to 10% in passenger transport	Expansion of railway network to expand rail operations	Undertake construction of 856 kilometer of new rail track
	Double tracking of important sections and gauge unification to overcome operational bottlenecks	Undertake dual gauge double tracking of 1110 kilometer
	Rehabilitate/upgrade existing rails for improved speed and safety	Undertake rehabilitation of 725 km of existing rail track
	Construction of railway bridges and other infrastructure for operational improvement.	Undertake construction of rail bridges, improvement of level crossing gates and improvement of other infrastructure
	Procure new locomotives to improve service quality	Purchase 100 new locomotives, 1 locomotive simulator and 4 relief cranes.
	Procure new coaches for passenger comfort	Purchase 1120 passenger coaches and rehabilitate 624 coaches.
	Upgrade railway workshops and maintenance	Procure modern maintenance equipment
	Improve rail speed and safety	Upgrade rail signal for 81 stations
	Improve rail efficiency	Strengthen railway management
	Improve railway finances	Eliminate operational deficit through price increases and operational efficiency gains.

The railway expansion program is based on the following strategic considerations:

- Shortening the Dhaka –Chittagong rail distance.
- Double tracking of all major railway corridors by phases.
- Developing a full access controlled right of way as well as capital intensive grade separated measure to make level crossing free allowing segregated rail corridor and thereby ensuring operation of commuter trains in urban areas. Emphasis would be given to higher frequency and speed without affecting the roadway capacity.
- Strengthening South Asia regional and Trans-Asian railway connectivity.

- Modernization of train (Electric Traction System), improving the speed and efficiency to move the containers to and from the hinterland more efficiently and thereby to make the railway profitable
- Priority would be given to connect large EPZ/SEZ mouth ICDs and thereby to develop market oriented container transport friendly new railway infrastructures.
- In the long run for even distribution of traffic load, urban contribution of railway in terms of carrying commuter traffic needs to be increased by adopting two-tier railway system i.e. sub-urban and urban rail. Urban rail network needs to be developed by including the circular rail.

Along with routine and regular activities/ projects/ programmes, the following major/remarkable projects are underway to be implemented during Seventh Five Year Plan;

- Construction of Single Line Duel Gauge Railway Track from Dohazari to Cox's Bazar via Ramu and Ramu to Gundhum near Myanmar Border.
- Padma Bridge Rail Link Project (Dhaka-Mawa-Bhanga- Jessore)
- *Construction of Double Track Standard Gauge Railway Line from Dhaka to Chittagong via Comilla/ Laksam (expressway)*
- Construction Modern Railway Workshop at Rajbari.
- Construction of Double Line (Duel Gauge) Railway Track between Joydebpur-Iswardi sections;
- Construction of Bangabandhu Railway Bridge (2nd) over the River Jamuna;
- Construction of Railway line from Khulna to Mongla Port with feasibility Study; and
- Construction of Dual Gauge Double Rail Line and Conversion of Existing Rail Line into Dual Gauge between Akhaura and Laksam.

Hence, the strategies outlined suggest heavy rail based development in this Project area. Also, some of the priority projects listed above pass through the Project area.

As part of the above strategy, the construction and reconstruction of 441 km rail line is already under way. To make railway communication between Dhaka and Chittagong more efficient, the Government has taken initiatives to upgrade Dhaka-Chittagong corridor into double lines.

Port Infrastructure

While there has been improvement in Chittagong Port container handling efficiency, further efforts are needed to increase efficiency in line with good international practice. To this end, during the Seventh Plan, priority would be given to:

- Reducing port induced semi-trailer truck traffic by developing wider intermodal rail and river connectivity.
- Developing the Chittagong Port as "Climate resilient" against sea level rise (SLR) and land subsidence potential.
- Maintaining and improving the navigability of the channel through capital dredging and regular maintenance dredging
- Increasing container handling capacity through expansion of terminal/yard facilities, acquisition of modern container handling equipment and procurement of harbour crafts and vessels to ensure improved operating system.
- Setting up ICDs/CFS by the Public/Private sector at all potential cargo distribution centres across the country to decongest the port.
- Involving private sector in port management and port development infrastructure on BOO/BOT/PPP model for which a clear, reliable and transparent policy guideline is to be approved by the Government
- Improving institutional capability in training, planning, safety and environmental management control in the port.

In relation to this, CPA has already completed the task of preparing a Master Plan, conduct the feasibility study for the Bay terminal and also award the tender to conduct the feasibility study of a port in Mirsharai. All these projects will have impact on this Project and the analysis will consider the traffic being generated from these projects.

2.1.2 National Perspective Plan

The National Perspective Plan was prepared by General Economics Division (GED) under Planning Commission. The report was published in April, 2012.

The 'Vision 2021' aims at developing Bangladesh into a resourceful and modern economy through efficient use of information and communication technology. The Perspective Plan provides the road map for "Making Vision 2021 a Reality" through accelerating the growth and laying down broad approaches for eradication of poverty, inequality, and human deprivation. A brief summary of "The Perspective Plan" on Transport Sector has been discussed which is as follows.

2.1.2.1 Transport for the Future-Vision

The vision of the perspective plan is to establish a safe, low cost, modern and technologically dependable, environmentally friendly inter-modal transport system with a view to reducing the financial cost and time for both commercial traffic, cargo and for public transportation.

2.1.2.2 Policy Objectives

The main objective of the perspective plan is to develop an efficient, sustainable, safe and regionally balanced transportation system in which various modes complement each other, interface appropriately and, where possible, provide healthy competition to each other. The broad policy objectives are as follows:

- *Meeting the transport demand generated by higher rate of growth of GDP.*
- Introduction of modern technology for increasing capacity and improving quality and productivity.
- Development of the two sea ports.
- Establishment of effective railway linkages between the east and west zones of the country.
- *Re-orientation of the development strategy for rural transport for efficient external access through optimal integration of road and inland water transport and off-road internal accesses.*
- *Development of some of the critical inter-modal transport network that will allow the connectivity of neighbouring countries to the two sea ports of Bangladesh.*
- Participation in global and regional transport connectivity initiatives that will help develop the land route links between South Asia and East Asia through Bangladesh.
- Improvement in resource mobilization through introduction of user charges and fees.
- Provision of required incentive packages for the private sector for ensuring greater participation not only in transport services, but also for infrastructure building.
- Transport development strategy framework will be broadened by incorporating the vital urban transport dimension starting with improvement in transport services of greater Dhaka city.

Adequate care will be taken while developing transport network and service so that these do not cause environmental pollution and affect ecological balance.

2.1.2.3 Sub-Sectoral Goals, Objectives and Strategies

Roads

The primary road network consists of national highways, regional highways and zila roads (former Feeder Road Type A) which is constructed and maintained by RHD. The other roads – upazila roads,

union roads and village roads –serve mainly rural areas, and are constructed and maintained by the Local Government Engineering Department (LGED).

The long-term goal of the perspective plan is to *develop a safe, cost effective, efficient and sustainable system of land transport that facilitates economic development through the movement of people, goods and services throughout the country.*

Strategies

- *Upgradation and maintenance of the existing roads relative to new road construction through removing backlog and strengthen capabilities in all the fields of road maintenance.*
- Routine and periodic maintenance programmes will be drawn up by concerned authorities.
- *National Highways should receive priority attention to ensure a high level of service, safety and quality.* The Dhaka-Chittagong Highway (NH1) is to become a six-lane road while the *other highways should gradually become four-lane by 2021*. These roads can form part of the *regional road network*, as well as the *Trans-Asian Road network* facilitating trade between Bangladesh and neighbouring countries.
- Ensuring balanced development across the country, there should be an adequate number of east-west connections.
- *Improvement of the road connectivity with neighbouring countries through various regional cooperation forums*

Urban Transport

The aim of urban transport development is to improve transport and traffic infrastructure so as to meet existing and potential demands, and developing an integrated and balanced system in which *all modes (motorized and non-motorized) can perform efficiently and each mode can fulfil its appropriate role in the system.* The main objective of urban transport policies should be to support sustainable urban development.

Rural Transport

It is important to give attention to ways that the rural transport infrastructure, particularly the physical infrastructure, can support rural economies. Roads, waterways, or both serve most of rural markets and growth centres. Upazila roads (formerly, Feeder Road Type B) connect growth centres to the RHD road network or to the upazila headquarters or connect one growth centre with another. Union roads connect union headquarters with the upazila headquarters, and local markets with each other, while village roads connect villages and farms to local markets and union headquarters. All these roads, along with waterways, are important for the efficient functioning of rural markets. Access to markets will encourage improvements in market facilities.

The long-term goals of the perspective plan with respect to rural roads are *(i) to provide all-weather access to all growth centres, all union parishad complexes, most rural markets and other rural service delivery centres,* and *(ii) to improve rural accessibility to facilitate agricultural production and marketing.* The strategies may be adoption of a *Rural Road Master Plan and Maintenance Plan* with priority accorded on *maintenance over new construction*, and more involvement of LGIs in ensuring utilization and maintenance of constructed facilities.

Railways

The vision of the Perspective Plan is to expand and improve the railway system to provide safer, better, a more environmentally friendly and cost-effective transport facility to national and international traffic through establishing international rail links for *regional/sub-regional connectivity* and Trans Asian Railway (TAR), e-governance, introduce modern technology such as metro rail in Dhaka and undertake *modernization of signalling system to ensure safety*.

Strategies

- *Rehabilitate, upgrade/improve and replace old-aged infrastructures* and rolling stocks to reduce journey time, improve the service quality and to build the image of railway as a safe and reliable means of transport.
- Augmentation of line capacity along selected corridors, acquiring modern locomotives, coaches and wagons.
- Increasing market share in freight transport, in container transport between Dhaka-Chittagong Port and in passenger transport.
- Organizational reforms introducing a modern financial management system, improved maintenance and operational system and human resource development.
- Connect the Capital City with Cox's Bazar, Mongla Port, Tungipara, Barisal, Chittagong Hill Tracts and other areas where rail network does not exist.
- *Improve Commuter Train Services to provide better urban transport facilities to the daily passengers* around Dhaka, Chittagong, Rangpur, Dinajpur, Parbatipur, Nilphamari, Sylhet etc.
- Improve efficiency and cost recovery.

Ports and Shipping

The Maritime transport sector is critical to the economic development of Bangladesh. The objective of the perspective plan is to *promote efficient, effective and internationally competitive port and shipping facilities to enhance international trade and exports*.

Strategies

- Maintain and improve the navigational channel through capital dredging and regular maintenance dredging.
- *Develop efficient inland distribution of container traffic by road, rail, and inland water transport to relieve the congestion and long travelling time at Chittagong Port.*
- Expansion of terminal/yard facilities and improvement of operations through the acquisition of modern container handling equipment and procurement of harbour crafts and vessels.
- Urgent establishment of ICDs/CFS at all potential cargo distribution centres across the country.
- PPP in port management and port development infrastructure through a BOO/BOT model using a clear, transparent policy guideline.
- Improve institutional capability for training, planning, safety, and environmental control.

Multi-Modal Transport

Multi-modal transport has the potential to reduce transport expenditure and time. The modes should be integrated, and the communication system should be improved to facilitate tracing the vehicles and sharing information among different stakeholders, such as importers/exporters, port authority and shippers.

2.1.3 Sustainable Development Goals (SDGs)

The report was prepared by General Economics Division (GED) under the Support to Sustainable and Inclusive Planning (SSIP) Project under Planning Commission. The report was published in February, 2016.

There are 17 Sustainable Development Goals with 169 associated targets. The goals are as follows:

Sustainable Development Goals (SDGs)
Goal 1: End poverty in all its forms everywhere
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3: Ensure healthy lives and promote well-being for all at all ages
Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5: Achieve gender equality and empower all women and girls
Goal 6: Ensure availability and sustainable management of water and sanitation for all
Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10: Reduce inequality within and among countries
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12: Ensure sustainable consumption and production patterns
Goal 13: Take urgent action to combat climate change and its impacts[1]
Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

Among these goals the Consultant team finds out some targets which may be related to the project. Some these targets are fully/partially aligned with the *"Seventh Five Year Plan"*

Targets of the Sustainable Development Goals (SDGs)

Goal 1: End poverty in all its forms everywhere

Target 1.1: By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day

Target 1.a: Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions

Goal 5: Achieve gender equality and empower all women and girls

Target 5.c: Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

Goal 6: Ensure availability and sustainable management of water and sanitation for all

Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

Target 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Target 8.1: Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

Target 8.2: Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

Target 8.3: Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

Target 8.9: By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture' and products

Target 8.a: Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade- Related Technical Assistance to Least Developed Countries

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being with a focus on affordable and equitable access for all

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

Target 11.4: Strengthen efforts to protect and safeguard the world's cultural and natural heritage

Target 11.7: By 2030, provide universal access to safe, inclusive and accessible, green and public

spaces, in particularly for women and children, older persons and persons with disabilities

Target 11.a: Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

Target 11.b: By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels

Goal 12: Ensure sustainable consumption and production patterns

Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Target 14.2: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

Target 14.5: By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Target 16.6: Develop effective, accountable and transparent institutions at all levels

Target 16.7: Ensure responsive, inclusive, participatory and representative decision- making at all levels

Target 16.10: Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

Target 17.11: Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020

Target 17.16: Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries

Target 17.17: Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Conclusion

The literature review has presented the excerpts from three major reports regarding the developing Bangladesh especially emphasizing aspects relating to transportation and particularly to this project. From this discussion, it is also highlighted the components, strategies and priorities that fall in tandem with the aim and objectives of this Project. The final travel demand forecasting model and its suggested sustainable transportation system plan will reflect all these issues highlighted in the literature review.

2.2 Collection and Review of Relevant Data

Apart from conducting literature review on major documents related to the Project, substantial amount of secondary data were also amassed for this project. The following subsections lists the relevant data sources and the description of data that the consulting team found to be relevant for this project.

2.2.1 Collection of Geo-physical Maps and Relevant Reports

Government's Future Projects

Road Network

Projects	Source
Mirsharai –Teknaf Marine Drive Road Project	Report on Sustainable Transport System: A Road to Development (Ministry of Road Transport and Bridges Road Transport and Highways Division)
Cross-Border Road Network Improvement Project	
Dhaka Chittagong Expressway Project on PPP Basis	
Coastal Expressway from Shitakunda via Chittagong to Cox' Bazar	Website of CDR International

Mirsharai –Teknaf Marine Drive Road Project

The proposed Mirsharai-Teknaf Marine Drive is a route along the sea shore which will connect Asian Highway network as well as India, Myanmar and China especially Kunming. The route passes beside the largest sea port of Bangladesh and the largest ship breaking yard of the world. The project road will contribute to the development of tourism in the area and facilitate regional connectivity. It is now under construction and it is directly connected to the *Economic Zone of Mirsharai.*

After completion of this road the connectivity with Mirsharai will be improved and economic development will be flourished in home and abroad.

Figure 2-2: Mirsharai-Teknaf marine drive

Cross-Border Road Network Improvement Project

RHD has plan to take upgrading of Ramgarh-Heako-Baraiyarhat road section project to establish improved connectivity between Bangladesh and North-East Indian states. The proposed commencement of civil work is January 2019 and the completion of civil work is December 2021.

The project will be implemented through RHD under Ministry of Road Transport and Bridges in order to build a reliable and efficient cross-border road network among neighboring countries. This road will

coincide with Asian Highway 1 and 41 and also a part of Bangladesh-Bhutan-India-Nepal Motor Vehicle Agreement planned corridor.

This project will improve the connectivity of Mirsharai with North-East Indian states and make the area an important industrial hub and also improve the eco-tourism.

Figure 2-3: Alignment of Cross-Border Road

Dhaka Chittagong Expressway Project on PPP Basis

The project aims at construction of a 217 kilometers expressway along Dhaka-Chittagong corridor on public private partnership basis. The expressway is proposed to be constructed parallel to National Highway, N1. When the expressway will be completed and opened the development of Mirsharai will be flourished, land use pattern will change, congestion will be reduced, regional, national and international road connectivity will be improved. Mirsharai EZ will also be benefited.

Figure 2-4: Part of the Proposed Dhaka-Chittagong Expressway

Coastal Expressway from Shitakunda via Chittagong to Cox' Bazar

As part of the feasibility study for the Marine Drive Expressway and Coastal Protection Works CDR International, in cooperation with DevConsultant from Bangladesh, was appointed to carry out the Preliminary Environmental Impact Assessment for China Harbour Engineering Company (CHEC). Through this project, the Bangladesh Government intends to improve the accessibility of the Southeast

region of Bangladesh along with an improvement of the flood safety. Nowadays, the area is moderately accessible which hampers the economic development of the region, comprising of the Chittagong and Cox' Bazar districts. The area is characterized as hilly area with relatively short rivers where the coastal low-lying delta planes are affected by tidal waves and river flooding, which frequently damage households and vital infrastructure.

The alignment of the Expressway runs from Shitakunda via Chittagong to Cox' Bazar. The total length of the trajectory is about 170 km in total and includes approximately 100 bridges and 80 km of coastal protection works. The proposed roads will be a dual four-lane carriageway of 21.6 m in width, with a bituminous road surface. It will become a national trunk road upon its completion.

Positive impacts of the project are i) increase of the flood safety ii) the creation of employment opportunities during construction iii) better economic opportunities for local business and iv) unlocking of the hinterland for socio-economic development.

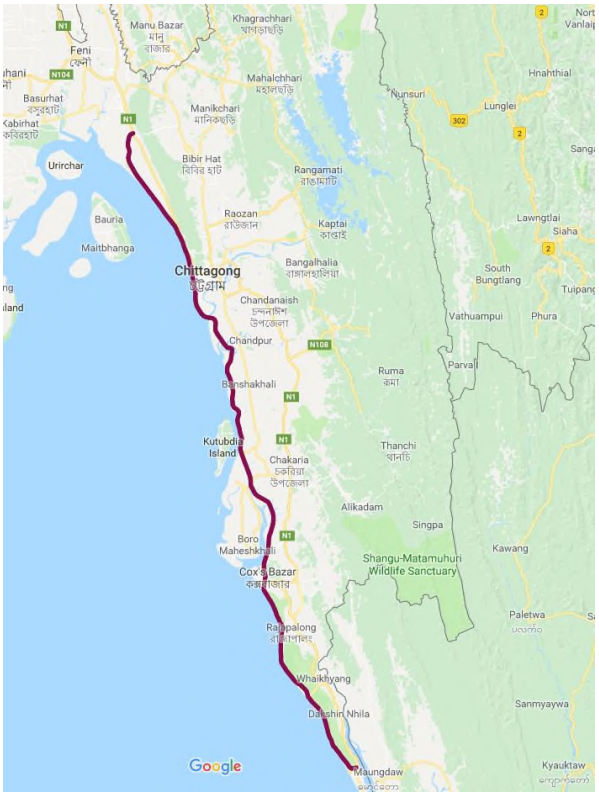


Figure 2-5: Coastal Expressway

This expressway directly connects the Mirsharai Paurashava and overlap with the Mirsharai-Teknaf marine drive

Bridge

Projects	Source
Indo-Bangla Maitree bridge from Sabroom to Ramgarh	Dhaka Tribune, Published on October 11, 2017 at 01:56 pm, written by Shilajit Kar Bhowmic

Indo-Bangla Maitree Bridge from Sabroom to Ramgarh

The construction of the Indo-Bangla Maitree Bridge from Sabroom to Ramgarh is currently in full swing. National Highway Infrastructure Development Corporation Limited (NHIDCL), a nationalized company of the Indian government is supervising the complete project. The India-Bangladesh Maitree Bridge, is a 180m long four-lane approach road construction project that was implemented bilaterally between the two countries. The bridge will connect Sabroom, a border town in southern Tripura with Ramgarh in Bangladesh, which will allow India to use Chittagong as a "port of call." The route will provide a significant road link to India's north-eastern states, and facilitate greater trade and exchanges between the two countries.

Figure 2-6: Location of Sabroom to Ramgarh Bridge

Ports and Bay Terminal

Projects	Source
Ramgarh Port	Bangladesh Land Port Authority (BLPA)
Sitakunda/ Mirsharai Port	Chittagong Port Authority
Bay Container Terminal	The Daily Star and the Strategic Masterplan for Chittagong Port (ADB)

Ramgarh Port

The government has decided to establish three new land ports in Chittagong Hill Tracts (CHT) to ensure smooth and efficient trade with India and Myanmar. The ports will be built at Ramgarh in Khagrachhari, Gundam in Bandarban and Tegamukh in Rangamati. Among these ports Ramgarh will establish trade connection with India's Tripura state.

Ramgarh port will be connected with Mirsharai Upazila by the Ramgarh-Heako-Baraiyarhat road section. This will make a positive effects in export-import business for Mirsharai and Economic Zone of BEZA.

Figure 2-7: Location of Ramgarh Port

Sitakunda/ Mirsharai Port

To meet the challenges of globalization and liberalization of world trade and economy, Chittagong Port Authority has undertaken many ambitious projects to enhance the capacity of Chittagong Port, improve efficiency and quality of services and also develop adequate facilities to turn itself into a world class regional port.

Bangladesh has planned to construct an Economic Zone in Feni-Mirsharai area. To establish that zone a port or terminal is very important. Moreover that port/terminal will be an intermediate port/terminal helping the services of Chittagong Port Authority. The proposed location is in and around Sitakunda Upazila near Mirsharai. The total area of the port will be 28 square kilometers. The proposed port/terminal will be able to handle more containers and bulk cargos and decrease the pressure on Chittagong Port.

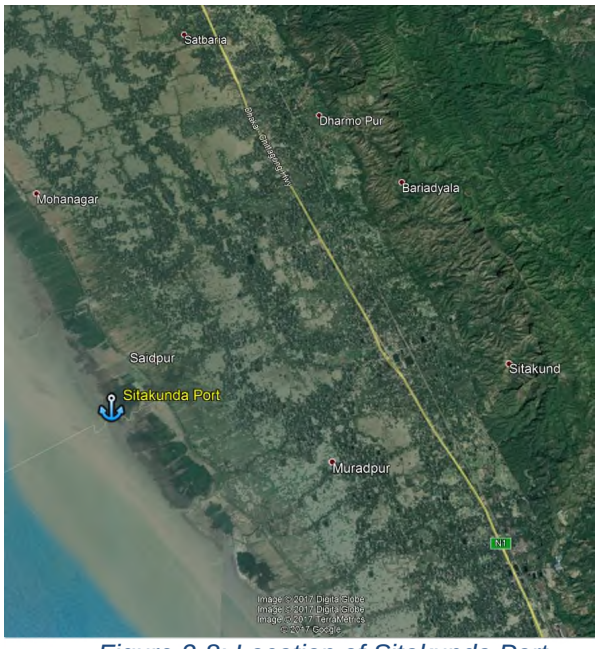


Figure 2-8: Location of Sitakunda Port

Bay Container Terminal

The new terminal named Bay Terminal on Patenga coastline with all modern port facilities to mobilize port activities and reduce transportation cost is now in top priority list of Prime Minister Sheikh Hasina. The government has initiated a move to construct a bay container terminal with the Indian credit to enhance the capacity of Chittagong Port, which will reduce congestion at the port. An 11km char had emerged about some 800 meters off the coast. It was not visible before 1990 and a channel was also created there where the sea depth in some areas is up to 10 meters. The possible footprint of the new Bay Terminal, measuring up to 2,500m quay length and up to 1,000m depth of land is also already shown on the figure above. This would lead to a total area of up to around 250ha.

Figure 2-9: Location of Bay Terminal

The outer anchorage of the Chittagong Port is also near the area where sea depth is up to 12 to 13 meters. The feasibility study to construct the terminal is ongoing by a German Company and the Chittagong Port Authority (CPA) intends to open the terminal in 2021 after the completion of 1st phase works. The distance of Chittagong Port from the outer anchorage is now 15km and this distance will come down to only 1km once the terminal is set up. Again, the capacity of the anchoring ships will be increased from present 19 ships to an estimated 35 ships at a time.

Railway

Projects	Source
Construction of double line between Laksham-Chinki Ashtana, Mirsharai (JICA funded)-*On going*	Master Plan, Bangladesh Railway Authority
Modernization of 11 station's signaling system in between Chinki Astana, Mirsharai-Chittagong (EDCF)-*On going*	

Construction of double line between Laksham-Chinki Ashtana, Mirsharai

The construction work of 61-kilometer railway track doubling between Laksham and Chinki Astana on Dhaka-Chittagong section is a sub-project of Dhaka-Chittagong Railway Development Project. The main objective of this sub project is to increase the line capacity of Laksam-Chinki Astana section for efficient train operation and to meet fast growing freight and intercity passenger traffic. There also will be the scope for laying broad-gauge lines too.

Figure 2-10: Future Double Line Track from Laksham-Chinki Astana

Modernization of 11 stations' signaling system in between Chinki Astana, Mirsharai-Chittagong

Eleven railway stations will be remodeled under this project. This project includes: Design, Supply, Installation, Testing, and Commissioning of Computer based Interlocking Color Light Signaling System and Related Works & Services at eleven (11) Stations of Chinki Astana-Chittagong Section.

Feasibility Study Report for Mirsharai Economic Zone, Bangladesh Economic Zones Authority (BEZA)

Proposed Transportation System

The Figure 2-11 shows the proposed transport network of Mirsharai Economic Zone

Approach/ Access road: Two approach/access roads has been suggested in EZ plan. One is from Dhaka-Chittagong old highway, with the intersection to the highway at Borotakiya Bazar, distance from Borotakiya Bazar to the site is about 9.30 Km, and another approach/access road is from Zorawargonj intersection to Muhuri Project Embankment. The distance from Zorawargonj to Muhuri Project Embankment is about 7 Km. BEZA suggests to extend the road up to 4-lanes. According to BEZA there are some possibilities and constraints of the existing two access roads.

4-lane highway Construction: There is also a proposal to connect the EZ with the Port Link Road in Chittagong by constructing a new 4-lane highway on the existing BWDB dike/Embankment Road, by improving it. It will also be constructed if the demand for industries rises higher and there is a need for a direct alternative connection to the Chittagong Port and Chittagong City. The following figure shows the transportation system proposed for Mirsharai EZ.

Port/Jetty: A jetty will be established to transport coal directly to the proposed 600MW coal-fired power plant. A channel route is proposed to connect this site with the deep sea, in order to import coal.

Rail access: Closest rail station at Borotakiya RS from Chittagong railway station is available and it may be used in future for rail connectivity to EZ.

Data Collection from Local Government Engineering Department (LGED), Bangladesh

In Mirsharai upazila there is Upazila pucca and katcha road, Union pucca and katcha road, Village road. Dhaka-Chittagong National Highway, Regional Highway and Zila road connect the Mirsharai with other district. The Consultant Team collects the following database from LGED in both GIS format and hard copy. The Figure 2-12 represents the major road network of Mirsharai with other features.

- Existing road network
- Growth center

- Rural market
- Administrative boundary
- Upazila and union headquarters

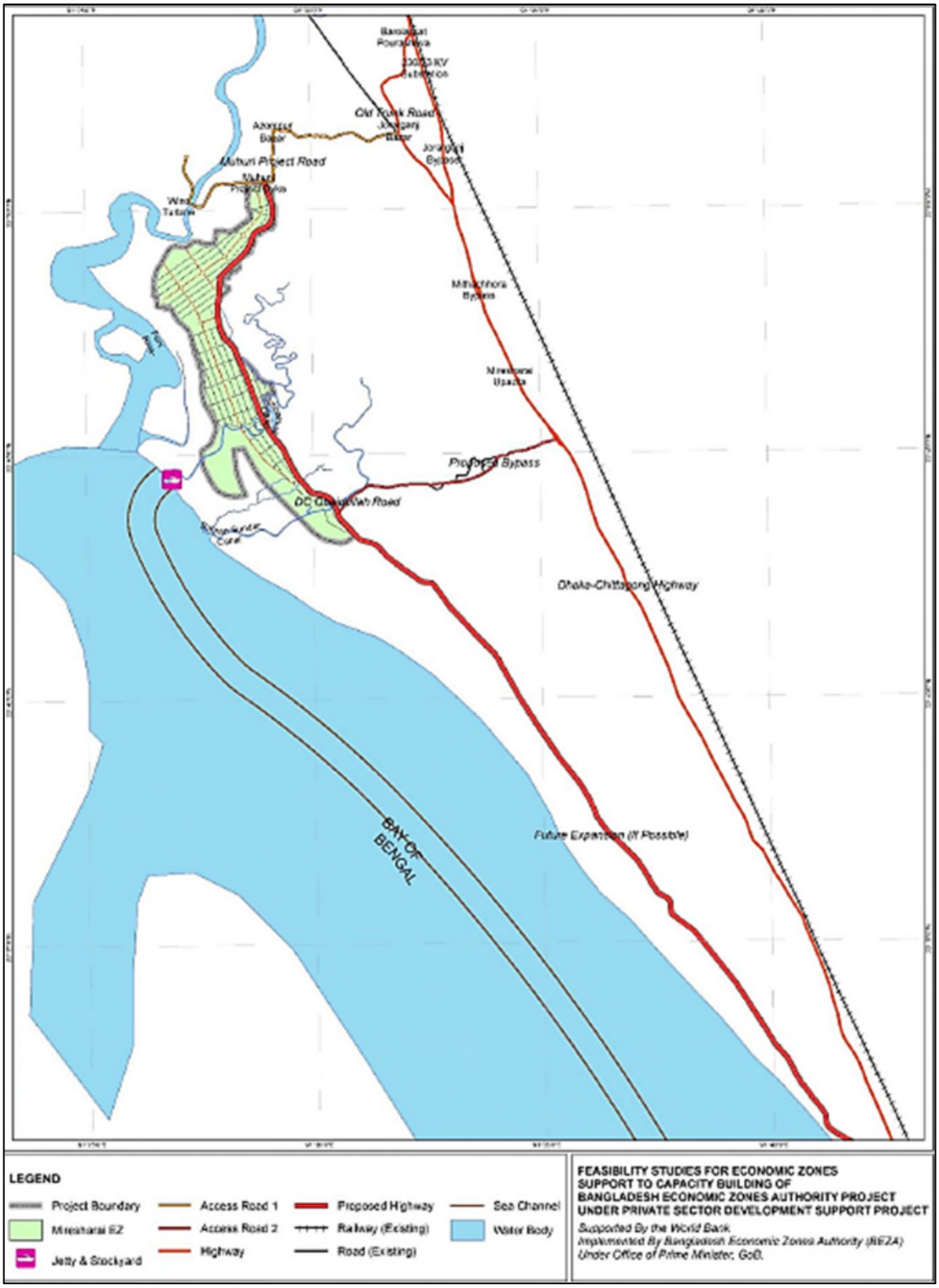


Figure 2-11: Proposed Transportation Network for Mirershorai EZ

Figure 2-12: Existing Major Road Network of the Study Area

Source: LGED

2.2.2 Collection of Basic Statistics: Present Activities

2.2.2.1 Population

Total population of Mirsharai upazila is 3, 98,716 and total household size is 79,545. Population density of the upazila, 826 persons per square kilometer. Urbanization rate of the upazila is 7.83%. Table 2.3 represents the area, households, population and density of the project area.

Table 2.3: Area, No. of Households, Population and Population Density of the Project Area

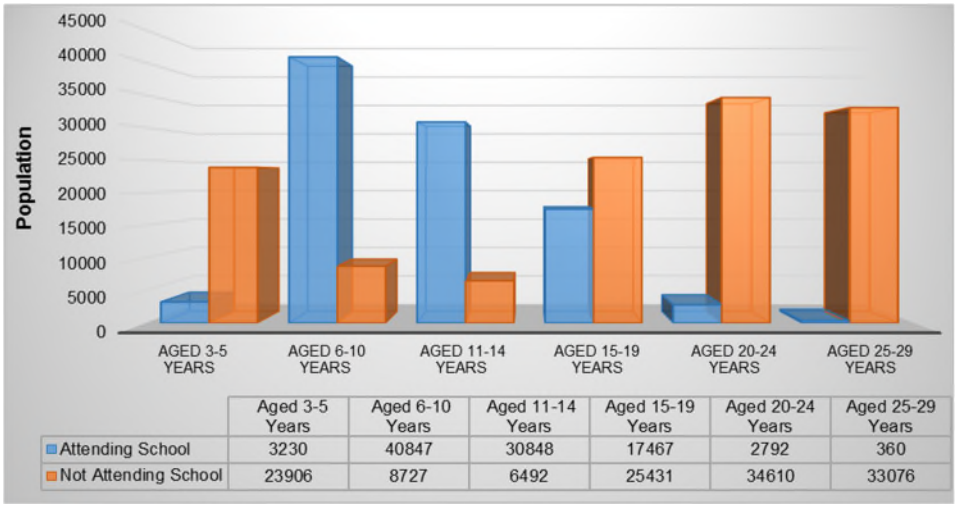
Paurashava/Union	Area (ac)	No. of Households	Population	Population density (per sq. km.)
Baroiyarhat Paurashava		2399	11602	
Mirsharai Paurashava		3507	16218	
Dhum	5587	3419	16770	742
Durgapur	3742	4351	21128	1395
Haitkandi	3271	3700	19051	1439
Hinguli	4562	5889	29133	1578
Ichhakhali	15754	5205	27980	439
Karerhat	39144	7362	35467	224
Katachhara	3446	4366	23596	1692
Khaiyachhara	1483	4879	23423	3903
Mayani	4590	3549	18285	984
Mirsharai	2816	3164	16828	1477
Mithanala	5338	4445	23109	1070
Maghadia	2626	4832	23406	2203
Osmanpur	5034	3046	14645	719
Saherkhali	8609	3049	16912	485
Wahedpur	4682	4752	24981	1319
Zorwarganj	5517	7631	36182	1621

Source: BBS, Population Census, 2011, Community Series: Chittagong

2.2.2.2 Education

Education rate: 52.01% (Aged 7+ population)

- School-going students: 95544 (3-29 aged)
- Government primary schools: 145
- Government registered primary schools: 23
- Community primary schools: 14
- Private unregistered primary schools: 12
- Primary School attached with high school: 1
- Private high schools: 44 (including 5 girls' schools)
- Kindergarten schools: 12
- Madrasas: 24 (1 women's madrasa)
- Independent Abtedia madrasas: 17
- Private degree colleges: 3
- Intermediate colleges: 2 (1 girls' college)
- Textile engineering college: 1



	Aged 3-5 Years	Aged 6-10 Years	Aged 11-14 Years	Aged 15-19 Years	Aged 20-24 Years	Aged 25-29 Years
Attending School	3230	40847	30848	17467	2792	360
Not Attending School	23906	8727	6492	25431	34610	33076

Figure 2-13: Distribution of population by age group and school attendance

The literacy rate of Mirsharai is 52.01%. Mainly primary and secondary education rate is high than university level. After higher secondary level the number of students is become lower (see the Figure 2-13). That means the tendency to receive higher education among people of the Upazila is low. When the upazila will be developed and the economic zone will be operational more employment opportunities will be created which will lead to higher incomes for the youth and also for adult, and this will lead to the expectation toward the contribute to higher attendance levels of children including girls at schools leading to overall higher education for all.

2.2.2.3 Employment Status

The project area is predominantly agriculture-based and partly fisheries-based. Main occupations of the upazila are: agriculture 34.06%, forestry 2.23%, agricultural labourer 15.86%, wage labourer 3.39%, commerce 10.8%, service 16.89%, fishing 1.32%, transport 2.37% and others 11.26%.

Turning to the employment status, it appears that mainly male population are involved in employment sector rather than female. Women are predominantly engaged in the household work. Of those not having jobs, the number of women is higher than that of men which indicates that women's domestic labor may not be counted in the labor force. The employment status clearly shows (See Figure 2-14 and Figure 2-15) that the majority are dependent on agriculture related activities. The number of people in the service sector is almost one third of the number who are involved in agriculture. The very low number of people employed in industry is due to lack of opportunity.

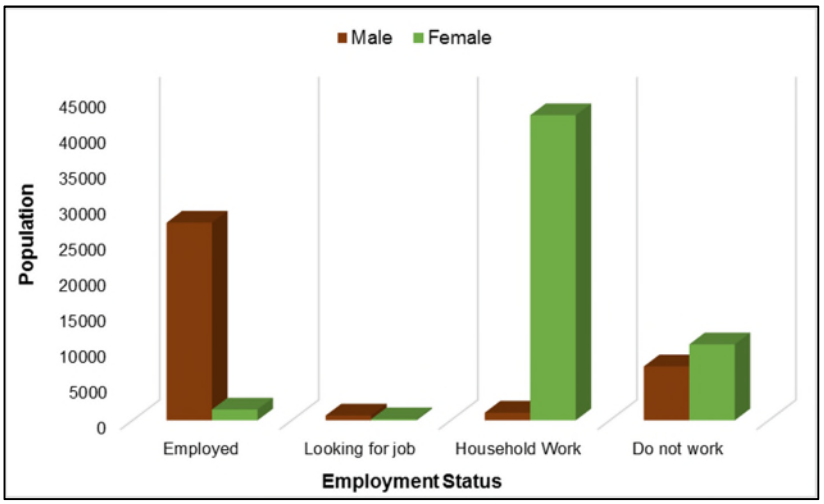


Figure 2-14: Employment Status of Mirsharai Upazila

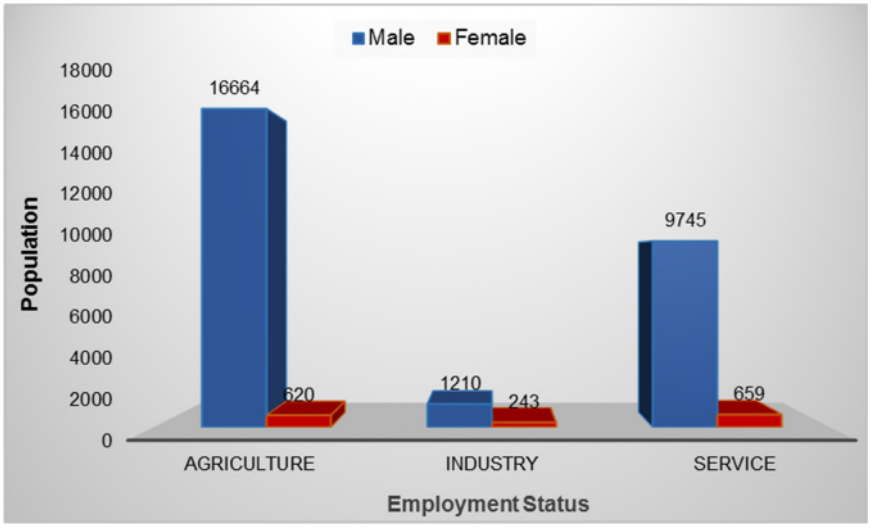


Figure 2-15: Employment Status based on Employment Sector

With the improvement of Mirsharai upazila, development of economic zone and tourism sector employment opportunities for people of Mirsharai will be generated and also provide them a better socio economic status and thus, empowerment especially for women.

The EZ which alone will generate 532,440 job opportunities, will not only change the scenario of the Upazila but also that of the neighboring Upazilas and will contribute to a reduction in migration to the large cities such the capital, Dhaka and the nearby mega-city of Chittagong. This locality is expected to become a new hub for business the service sector with all urban facilities.

2.2.2.4 Household structure, Sanitation facilities and Drinking water facilities

The household pattern, sanitation facilities and behavior shows a grim picture of poverty. Most of the households have kutcha houses in the upazila. A very low percentage of households have pucca houses. The number of people using proper sanitary toilets is small, most people have non-water sealed sanitary ones. Sixty percent of households have non-sanitary toilets and 22% have non-sanitary toilets in the upazila. Again 94% people use tube-well for drinking water purpose. This information is important for the project as it provides insight into the economic status of the Mirsharai dwellers.

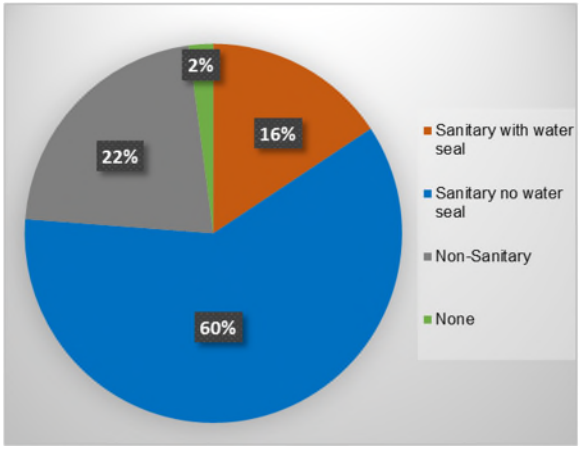


Figure 2-17: Sanitation Facilities of Mirsharai Upazila

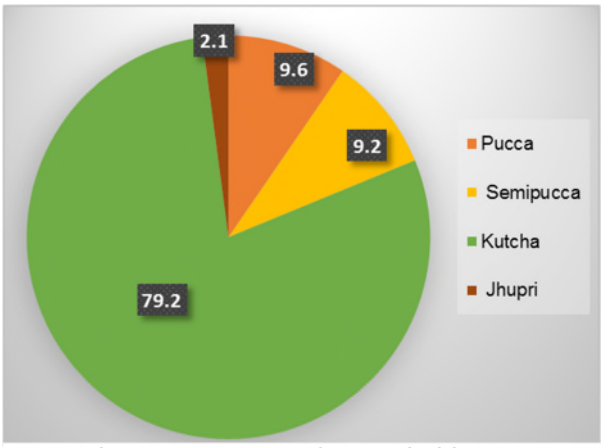


Figure 2-16: Type of Household Structure

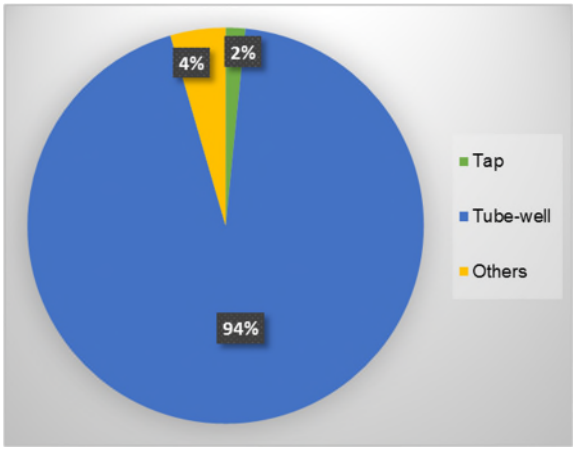


Figure 2-18: Drinking Water Facilities in Mirsharai Upazila

2.2.2.5 Health

There is one 50 beds Upazila hospital in the Mirsharai upazila. Besides it there are 14 family welfare centres, 7 union health centres, 3 private clinics and one mother and child welfare center.

The data on occupations, education and household types give an idea of the locality. From these variables, it can be said that the area is impoverished and not many well-off families live in the area. But at the Upazila Headquarters there are several structures and buildings and institutions but established in an unplanned manner. Also, the data explains the low private vehicle ownership and high dependencies on public transport by the local people.

2.2.2.6 Commercial Activities

Manufacturing Facilities: Carpet industry, pipe mill, ice factory etc. Cottage industries consists of weaving 903, goldsmith 110, blacksmith 100, potteries 100, bidi 4, tailoring 250, wood work 150, bamboo work 200 and sanitary 20.

Markets, Hats, Bazars and Fairs: Hats and bazars are 30, most noted of which are Mohajan Hat, Abu Torab Bazar, Kamar Ali Bazar, Boro Daroga Hat, Karer Hat, Baroia Hat, Shantir Hat, Jorarganj, Mithachara, Fakir Hat, Abur Hat and Bamonsundar Daroga Hat; fairs 5.

2.2.2.7 Transportation Facilities

Existing Roads: Pucca 193 Km, semi pucca 119 Km and mud road 1500 Km; railways 16 Km; waterways 11 nautical mile. Traditional transport are palanquin, Shampan boat and bullock cart. These means of transport are either extinct or nearly extinct.

Existing Modes: The conventional public transport services are only available in Mirsharai along the Dhaka-Chittagong highway. Within the Paurashava/Union/Village, unconventional modes of transport – mainly auto rickshaws, easy bikes and leguna serve as para transit. Rickshaws are also predominant just like throughout Bangladesh. Even along the Dhaka-Chittagong highways, alongside conventional buses and mini-buses, a substantial number of leguna were seen in operation.

2.2.2.8 Present Power Supply Situation and Telecommunication in Mirsharai

Power supply

At present, electricity is supplied to the area by the Rural Electrification Board (REB) by 11 KV line connected to REB's 33 KV sub-station at Mithachara, capacity 20 MVA. But it can only deliver 10MW

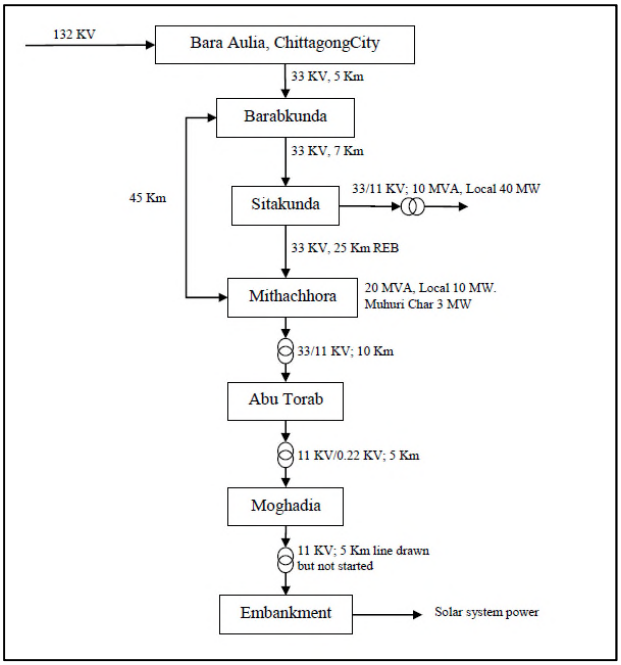


Figure 2-19: Present Power Supply Situation of Mirsharai

due to the limited power supply. Grid supply in the area is not available now. Some Solar Home systems are available.

Telecommunication

Upazilla Exchange is connected by Optical Fibre Links (OFC) to the Chittagong main Exchange.

2.3 Review of the Available Data

The consultant team have reviewed and still reviewing all data that are available at hand and will collect other necessary reports and documents from the concerned entities. From the review of the data as briefed in the Section 2.2.1, the following projects taken by the government directly or indirectly link with the study area:

- Mirsharai Special Economic Zone (BEZA)/ Mirsharai EPZ (BEPZA)
- Mohamaya Eco-tourism Park (proposed)
- Khaiyachhara Waterfalls (proposed)
- Gobania Rubber Dam (proposed)
- Mirsharai-Teknaf Marine Drive Road Project
- Cross-Border Road Network Improvement Project
- Dhaka Chittagong Expressway Project on PPP Basis
- Coastal Expressway from Shitakunda via Chittagong to Cox' Bazar
- Indo-Bangla Maitree Bridge from Sabroom to Ramgarh
- Functioning of the Proposed Ramgarh Port in Khagrachhari
- Sitakunda/ Mirsharai Port (CPA)
- Bay Container Terminal (CPA)
- Construction of double line between Laksham-Chinki Ashtana, Mirsharai
- Modernization of 11 station's signaling system in between Chinki Astana, Mirsharai-Chittagong

These project interventions have been marked and linked with the proposed tentative road network for the Mirsharai Upazila in the Figure 2-20.

2.3.1 Additional Data Requirement

The additional data requirements are highlighted in Chapter 7 and the data will be collected through survey and from meetings with the stakeholders. Chapter 7 outlines in detail the data collection methodologies to be followed in this Project.

Figure 2-20: Government's Projects and Consultant's Proposed Tentative Road Network

3 TRAFFIC SURVEYS

The objectives of the traffic survey are two folds. *Firstly*, it provides idea about the existing traffic demand available supply in the form of infrastructure and services. *Secondly*, it acts as the input for the travel demand forecasting model that is to be constructed as the output of the project which will enable UDD to analyze various traffic scenarios with respect to changed network as well as land use scenarios. The following sub sections elaborate the survey requirements along with the survey design. Figure 3.1 illustrates how these data will eventually be used to develop a travel demand forecasting model.

3.1 Survey Requirement and Types

According to the TOR, the consultant team will be responsible to construct a 20-year prediction model for transportation of the project area. A simple four-step travel demand-forecasting model will be constructed with the survey data that will determine the travel demand on the future road network of Mirsharai Upazila.

To estimate the future traffic demand on the future road network of Mirsharai the following surveys will be conducted:

RECONNAISSANCE SURVEY

Reconnaissance Survey is required for understanding the condition of the existing road network (including road condition assessment), identification of the relevant stakeholders and the tentative traffic survey locations.

PRODUCTION-ATTRACTION SURVEY

This will comprise production from the households' daily trips survey and attraction to the commercial land use and will contribute to the trip generation.

TRAFFIC COUNT SURVEY

The traffic count reflects the base year demand in terms of categorized traffic volume.

ORIGIN-DESTINATION (OD) SURVEY

The OD facilitates identifying final Traffic Assessment Zones (TAZ), demand for different external and internal zones, as well as directional distribution at different intersections.

TRAVEL TIME SURVEY

The travel time study produces the generalized travel cost matrix and determines the shortest routes for different OD pairs.

STAKEHOLDER INTERVIEW

The stakeholder interviews involves stakeholders from different concerned entities, the community truck, bus and UCMs, assisting in identifying the transportation modes and the users of the proposed road network. This will enable in designing future transportation network as well as services around this network which can be constructed, operated and maintained sustainably.

These surveys will input in different steps of the travel demand model in the following manner:

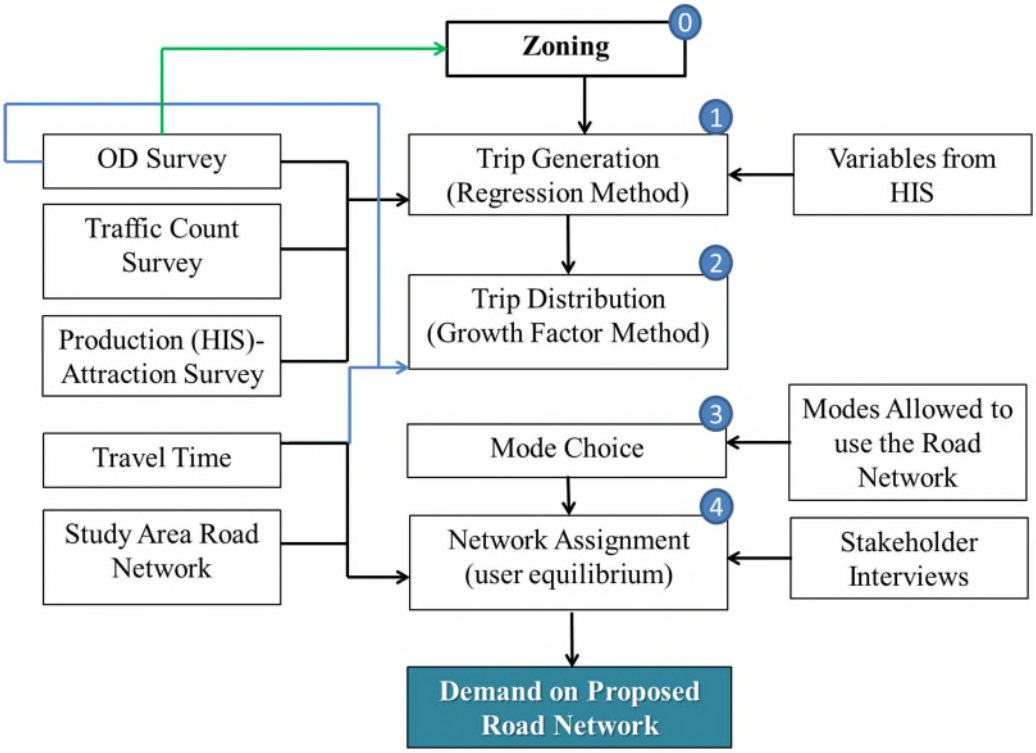


Figure 3-1: Flow Chart of Steps of Travel Demand Forecasting

3.2 Methodology of the Surveys

The methodology adopted for the surveys to be conducted are characterized by the properties of the existing roads and traffic, and will be as follows:

3.2.1 Reconnaissance Survey

As a specific requirement of the TOR, the consultants are to pay a thorough visit to the project area covering, if not all, the critical locations of the existing transport network. In addition, the experts are to discuss major issues and field constraints with the local people and their elected representatives in cooperation with the field staff of UDD. The reconnaissance also resulted in consultation meetings with local stakeholders and finding out important aspects of the existing scenario from the transportation point of view, incorporated in the future transport network to be proposed.

In this connection, the consultants arranged for a two-day reconnaissance field visit to Mirsharai on November 24, 2017 (vide our memo no. URI-UI-53-4972).

The project involves several survey activities, such as, assessing the road condition, collection of traffic volume, investigation of major intersections, major OD pairs, operational speed of the roads, public transport availability, etc. For each survey, the suitable location of survey along with resource requirements to conduct the survey were estimated during the reconnaissance survey. Opportunities to involve local people was also considered to increase the quality of survey. The field visit also identified major stakeholders– both institutes/ organizations and individuals. Relevant data and available maps collected during performing the task of reviewing available data are validated and updated accordingly during the reconnaissance. A work checklist that was prepared before going to the field is as follows:

Works Checklist:

- ✓ Inspection of Major Intersections and Growth Centers along the highway and internals
- ✓ Cross checking maps of existing road network with the present condition (up to Upazila level) collected from LGED, dated 2011;
- ✓ Road Condition Assessment (visual assessment, photo/ video recording, discussion with LGED Upazila office/ RHD Sub-division)
- ✓ Sample cross-referencing of collected demographic data with actual condition
- ✓ Assessment of existing Traffic Volume in different routes
- ✓ Identification of public/ para-transit routes
- ✓ Preliminarily identify probably traffic (Fix up survey points)
- ✓ Identification and Discussion with Primary Stakeholders (as available at site)
- ✓ Video filming of important routes having potential to improve
- ✓ Identification of existing bottlenecks and speculate problems that might arise with the increasing traffic from the EZ activities
- ✓ Discuss with local representatives and the UDD officials to identify possible solutions to existing problems
- ✓ Gather up all necessary information to furnish an integrated road network

The findings and assessment of the existing transportation scenario as understood from the field visit are elaborately discussed in **Chapter- 0**.

For better understanding the project area the survey team visited some places of Mirsharai upazila. The places include some intersections, bazars and growth centers. The following table gives the list of the visited places.

Table 3.1: Places visited during reconnaissance survey

Intersection	Growth center	Bazar	Tourist Spot
Baraiyerhat	Santir Hat	Abu Torab Bazar	Mohamaya Lake
Zorawargonj	Abur Hat	Azampur Hat	Khoyachhara Waterfalls
Chitanner	Baman Sunder Hat	Bishu Mia Bazar	
Mithachara	Mirsharai Hat	Haidkandi Bazar	
Mirsharai	Hadi Fakir Hat	Domdoma Bazar	
Bara Takiya Bazar	Bhorer Bazar (Shaherkhali)	Mithanala Bazar	
Sarkarhat		Sufia Bazar	
		Zorawargonj Bazar	
		Muhurighat Bazar	

The following figure shows the visited locations (marked by black circle).

Figure 3-2: Locations visited during reconnaissance survey

Some photographs showing parts of the overall reconnaissance visit of the project area are as follows:

Project office of UDD in Mirsharai

Baraiyar hat intersection (N1), one of the busiest

Chitanner hat intersection

Mithachara intersection on Dhaka-Chittagong highway

Mirsharai intersection on the highway

Fatikchhari road (Z1021) from Mirsharai intersection

Sarkar hat on Dhaka-Chittagong Highway

Shantir hat growth center, Mirsharai

Hadi Fakir hat growth center, Mirsharai

Access road to Mohamaya Lake

Mohamaya Lake, Mirsharai

Way to Khoiyachora waterfalls, Mirsharai

Survey team on the way to Khoiyachora waterfalls

Khoiyachora waterfalls, Mirsharai

Site visit to Mirsharai Economic Zone

New Embankment Road within the EZ site

Future residential zone of Economic Zone, Mirsharai (Phase-1)

3.2.2 Production (Household Survey)

Production Survey was done by the interview on households. The interviews concentrated on the daily trip behavior- average travel time, mode choice behavior, cost of travel, time of travel, route choice, purpose including the basic socio-economic information such as no. of family members, age, gender, income level etc.

For production/ household survey, the Mirsharai Upazila was divided into sixteen (16) zones based on administrative boundaries (Union Boundary). The Figure 3-3 represents the Zone boundary of Mirsharai Upazila.

Sixteen (16) surveyors along with supervisors and coordinators were assigned in Eight (8) teams (2 persons in each team) to collect the data. A coordinator executed the survey in different zones and the supervisor was in charge of overall qualitative monitoring and troubleshooting. The targeted sample size for each zone was maximum 45 households with at least 30 nos. from each union. The duration of survey was 5 days (April 8th to April 12th, 2018).

In this study, an aggregated modelling approach is adopted where data for each zone will be compiled for each variable and then one record for each zone will be used as input to the model. *Hence, 30 samples per zone were considered to be sufficient. These households were chosen randomly in each zone to comply with the modelling methodological requirements. The data will be particularly important for developing trip generation models using* ***regression method*** *where the 30 samples of each zone will be aggregated into one data point, i.e., in total 16 data point for the 16 internal zones, to develop the regression model. Due to this aggregation, following the central limit theorem of statistics, 30 random samples per zone is expected to be sufficient*. However, surveyors were instructed to follow the below criteria to select the households:

	HHS	Income Category		
		15,000 or below	15,000 – 30,000	30,000 or above
Maximum 45 samples in each Zone	3 or below	5	5	5
	4-5	5	5	5
	Above 5	5	5	5

Surveyors were instructed to collect data from these three income categories households and three types of household size. The variables that were *selected: Number of members, Gender, Age, Income level, Educational institution, Vehicle ownership, Origin, Destination, Start time, End time, Purpose, Mode, Cost and Routes. Total* ***480+ sample*** *household data were collected from the survey.* The zones are as following:

- Zone 1: Karerhat
- Zone 2: Hinguli
- Zone 3: Dhum
- Zone 4: Zorawargonj
- Zone 5: Osmanpur
- Zone 6: Durgapur
- Zone 7: Katachhara
- Zone 8: Ichhakhali
- Zone 9: Mirsharai
- Zone 10: Mithanala
- Zone 11: Shaherkhali
- Zone 12: Maghadia
- Zone 13: Khaiyachhara
- Zone 14: Mayani
- Zone 15: Wahedpur
- Zone 16: Haitkandi

The spatial distribution of households are shown in the map below figure:

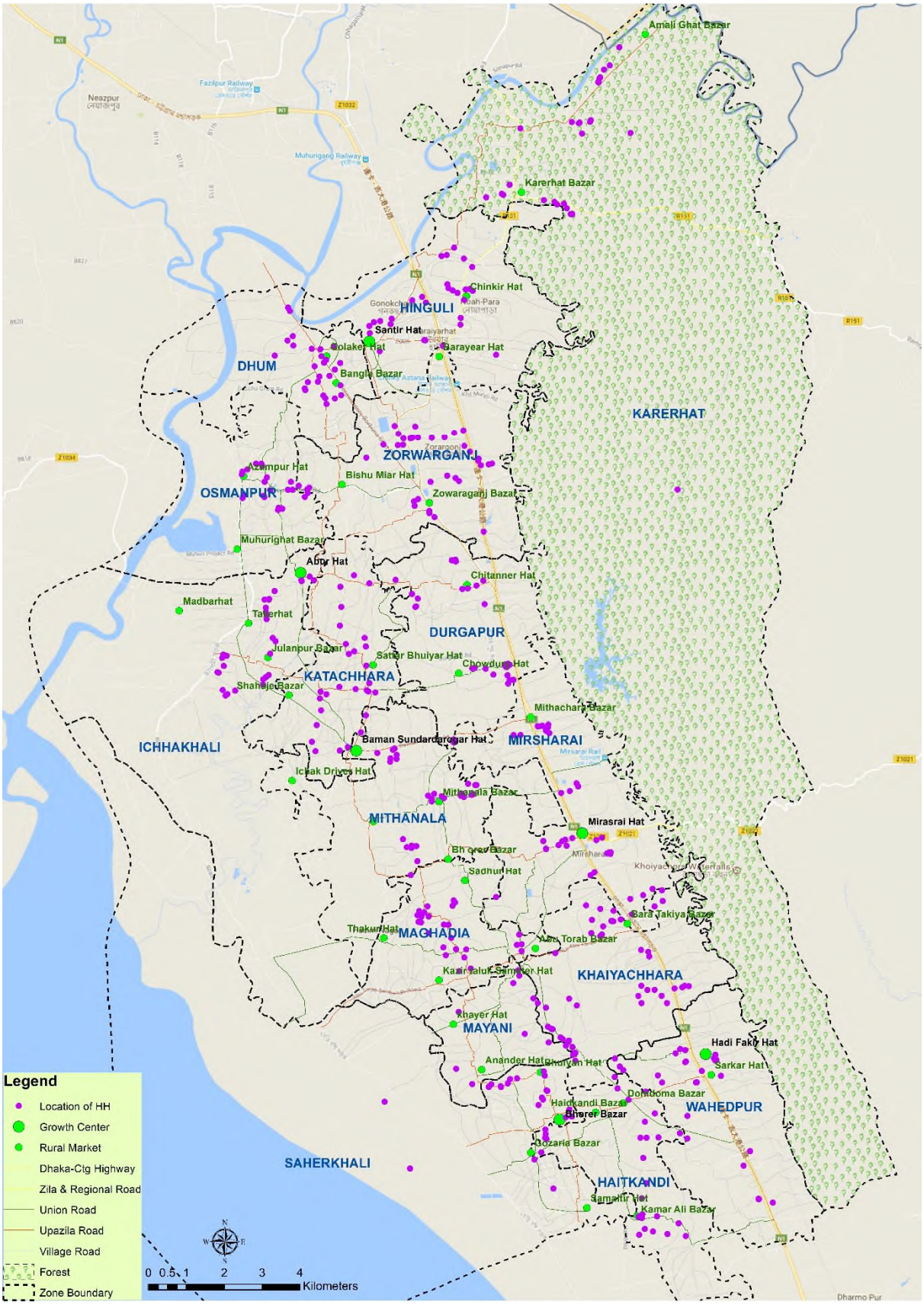


Figure 3-3: Zone boundaries and household locations

Some pictures of household survey have been represented in the following:

Household survey in Karerhat (Zone- 1)

Household survey in Hinguli (Zone- 2)

Household survey in Dhum (Zone- 3)

Household survey in Zorawargonj (Zone- 4)

Household survey in Osmanpur (Zone- 5)

Household survey in Durgapur (Zone- 6)

Household survey in Katachhara (Zone- 7)

Household survey in Ichhakhali (Zone- 8)

Household survey in Mirsharai (Zone- 9)

Household survey in Mithanala (Zone- 10)

Household survey in Shaherkhali (Zone- 11)

Household survey in Maghadia (Zone- 12)

Household survey in Khaiyachhara (Zone- 13)

Household survey in Mayani (Zone- 14)

Household survey in Wahedpur (Zone- 15)

Household survey in Haitkandi (Zone- 16)

3.2.3 Attraction Survey

Attraction Survey was carried out focusing on the commercial activities within the Mirsharai Upazila. For this survey six major growth centers and two Paurashavas were taken into consideration because most of the facilities are located in these places. Figure 3-4 shows the location of growth centers. The locations are:

Growth centers	**Paurashava**
Shantir Hat	Mirsharai
Abur Hat	Baraiyarhat
Baman Sundardarogar Hat	
Mirsharai Hat	
Hadi fakir Market	
Shaherkhali Bhorer Bazar	

Growth Centers (GC) are those areas where maximum economic growth in a certain region is expected. For Mirsharai, it is also assumed that most economic activities in present scenario take place in the major growth centers. In addition, it can be considered that the other markets will also develop to be of the same attributes as those of the existing GCs with overall development of the study area. From the reconnaissance, it was seen, on the other hand, that the two municipalities have the largest urbanized area. *The fundamental of transportation planning is based on the idea to provide enough facilities to address the worst possible traffic scenario.* The reconnaissance survey confirmed that highest traffic are attracted by these two locations (Mirsharai and Baraiyarhat Pourashavas). Hence, assuming that other bazars do not attract more traffic than the major GCs and the Municipalities, only the above-listed sites were surveyed for attraction of traffic.

The tourist spots were not surveyed for attraction of trips because most locations except the Mohamaya Lake site, are not yet developed and has limited facilities. Moreover, from the reconnaissance survey in the parking area and discussion with the representatives of the lake authority, it was found that *70-80 tourist vehicles (especially buses) on an average come to Mohamaya during the tourist season*. Therefore, the facilities will have to be designed based on this.

Seven type of facilities were considered to be surveyed: i) Bazar, ii) Government Office, iii) Private Office, iv) Shopping Center, v) Shops, vi) Hospital and vii) Educational Institutions. In case of facilities except the educational institutions the following variable were considered: Type of facility, Mode, Occupancy, and Arrival time. Surveyors were instructed to collect data from these facilities by spending at least an hour at each facilities and covered as much as facilities they can. For educational institutions information was collected from students on: *Origin (when they are coming to school), Destination (when they are going back), Mode, Start time from home, End time, and, Cost of travelling*. Surveyors were instructed to take maximum ten (10) students in each institution randomly to collect information about their travel behavior. Total Two (2) surveyors were assigned for Four (4) days for the survey.

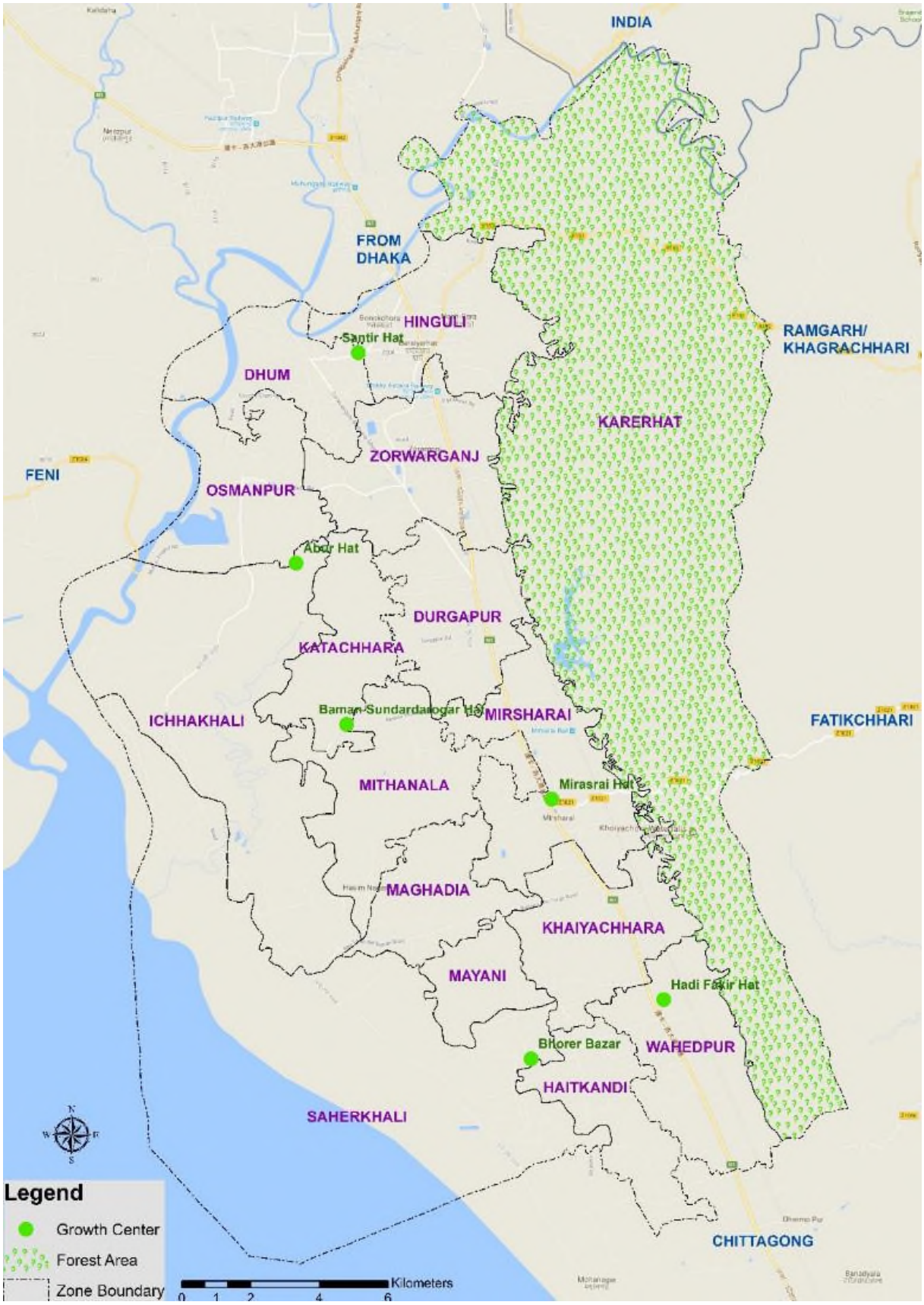


Figure 3-4: Zone boundary and location of growth centres in Mirsharai Upazila

3.2.4 Traffic Count Survey

To understand the base-year traffic volume of the study area it is necessary to execute traffic count surveys. However, the traffic from the proposed Economic Zones cannot be found from site until it starts operation. Again, no traffic data is available yet from the EZ authorities because of the incomplete Master Plan. In interviews with BEZA and BEPZA, the concerned officials suggested that the Mirsharai EZ traffic could be predicted from the traffic of a similar EZ/ EPZ, which is fully operational at present. In addition, it is their presumption that the Mirsharai EPZ (BEPZA industrial zone) will have 3 times the traffic of Dhaka EPZ in the next 25 years' period. Moreover, that of the entire EZ in this period will be 7 to 8 times the DEPZ traffic. Therefore, to forecast the traffic volume to be generated from Mirsharai including the present traffic, a survey needed to be conducted at the DEPZ area in Ashulia, Dhaka.

This led consultant to divide the count survey into two parts; (i) Traffic Count (Video Filming method) in Mirsharai; and (ii) Traffic Count (Video Filming method) in Dhaka EPZ.

3.2.4.1 Traffic count survey in Mirsharai

Ten (10) locations (as shown in **Figure 3-5**) were selected among which four were external where traffic enters and exists Mirsharai from different locations of the country and other six locations were internal; where traffic moves within the Upazila. Below is the list of the Survey Locations within the study area:

List of Survey Stations	Co-Ordinate (Latitude, Longitude)
Station- 01: Baraiyarhat Foot overbridge (Dhk-Ctg Highway)	22.894548°, 91.534453°
Station- 02: Baraiyarhat Rail Crossing (Karerhat Road)	22.894581°, 91.535435°
Station- 03: Shantir Hat Road (Near Janata Super Market)	22.895097°, 91.534000°
Station- 04: Muhuri Project Road	22.860102°, 91.529442°
Station- 05: Thakur Dighi Bazar	22.817682°, 91.553414°
Station- 06: Mirsharai Stadium (Fatikchhari Road)	22.777299°, 91.573601°
Station- 07: Mirsharai Paurashava (Upazila Road)	22.775977°, 91.568448°
Station- 08: Bara Takiya Bazar (EZ/ Abu Torab Bazar Road)	22.755171°, 91.586168°
Station- 09: Sarkar Hat (near Nizampur College)	22.720135°, 91.602477°
Station- 10: Boro Darogar Hat (Dhk-Ctg Highway)	22.681730°, 91.624558°

External traffic count was executed at the entry-exit points of Mirsharai Upazila and was located on the roads providing national/ regional connectivity. On the other hand internal traffic count was done near major intersections within the study area. The Consultant team conducted the count survey by ***"Video Recording Method"*** using ***"EKEN 4K H9R"*** camera and for power back up used ***"Apollo 650VA" UPS***. The following pictures show the equipment used in Count Survey.

UPS for continuous battery backup

4K ultra HD wide angle camera

Camera setup on tripod with battery backup at Shantir Hat

The consultant conducted count survey for more than 8 hours in external locations and more than 2 hours in some internal locations capturing the evolution of the peaks. The peak hours were defined from the reconnaissance survey and by consulting the local people. The model to be developed is to be sufficient to handle the peak hour traffic. Hence, any other time of the day when the traffic demand will be lower will not be of much concern.

Vehicles were categorized based on RHD standard and the consultant's observation. The Table 3.2 represents the vehicle categories. It is to be noted that the internal routes lack private vehicles and large vehicles such as Bus, Trucks, Lorries and had mainly unconventional modes/ para transit vehicles, NMVs etc. populating the roads.

Table 3.2: Vehicle Categories Used for Traffic Counts

Major category	Category No.	Sub category
Motorized Vehicles	1	Trailer (6-axle or 3S-2 tractor-trailer combo, 15-25 tons)
	2	Large/Heavy Truck (single unit straight truck, 2-3 axles, GVW 7+ tons)
	3	Medium Truck with at least 2 axles (2 axles, 5>7 tons, single unit vehicle)
	4	Small Truck (4-wheels)
	5	Large Bus (>31 seat capacity including driver)
	6	Minibus, Coaster (up to 31 passenger capacity)
	7	Microbus (up to 10 passenger capacity)
	8	Pick Up, Jeep, Converted Jeep, SUV
	9	Sedan Car (2 axles, for carrying passengers)
	10	Auto Rickshaw (Maxi/Tempo/Easy Bike/Leguna)/ CNG
	11	Motorcycle
Non-Motorized Vehicles (NMV)	12	Bicycle
	13	Cycle Rickshaw
	14	Animal/Push Cart/ Van

Traffic Count Survey was conducted through the 4 days. Table 3.3 presents survey locations and survey dates.

Table 3.3: Traffic count survey locations and survey dates

Date & Day	Location of Survey	Survey Station Type	Duration	Time
08.01.2018 (Monday)	1. Mirsharai Stadium (Fatikchhari Road)	External	11 hrs	9:00 am- 4:00 pm and 6:00 pm- 9:00 pm
	2. Mirsharai Paurashava (Upazila Road)	Internal	2 hrs	9:00 am- 11:00 am
	3. Boro Takiya Bazar (EZ/ Abu Torab Bazar Road)	Internal	2 hrs	3:00 pm- 5:00 pm
09.01.2018 (Tuesday)	1. Boro Darogar Hat (Dhk-Ctg Highway)	External	9 hrs	9:00 am- 6:00 pm
	2. Sarkar Hat (near Nizampur College)	Internal	2 hrs	9:00 am- 11:00 am
10.01.2018 (Wednesday)	1. Muhuri Project Road	Internal	6 hrs	3:00 pm- 9:00 pm
	2. Thakur Dighi Bazar	Internal	2 hrs	9:00 am- 11:00 am
11.01.2018 (Thrusday)	1. Baraiyarhat Foot overbridge (Dhk-Ctg Highway)	External	10 hrs	10:00 am- 8:00 pm
	2. Baraiyarhat Rail Crossing (Karerhat Road)	External	11 hrs & 20 min	10:00 am- 9:20 pm
	3. Shantir Hat Road (Near Janata Super Market)	Internal	6 hrs	3:00 pm- 9:00 pm

Consultant team showing UDD official how Video Filming is done, in Mirsharai Stadium Site

Surveyor Operating Camera at Baraiyarhat

Surveyor Operating Camera at Baraiyarhat

Survey team with traffic control officials

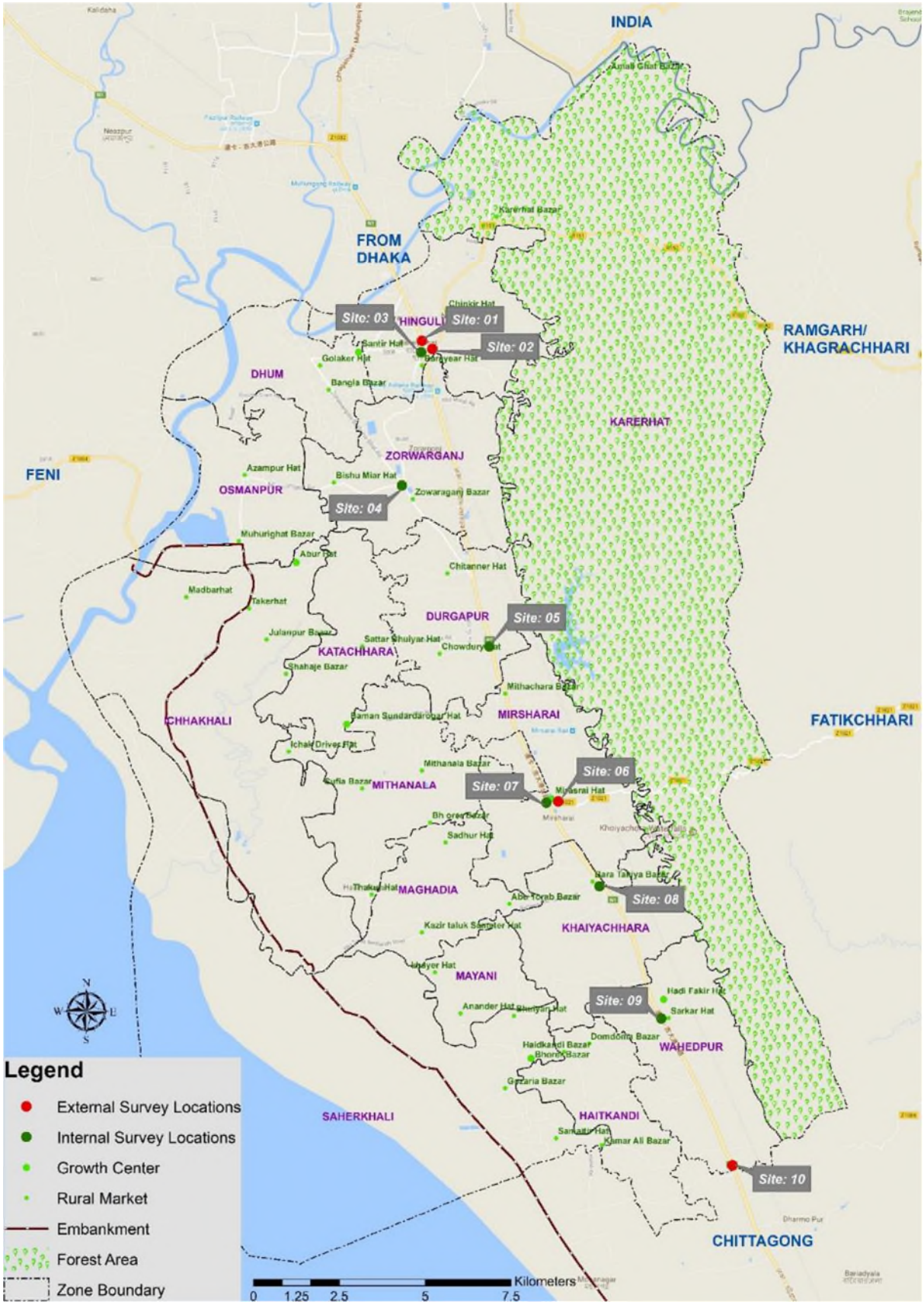


Figure 3-5: Vehicle Count and OD Survey Locations

3.2.4.2 Traffic count survey in Dhaka EPZ

To predict the traffic generated from the proposed economic zone, this vehicle count survey was conducted at the Dhaka EPZ entrance and exit points. The count was done by video recording for 16 hours except for the pocket pedestrian access gates with specific hours of opening. The survey was initiated followed by discussion and necessary approval from UDD & BEPZA HQ.

Figure 3-6: Survey locations in Dhaka EPZ

The survey included both Vehicle and Pedestrian counts using video filming method. Similar equipment as in the count survey in Mirsharai were used for the purpose. The daylong survey was conducted on Sunday, May 20, 2018 during the month of Ramadan when shifting hours were slightly different from the regular ones. However, as the objective was to identify the peak vehicle as well as pedestrian in/out flow, it is safe to expect that the changed schedule only shifted the peaks rather than having impact on the total volume of the peak demand.

Vehicle and pedestrian movement at main gate in Dhaka EPZ Extension

Pedestrian movement at pocket gate in Dhaka EPZ Extension

Vehicle and pedestrian movement at main gate in Dhaka EPZ

Vehicle and pedestrian movement at main gate in Dhaka EPZ

Pedestrian movement at pocket gate in Dhaka EPZ

3.2.5 Origin-Destination (OD) Survey

In a transportation model development, it is necessary to know the exact origin and destination of the trips and group these trips with reference to the zones of their origin and destination. Origin is the place where trip begins and destination is the place where trip ends. In this survey, two types of OD survey were conducted: (i) Road side OD and (ii) Household OD.

3.2.5.1 Road side OD Survey

Text books recommend that in case of the External OD Survey, the data is to be collected stopping every 10th vehicle of each category which will enable the modeler to have access to information on 10% of the flow data. However, considering the large volume and speed of traffic on national and regional highways, the consulting team understands that it may not be possible to stop more than 5% of the traffic on busy Dhaka-Chittagong highway. However, 10% sample size may be achieved for the regional highways, such as, R151 (Baraiyerhat-Karerhat-Heako-Narayanhat-Fatikchhari (Haidchokia) Road) and Z1021 (Mirsarai-Fatikchhari (Narayanhat) Road). So consulted team was tried to achieve information on at least 5% of the flow data at external locations. On the other hand, it was noticed during the reconnaissance survey that the internal count sites mostly have CNGs and other unconventional modes of transport along with NMVs and motorcycles. So consultant team tried to interview 10% of the passing traffic at internal locations

For the purpose of the project, *External and Internal OD Surveys* were undertaken at the same survey stations as that of the *External and Internal Traffic Count Surveys* (**Figure 3-5**). The information that was collected from the OD survey were: origin and destination, time of the day when the journeys are made, trip purpose and mode of travel and occupancy of the vehicle. Vehicle categories for the surveys were matching with the count study and the study duration was the same as the count data collection study. Total six (6) number of enumerators were involved in conducting the survey for 4 days.

The enumerators asked the driver of the vehicle to mention where they were coming from and their destination. The enumerators ensured that the locations are well-known later to be identified in a map. If not, then the enumerators asked further questions to identify the district and sub-district name. In case of external OD survey, the surveyors themselves did not stop any vehicles. The representatives of traffic control division were requested to stop every 10th vehicle of each class and request them to park at the road side so that the enumerators can collect data. Finally, another officer guided the vehicles to merge into the mainline vehicle stream safely after the data collection was over. Buses were excluded from the interview as their OD could easily be identified by taking pictures of their windshields containing information about their trip ends. For internal OD survey, surveyors stopped as many as vehicles possible to collect data with the help of police or lineman. The below diagram shows the OD survey setup.

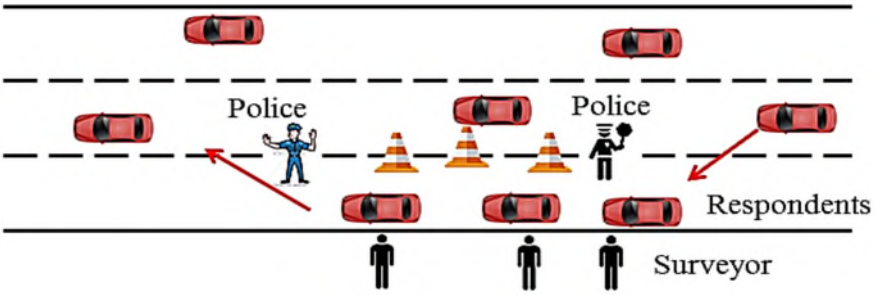


Figure 3-7: Roadside O-D Survey Setup

The following pictures represents ongoing OD survey at different survey locations

OD survey at Baraiyarhat Rail Crossing Site

OD survey at Bara Darogar Hat

OD survey at Boro Takiya Bazar

OD survey at Shantir Hat

3.2.5.2 Household OD Survey

The household OD survey was done simultaneously along with the Household Interview Survey in the same questionnaire. The Origin and Destinations were obtained from their trip details along with the purpose and mode of the trips made.

3.2.6 Travel Time Survey

Seven (7) major routes were selected for Travel Time Survey and survey was conducted following the 'Average car technique'; where vehicles (typically a commonly available sedan car) having PCU value equal to 1, are driven through the traffic stream at average speed and travel time for each link of each route are calculated. The following steps were followed during the survey:

The steps followed were as follows:

- For each route, each day one passenger car was dispatched from one end of the route at specified time.
- Driver was instructed to drive at the speed of the average traffic stream.
- Each route was divided into nodes (nodes may be intersection or specific landmarks) and links (section between two intersections or landmarks), or only route was considered to find out continues travel time depending on the circumstances.
- Driver was presented with printed sheets containing the names of the nodes and instructed to note down the time 'after' crossing each node/note down the time traveling the entire route.
- Driver was also instructed to ensure that he did not make any stops while traversing a route. All stops for re-fueling, refreshment, etc. were performed after the driver had been reached one end.

Special arrangements were made with gas stations to ensure that the vehicles did not have to queue to refuel.

- Each route was covered once (working days only).

The Travel time survey routes with nodes and links were:

Route 1: Janata super market-Santir Hat-Golaker Hat-Bishu Miar Hat-Abur Hat-Sattar Bhuiyar Hat-Baman Sundardarogar Hat GC-Sufia Bazar-Kazir Taluk Sameter Hat-Khayer Hat-Anander Hat-Bhuiyan Hat-Shaherkhali Bhorer Bazar GC-Haidkandi Bazar-Kamar Ali Bazar-Boro Daragar Hat

Route 2: Maulabhi Bazar-Osmanpur road-Azampur Hat-Muhurighat Bazar-BEZA Embankment

Route 3: Intersection of Zorawargonj-Borburia ghat road and Muhuri project road (M. Rahman Store)-Bishu Miar Hat-Azampur Hat

Route 4: Thakur Dighi Bazar-Chowdhuri Hat-Julanpur Bazar-Takerhat-Muhurighat Bazar-BEZA Embankment

Route 5: Mirsharai Paurashava HQ-Mithanala Bhorer Bazar-Sufia Bazar-Baman Sundardarogar Hat GC-Shahaje Bazar-Julanpur Bazar-Takerhat Bazar

Route 6: Bara Takiya Bazar-Abu Torab Bazar-Kazir Taluk Sameter Hat-BEZA Embankment

Route 7: Sarkar Hat-Domdoma Bazar-Haidkandi Bazar-Shaherkhali Bhorer Bazar Growth Center-BEZA Embankment

The table below lists the routes and survey dates and Figure 3-8 shows the routes selected for survey.

Table 3.4: Travel Time Survey Routes and Date

Route Name	Survey Dates
Route 1: Janata super market to Boro Daragar Hat via Baman Sundardarogar Hat GC and Haidkandi Bazar	12 January, 2018
Route 2: Maulabhi bazar to BEZA embankment via Azampur hat	12 January, 2018
Route 3: Zorawargonj intersection to Azampur hat via Bishu Miar hat	07 January, 2018
Route 4: Thakur dighi bazar to BEZA embankment via Muhurighat bazar	10 January, 2018
Route 5: Mirsharai Paurashava HQ to Takerhat bazar via julanpur bazar	10 January, 2018
Route 6: Bara Takiya bazar to BEZA embankment via Abu Torab bazar	09 January, 2018
Route 7: Sarkar hat to BEZA embankment via Haidkandi bazar	09 January, 2018

The following pictures show some landmark of different travel time routes and surrounding land uses.

Abu Torab Road

Taker Hat Road

Kamar Ali Bazar

Shaherkhali Bhorer Bazar

Sufia Bazar

Baman Sundardarogar Hat

Abur Hat

Bishu Miar Hat

Figure 3-8: Travel time survey routes

3.2.7 Stakeholder Interviews

From the preliminary reconnaissance survey and frequent discussions with the Client and locals, it was apparent that the following stakeholders are required to be consulted to prepare an acceptable sustainable transportation system for Mirsharai. Apart from UDD, the client, the name of the stakeholder organization, name of the concerned person and the meeting date; are listed below:

Sl.	Stakeholder Organization	Name & Designation of the Representative	Date of Meeting/ Interview
1	USAM (University Students Association of Mirsarai)	Md. Nahid Mahamood, Co-founder	November 25, 2017
2	Mirsharai Pourashava	Md. Gias Uddin, Hon. Mayor	November 25, 2017
3	Mohamaya Eco Park Authorities	Md. Gholam Kabir, Forest Beat Officer, Forest Department Tour Operator, Mohamaya Eco Park Representatives of BWDB	November 26, 2017
4	Baroiyar Hat Pourashava	Mr. Foyz Ahmed, Secretary to Mayor	November 26, 2017
5	Local People of Mirsharai (Tea Stall Meetings)	Individuals/ groups at different locations, Mirsharai	November 25-26, 2017
6	Baraiyarhat Pourashava	Md. Nizam Uddin, Hon. Mayor, Mr. Foyz Ahmed, Secretary to Mayor	January 10, 2018
7	Local People of Mirsharai (Tea Stall Meetings)	Individuals/ groups at different locations, Mirsharai	Jan 06, 2018 to Jan 12, 2018
8	BEPZA	Md. Hafizur Rahman, G.M (MIS) and Project Director (NARI)	March 11, 2018
9	BEZA	Md. Abdul Quader Khan, Consultant (BEZA)	March 21, 2018

Baraiyar hat Paurashava

Consultation with Mr. Foyz Ahmed, Secretary to Mayor, Baraiyarhat Paurashava

Consultation with Paurasha Mayors: Mirsharai Paurashava on the left, Baraiyarhat Paurashava on the right

Consultation with Mr. Golam Kabir, of Forest Department

Discussion with a local people

4 ANALYSIS AND RESULTS

4.1 Reconnaissance Survey

The reconnaissance survey covered 7 major intersections, 6 growth centers and several large/ small bazars within the Mirsharai Upazila. Most of the major intersection are located along the Dhaka-Chittagong Highway (N1), which needs expert attention for future development since the access roads to the Economic Zones will mostly connect with the highway and some will cross over further East towards Khagrachhari. As for now, the roads connecting to these intersections are mostly LGED Upazila roads having narrow opening, except for the Baroiyar Hat intersection where there are 3 important roads those connect to it (an Upazila road towards Shantir hat, the old section of the highway N1 and the regional road towards Ramgarh, Khagrachari). The RHD regional road is critical because it goes across the rail track and directly connects the Land Port in Ramgarh and is proposed for widening and improvement. Again, the N1 old section is one of the proposed access roads to the EZ. These issues make this intersection the most important of all. Another important intersection on the road network is the Bar Takia Bazar because it will be the intersection of the under construction access road of the EZ (and the only one at present) with the National Highway. However, the alignment passes through 3 growth centers and is likely to suffer traffic congestion.

Of the other growth centers, Abur Hat is critical because it is very close to the EZ Phase 1 site and the Muhuri Project of BWDB; and an access road can be proposed across it having the shortest distance to the highway. The other growth centers are built up in an unplanned manner and are located in different locations throughout the Upazila. The roads connecting these growth centers are narrow LGED roads and the present modes of transport are mainly para transits like auto-rickshaw (CNG), cycle rickshaw, cycle van etc.

Another important aspect of the existing road network is the RHD embankment road along the EZ and EPZ sites which is also a part of the Marine Drive road. Although widening may require in future, this road will be one of the most important roads for the economic zones connecting its different parts, the new residential area (modern industrial city) and connecting EZs with the national road network.

Therefore, the findings of the reconnaissance survey can be categorized in the following manner:

- Major Intersections
- Major Growth Centers
- Major Bazars/ Rural Markets
- Major Tourist Spots
- Public Transport Assessment

The observations made from the survey are described in the following tables:

Major Intersections:

Intersections	Union/ Paurashava	Road Connectivity	Road condition	Vehicle	Major Activity	Possibility to widen	Remarks
Baraiyerhat	Baraiyerhat Paurashava	• Santir hat road (upazila road) intersects N1: T-type intersection • Old Dhaka-Chittagong Road intersects N1 • Regional Highway (R151 toward Raamgarh) intersects N1 • R151 and Old Dhaka-Chittagong create *Four leg Intersection*	• Upazila road is Pucca. Width of upazila road is 16 to 18 feet. • Regional road is narrow not more than 18 feet. • Both sides of every road are encroached by different activities • On street illegal parking • There are bus, truck and auto rickshaw parking stands.	• In upazila road auto rickshaw and non-motorized vehicles comprise of major transport • In regional road leguna, auto rickshaw and non-motorized vehicles are major.	• Commercial activities • Stationary shops, bazar. • Educational institutions (school, college, madrasha) • Hospitals etc.	• Widening is possible but there are many permanent structures which may create problem while widening the road.	• Foot over bridge connects both sides of the N1 road • Santir hat road connects the Santir hat Growth Center (GC) with N1.
Zorawargonj	Zorawargonj Union	• Two roads connect the old Dhaka-Ctg Hiwhway - Muhuri project road (union road) - Zorawargonj-Bangla bazar-Santir hat GC road (upazila road) • *T-type intersection*	• Both upazila and union roads are pucca • Road with 15 to 17 feet	• Auto rickshaw and non-motorized vehicles are major.	• Educational institutions • Commercial activities	• Widening is possible.	• Muhuri project road is directly connected to the embankment road which access Zila road Z1034 leading to Feni.
Chitanner	Durgapur Union	• Old Dhaka-Ctg Hiwhway connects with N1 • Ahmed Kabir Chowdhury Road (Chaitanna hat-Abur hat) (upazila road) also connects with N1 • *T-type intersection*	• Upazila road is pucca • Width: 16 to 18 feet				
Mithachara	Mirsharai Union	• Mithachara-Bamon Sunder upazila road connects N1 • *T-type intersection*					• Upazila road directly connects the Baman Sunder GC.

Intersections	Union/ Paurashava	Road Connectivity	Road condition	Vehicle	Major Activity	Possibility to widen	Remarks
Mirsharai	Mirsharai Paurashava	• Upazila road (Court road) and Zila road connects with N1 • Zila road Z1021 connects the Fotikchhari upazila • *Four leg intersection*	• Upazila road is pucca • Width: 15 to 16 feet • Zila road (Z1021 is narrow • Road is encroached by hat, bazar and many illegal establishments	• Auto rickshaw and non-motorized vehicles are major modes in upazila and zila road	• Major Business center • Commercial activities on both sites of roads • Educational institutions	• Widening is possible	• Zila road Z1021 is main connecting road with the Fatikchhari Upazila
Bara Takiya Bazar	Khaiyachhara Union	• Abu Torab road (Upazila road) intersects the service road situated beside the N1 (Dhaka-Chittagong Highway). U-turn is needed from service road to access the N1 • *T-type intersection*	• Upazila road pucca • Widening of Abu Torab road is in progress • Vehicle parking beside the service road • Width: 16 to 18 feet	• Auto rickshaw and non-motorized vehicles are major in upazila road • Leguna, minibus tempo uses service road	• Educational institutions • Commercial activities	• Widening of Abu Torab Road to 100 feet is in progress	• Abu Torab road is the main access road of Economic Zone of Mirsharai which is now under construction by BEZA and BEPZA. • The road is now under the jurisdiction of RHD
Sarkarhat	Wahedpur Union	• Oli Ahammed Abdur Rahman Shaherkhali Rd. (Nizampur-Saherkhali-Bhorerbazar) connects N1 • *T-type intersection*	• Upazila road pucca • Width: 16 to 18 feet • Vehicle parking beside the service road		• Activities on both sides of road • Educational institutions • Commercial activities	• Widening is possible	• Upazila road leading to Bhorer bazar GC. • Foot over bridge connects both sides of roads.

Major Growth Centers:

Growth Centers	Union/ Paurashava	Road Connectivity	Road condition	Vehicle	Major Activity	Possibility to widen	Remarks
Santir Hat	Dhum Union	• Located beside the Shantir hat road • Upazila road	• Pucca road • With 16 to 18 feet	• Auto rickshaw (CNG) and non-motorized vehicles	• Bank, shops, commercial business, retail and wholesale markets etc.	• Widening is difficult at the entry point due to the presence of high number of permanent structures that have to be demolished otherwise	• Large scale GC
Abur Hat	Ichhakhali Union	• Located beside the Muhuri project road • Union road	• Road is pucca • Width: 16 to 18 feet		• Retail bazar, shops etc.	• Widening is possible	• This road already under the Muhuri Project • Abur Hat is Medium scale GC
Baman Sunder Hat	Katachhara Union	• Located in the three-leg intersected section of upazila road			• Retail and wholesale bazar, shops etc.		• Medium scale GC
Mirsharai Hat	Mirsharai Paurashava	• Located in the intersection of Mirsharai • Upazila road (Court road) and Zila road connects with N1 • Zila road Z1021 connects the Fotikchhari upazila • *Four leg intersection*	• Upazila road is pucca • Width: 15 to 16 feet • Zila road (Z1021 is narrow • Road is encroached by hat, bazar and many illegal establishments	• Auto rickshaw and non-motorized vehicles are major modes in upazila and zila road	• Major Business center • Commercial activities on both sites of roads • Educational institutions	• It is imparative to widen the upazila and zila road and oust the encroachment from the main highway	• Foot over bridge connects both sides • Bus stand, auto and truck stand • Large GC
Hadi Fakir Hat	Wahedpur Union	• Located along with the N1 • A union road also connects with the Growth center.	• Pucca union road • Width: 16 to 18 feet	• Auto rickshaw (CNG) and non-motorized	• Activities on both sides of road	• Union road is possible to wide	• Medium scale GC

Growth Centers	Union/ Paurashava	Road Connectivity	Road condition	Vehicle	Major Activity	Possibility to widen	Remarks
				vehicles on union road • Leguna, small pick up on highway	• Educational institution, mosque • Retail bazar, shops etc.		• Foot over bridge is needed to connect the both sides
Bhorer Bazar (Shaherkhali)	Shaherkhali Union	• Located in the three-leg intersection of upazila road	• Pucca and katcha road • Width: 16 to 18 feet	• Auto rickshaw (CNG) and non-motorized vehicles on union road • There is auto-stand	• Retail and wholesale business of vegetables • Small shops	• Katcha road is needed to be paved and made widen	• Small growth center

Major Bazars/ Rural Markets:

Bazar/Hat	Union/ Paurashava	Road Connectivity	Road condition	Vehicle	Major Activity	Remarks
Abu Torab Bazar	Maghadia Union	• Located along with Baratakiya-Abu Torab road	• Pucca road • Under widening progress	• Auto rickshaw (CNG) and non-motorized vehicles	• Large scale bazar • Wholesale and retail business • Many shops	• Abu Torab Road is the main access to EPZ
Azampur Hat	Osmanpur Union	• Located along with Muhuri project road	• Union road • Pucca • Width: 16 to 18 feet	• Auto rickshaw (CNG) and non-motorized vehicles	• Small bazar, shops.	
Muhurighat bazar	Osmanpur Union	• Located in the intersection Muhuri Project road and Sonagazi road (Z1034)	• Pucca road	• Truck in Zila road • Auto rickshaw (CNG) and non-motorized vehicles • Private car	• Shops, bazar etc.	• Muhuri project road connects the embankment road of BEZA's EPZ
Bishu Mia Bazar	Zorawargonj Union	• Located in intersection of Zorawargonj-Taker Hat union	• Pucca • 16 to 18 feet wide	• Auto rickshaw (CNG) and non-	• Small bazar	• Muhuri project road connects the bazar

Bazar/Hat	Union/ Paurashava	Road Connectivity	Road condition	Vehicle	Major Activity	Remarks
		road and Santir Hat-Abur Hat G.C upazila road		motorized vehicles		
Haidkandi Bazar	Haitkandi Union	• Along with Shaherkhali-Bhorer bazar GC road • Upazila road			• Small bazar • Educational institution	
Domdoma Bazar	Haitkandi Union					
Mithanala Bazar	Mithanala Union	• Along with Sufia-Mithanala Road • Union road	• Pucca • 15 to 17 feet		• Small katcha bazar and shops.	
Sufia Bazar	Mithanala Union	• Located three-leg intersection of upazila and union road	• Pucca and katcha • Width: 15 to 17 feet			
Zorawargonj Bazar	Zorawargonj Union	• Located along the N1	Survey team could not conduct a detailed reconnaissance during the first visit and plans to cover it comprehensively during the next visit.			

Major Tourist Spots:

There are several attractive places of touristic interest in Mirsharai upazila, such as, Mohamaya Chara Lake, Khoiyachora, Baghbiani, Napitachora, Sonaichora, Mithachora and Boyalia waterfalls. Among these places the survey team visited Mohamaya Lake and Khoiyachora waterfalls. **Error! Reference s ource not found.** and **Error! Reference source not found.** illustrate the location of Mohamaya Lake and Khoiyachora waterfalls along with their connecting roads and a brief introduction to these sites from accessibility point of view.

Figure 4-1: Mohamaya Lake, Mirsharai

Mohamaya Lake Location: Mirsharai Upazila

Road Connectivity:
- Mohamaya rubber dam road connects with N1
- Village road
- Rail crossing

Road condition:
- Some part of road is pucca and some is katcha
- Narrow road

Vehicle:
- Local people use CNG Rickshaw to visit the place or they visit the place by walking
- Tourist come to visit the place using bus or car

Possibility to widening: It is possible to widen the Mohamaya rubber dam road.

Figure 4-2: Khoyachhara Waterfalls, Mirsharai

Khoyachhara Waterfalls Location: Mirsharai Upazila

Road Connectivity:
- Khaiyachhara Waterfall road connects with N1
- This is a village road
- Rail crossing
- Walking trail

Road condition:
- Some part of road is pucca
- Most of the parts of road are katcha
- Narrow road

Vehicle:
- Mainly CNG, Rickshaw
- Private car can move in certain distance
- Walk

Possibility to widen: It is possible to widen Khoyachhara Waterfall road.

Public Transport Scenario:

The reconnaissance survey revealed that the conventional public transport services are only available in Mirsharai along the Dhaka-Chittagong highway. Within the Paurashava/Union/Village, unconventional modes of transport – mainly auto rickshaws, easy bikes and leguna serve as para transit. Rickshaws are also predominant just like throughout Bangladesh. Even along the Dhaka-Chittagong highways, along side conventional buses and mini-buses, a substantial number of leguna were seen in operation. However, their routes shorter in length (under 30 km) and covers the major business centers along the highway.

The survey team engaged into discussion with the on-duty local traffic police, the conductors and drivers of the unconventional modes of transport (UCM) both on the Dhaka-Chittagong highway and in the growth centers to understand their operational model. It was revealed that in most cases, the UCMs are operated through local unions informally. Therefore, in the geometric design of these roads, there are no provisions for their stoppage design. On the highways, they often share the space within

the bus layby with the conventional buses and mini-buses. In the local roads, they normally queue at the intersections. The informal union based organization dispatches these vehicles following the queue. Normally these UCMs within the union or pouroshobha operate between growth centers or connect the growth centers with the Dhaka-Chittagong highway.

4.2 Household Survey

Overview

The household survey represents the trip making behavior of each household including their demographic and social information. These insights will help calculate the **trip generation** in the first step of transport model. From the survey, the *modal share* and *purpose* of the trip will also be found which will help in understanding the existing scenario and in forecasting the future trip behavior of the people.

The consultant team conducted household interview survey in 16 zones namely, Karerhat, Hinguli, Dhum, Zorawargonj, Osmanpur, Durgapur, Katachhara, Ichhakhali, Mirsharai, Mithanala, Shaherkhali, Maghadia, Khaiyachhara, Mayani, Wahedpur and Haitkandi. Total 480+ number of households were surveyed throughout the Mirsharai Upazila having at least 30 samples from each zone.

For the ease of analysis, the consultant team categorized all purposes into five categories: Educational, Shopping (trips to bazar are also included), Work, Recreational and Others (personal, treatment etc.). Other than these category there is another category called Home Based Trip which includes all trips that destined to a household.

From the survey, it is observed that **on an average, 3.52 trips per household generate within the study area per day.** The table below represents the average trips of different purposes generated from each zone.

The detail trip information including household size, persons going educational institution, information of income level, information about vehicle ownership of each zone etc. has been attached in **Appendix B** in tabular format and maps.

In the following table below some of basic statistics of each zone has been represented.

Table 4.1: Basic statistics of each zone

Zone/Union	Population	No. of HH	No. of Households						Avg. Income (BDT)
			HHS Cat- 1	HHS Cat- 2	HHS Cat- 3	Income Cat- 1	Income Cat- 2	Income Cat- 3	
Karerhat	35467	7362	929	4360	2073	4236	2573	553	21567
Hinguli	34934	7089	783	3001	3305	3264	3001	825	24833
Dhum	22571	4619	447	2533	1639	1208	3086	326	27554
Zorawargonj	36182	7631	969	4603	2059	2544	4181	906	24103
Osmanpur	14645	3046	564	1354	1128	1354	1241	451	24000
Durgapur	26534	5520	381	3807	1332	3567	1357	596	25250
Katachhara	23596	4366	566	2426	1374	2421	1374	571	24500
Ichhakhali	27980	5205	961	2242	2002	2943	1762	500	27481
Mirsharai	22234	4333	427	2380	1526	1221	1922	1190	27748
Mithanala	23109	4445	265	2223	1958	1270	2011	1164	33828
Shaherkhali	16912	3049	346	1802	901	2531	491	28	22534
Maghadia	28812	6001	1355	2323	2323	3415	1839	747	19696
Khaiyachhara	23423	4879	552	2578	1749	1814	1749	1315	34100
Mayani	18285	3549	568	1845	1136	1384	1845	319	20867
Wahedpur	24981	4752	404	2325	2022	2010	2212	529	26750
Haitkandi	19051	3700	529	1903	1269	1353	1797	550	26500

By population and number of households, Zorwarganj and Karerhat are the two largest and Osmanpur and Shaherkhali are the smallest.

Findings by Trip Characteristics

Trip Purpose

The below table shows the total number of trips produced from each zone each day and the average number of trips produced from a household per day. Furthermore, it shows the share of trips by purposes.

Table 4.2: Trip Summary based on Purposes

Zone/ Union	Total No. of Trips per day	Avg. trips/ HH	Average Trips by Purpose					
			Work trips/ HH	Edu trips/ HH	Shopping trips/ HH	Recreational trips/ HH	Home Based trips/HH	Other trips/ HH
Karerhat	43989	**5.98**	16%	14%	13%	5%	45%	7%
Hinguli	19440	**2.74**	16%	30%	6%	0%	48%	0%
Dhum	15807	**3.42**	21%	20%	9%	0%	43%	7%
Zorawargonj	29959	**3.93**	17%	18%	7%	0%	41%	18%
Osmanpur	8052	**2.64**	20%	20%	0%	0%	40%	20%
Durgapur	27498	**4.98**	23%	21%	6%	0%	50%	0%
Katachhara	10077	**2.31**	13%	24%	7%	0%	44%	11%
Ichhakhali	13546	**2.60**	11%	30%	13%	1%	45%	0%
Mirsharai	13975	**3.23**	25%	21%	4%	2%	46%	2%
Mithanala	12123	**2.73**	25%	13%	6%	0%	44%	13%
Shaherkhali	12243	**4.02**	7%	24%	13%	0%	43%	12%
Maghadia	28947	**4.82**	18%	25%	3%	0%	46%	8%
Khaiyachhara	17633	**3.61**	12%	15%	16%	1%	41%	14%
Mayani	14776	**4.16**	24%	24%	1%	0%	48%	3%
Wahedpur	11789	**2.48**	27%	13%	4%	0%	44%	13%
Haitkandi	9958	**2.69**	11%	20%	9%	0%	37%	23%

Prominent Home-based Trips

From the table it is evident that the home based trips are the highest in all zones. This is because irrespective of which purpose a trip is made, it is always destined to the home of the trip maker suggesting that unlike typical city dwellers, trip chaining behavior not common among the residences of Mirsharai upazila. It is also important to mention here that a substantial number of trips are categorized as 'others' (as high as 23% in Hatikandi). A further investigation revealed that people in Mirsharai socialize a lot and it is common to visit the neighbors on regular basis as part of their day to day activities.

Work Trips in Different Zones

Of other kind of trips, it has been found that Work trips and Educational trips are highest than any other trips and shopping trips. The work trips are lowest in Shaherkhali , Ichhakhali and Haitkandi because of lack of commercial activities, good communication facilities and more agro-based lifestyle. On the other hand, Wahedpur, Mirsharai, Mithanala, Durgapur and Dhum are high in work trips. This might be because of adjacent developed commercial and municipality area with bazars and growth centers, ease of access to the highway etc. However, it must be noted that although the work trips tantamount

to a substantial number of overall trips, their share is much lower as compared to that of a typical city. The survey team further investigated to discover the reasoning behind it. It was found that in many households, the main bread earner works outside Mirsharai (in other big cities or at times in abroad). Moreover, many of the households run their home-based business where they do not have to go out everyday at a prescheduled time. Moreover, those involved in agriculture-based business, make work trips mainly during the cultivation season.

Educational Trips

Educational trips are higher in Hinguli, Ichhakhali and Magadhia. This is because of the improved lifestyle of the inhabitants making them more focused on education of their children also availability of such institutions. Mithanala, Karerhat and Wahedpur are the lowest in educational trips; not necessarily because of minimum options for education rather the buzzing commercial activities in these areas outnumbering any other trips.

Combining the results for each zone, the share of trips by different purposes as obtained from the household survey, can be represented by the following pie chart. It is seen that 21% of the trips are made for educational purpose; where 7% trips are made for shopping purposes.

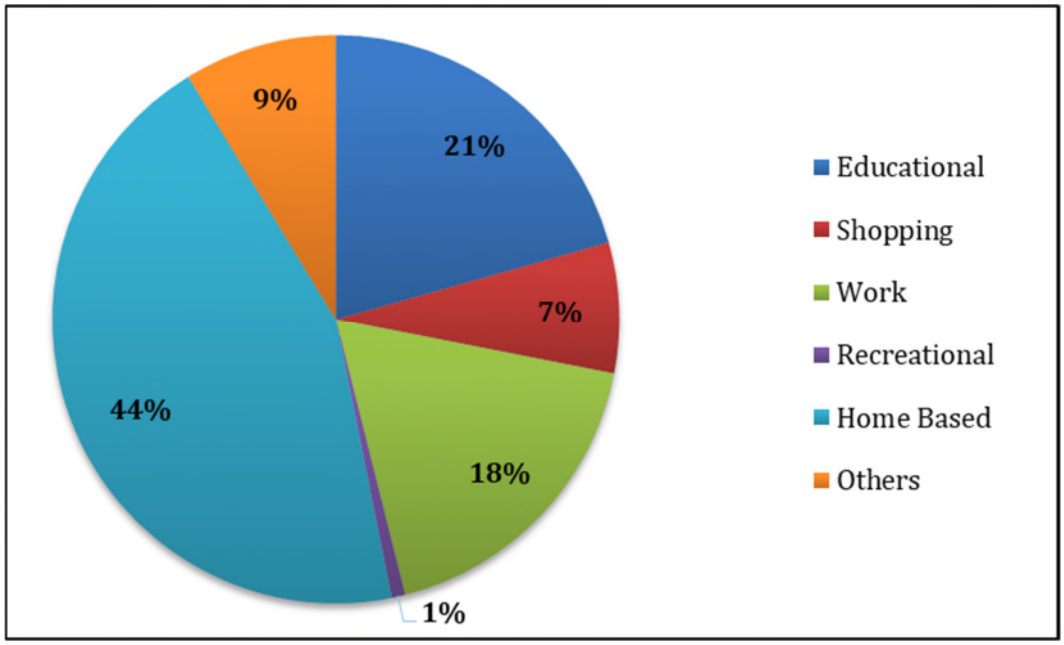


Figure 4-3: Trip Purpose (in percentage) of the Study Area

Mode Choice

The below table shows the share of modes for all trips made in each zone.

Table 4.3: Trip Summary based on Mode Choice

Zone/ Union	Walk trips (%)	CNG trips (%)	Bi-cycle trips (%)	Rickshaw trips (%)	Motor-Cycle trips (%)	Bus trips (%)	Other trips (%)
Karerhat	38.6%	**53.0%**	1.2%	0.0%	0.0%	2.4%	4.8%
Hinguli	76.6%	19.1%	0.0%	0.0%	0.0%	4.3%	0.0%
Dhum	45.4%	39.2%	0.0%	2.1%	0.0%	8.2%	5.2%
Zorawargonj	45.6%	31.6%	5.3%	0.0%	0.0%	5.3%	12.3%
Osmanpur	65.0%	35.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Durgapur	31.1%	**32.8%**	0.0%	0.0%	1.6%	14.8%	19.7%
Katachhara	85.7%	5.7%	8.6%	0.0%	0.0%	0.0%	0.0%

Zone/ Union	Walk trips (%)	CNG trips (%)	Bi-cycle trips (%)	Rickshaw trips (%)	Motor-Cycle trips (%)	Bus trips (%)	Other trips (%)
Ichhakhali	72.5%	20.0%	5.0%	2.5%	0.0%	0.0%	0.0%
Mirsharai	76.4%	10.4%	5.7%	1.9%	0.0%	2.8%	2.8%
Mithanala	80.0%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Shaherkhali	86.1%	7.0%	7.0%	0.0%	0.0%	0.0%	0.0%
Maghadia	60.5%	18.4%	13.2%	0.0%	0.0%	1.3%	6.6%
Khaiyachhara	32.7%	**42.9%**	0.0%	4.1%	0.0%	20.4%	0.0%
Mayani	55.9%	20.6%	5.9%	0.0%	0.0%	10.3%	7.4%
Wahedpur	60.3%	30.8%	5.1%	2.6%	0.0%	0.0%	1.3%
Haitkandi	54.7%	24.0%	13.3%	2.7%	0.0%	5.3%	0.0%

From the above table it can be easily identified that major modes are walking and CNG in all the zones. In Khaiyachara and Durgapur, the trips made by bus are higher than any other zone. Also, the number of long distance inter-zonal trips is higher for these zones. This is because the location of the zones adjacent to the highway creating greater opportunities for them to travel longer distance to make work trips .Again, the share of CNG trips are the highest in Karerhat, Khaiyachhara and Durgapur than any other modes. Therefore, it can be concluded that people in this area mainly rely on unconventional modes of transports (UCM) for intra- and inter-zonal trips.

In the overall scenario for whole Mirsharai, people make most of the trips by walking which is 58% of total trips. These trips are mainly short distance trips. Again, 27% are made by CNG. On the other hand 5% trips are made by bus and other modes each; while 4% trips are made by bi-cycle.

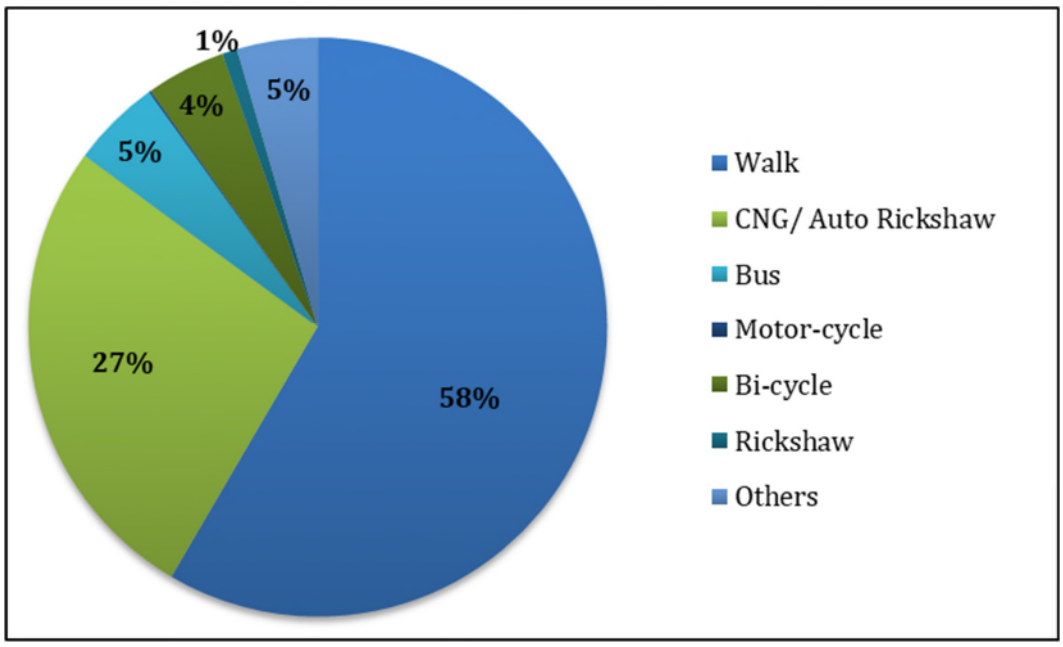


Figure 4-4: Mode of Travel in the Study Area

Travel Cost and Time

The below table represents the average travel cost (in Taka) and travel time (in minutes). The travel cost is lower in the zones where major modes of trips are walking and cycling though their travel time may be higher. In cases of Karerhat, Dhum, Durgapur and Khaiyachhara; the travel cost is higher because the inhabitants of these area depend on motorized modes (CNG or Bus etc.) and the travel distance is also high.

Table 4.4: Travel cost and travel time for each zone

Zone/ Union	Avg. Travel Cost (tk.)	Avg. Trip Length (minutes)
Karerhat	**10**	22
Hinguli	3	17
Dhum	**29**	27
Zorawargonj	6	18
Osmanpur	5	19
Durgapur	**14**	26
Katachhara	4	14
Ichhakhali	4	16
Mirsharai	3	15
Mithanala	3	20
Shaherkhali	1	21
Maghadia	5	20
Khaiyachhara	**17**	34
Mayani	6	25
Wahedpur	5	19
Haitkandi	4	22

4.3 Attraction Survey

Consultant team conducted Attraction survey in six major growth centers and two paurashavas of Mirsharai Upazila namely, *Shantir hat, Abur hat, Baman sundardarogar hat, Mirsharai hat, Hadi fakir market, Shaherkhali bhorer bazar, Mirsharai paurashava* and *Baraiyarhat paurashava*. The detail survey design and methodology has already been discussed in **Section 2.4 and Section 3.1.3.** During the survey, different facilities: bazars, government offices, private offices, shopping complex, shops and hospitals were surveyed to represent the trip demand of the entire Mirsharai Upazila.

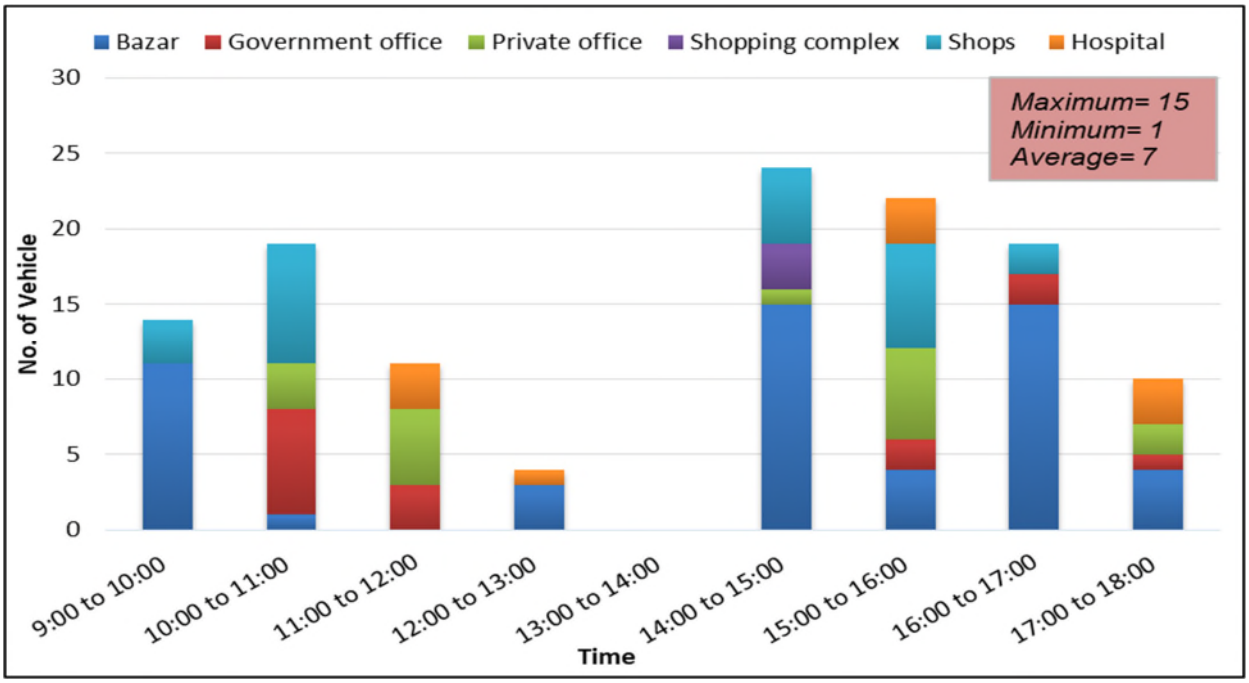


Figure 4-5: Demand in different facilities at different time

The above *Figure 4-5* represents the vehicle demand in different facilities at different time of Mirsharai. At bazar area, the vehicle movement rate is high other than any facility. During 9:00 am to 10:00 am, 14:00 pm to 15:00 pm and 16:00 pm to 17:00 pm the demand is high in bazar. The reason may be that local people move during morning to the nearby markets to buy their daily necessities and the unloading of perishable products such as: vegetable, fruits and other necessary products usually occur in the early part of the day. Besides, the consultant team came to know from the local people that between 9:00 am to 12:00 pm and 14:00 pm to 17:00 pm, vehicle movement becomes high in every location which match with the survey data *(Figure 4-5).* The maximum vehicle demand is 15 (fifteen), minimum is 1 (one) and average vehicle demand is 7 (seven) in the entire Mirsharai Upazila.

From the Figure 4-6 it has been revealed that in two paurashavas, vehicle attraction is higher than other locations. From the Consultant's observation it is found that most of the development has taken place in these two paurashavas. Most of the schools, colleges, bazars, shops, hospitals, government and private offices are located in these two paurashavas. So the traffic demand is high in these two areas**.** As the Mirsharai growth center is located at paurashava area and adjacent to the paurashava headquarter the attraction rate is higher than the other growth centers. In case of rest of the growth centers attraction rate is same which is 10%.

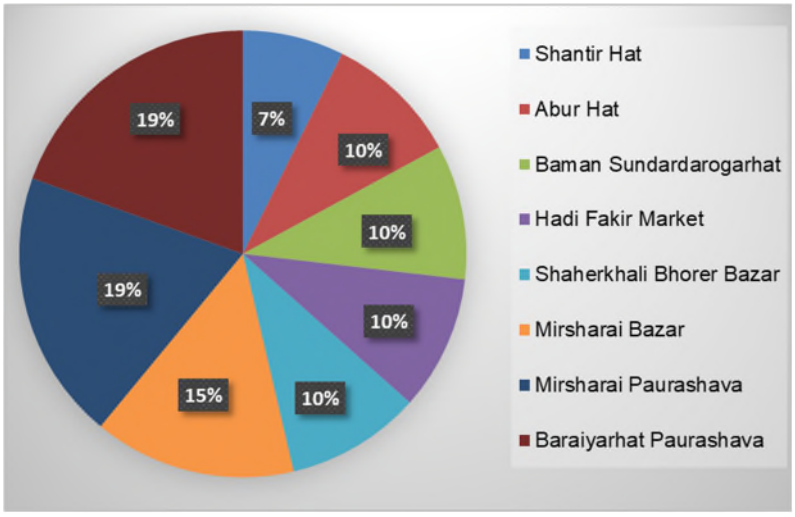


Figure 4-6: Attraction at different surveyed locations

From the Table 4.5**,** it has been seen that maximum number of trips attracted to Baraiyarhat and Mirsharai paurashavas, which are respectively 67 and 90 trips per hour. These two areas are the heart of business and all commercial activities of Mirsharai Upazila.

Table 4.5: Number of trips (per hour) attracted to different land uses at different locations

Locations	Trips (per hour) at different Land uses					
	Bazar	Govt. office	Private office	Shopping complex	Shops	Hospital
Shantir Hat	14	40				
Abur Hat	15	10	9		13	
Baman Sundardarogarhat	16	5	9		12	
Hadi Fakir Market	8	3	30		9	
Shaherkhali Bhorer Bazar	9	13	11		17	
Mirsharai Bazar	14		13		23	7
Mirsharai Paurashava	26	13	18		19	15
Baraiyarhat Paurashava	19		18	16		14

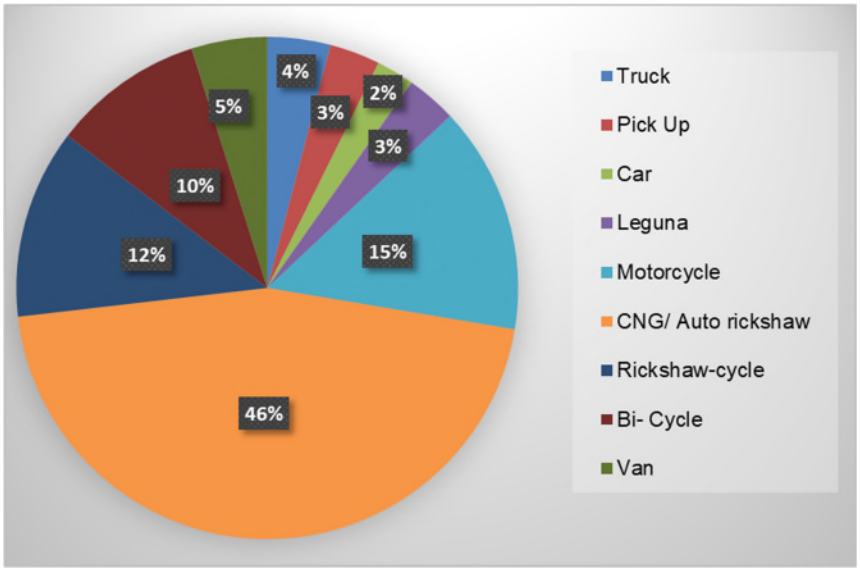


Figure 4-7: Vehicles attracted to commercial areas

CNG/ Auto rickshaw are main mode of transport at different commercial areas, which is 46%. Other than CNG/ Auto rickshaw, people use motorcycle (15%), Rickshaw-cycle (12%) for their movement. Pick-ups (10%) are used for loading and unloading of goods in commercial areas.

Educational Institution

Consultant team conducted survey at 16 (sixteen) educational institutions to understand the travel behavior of students like what kind of modes they use, cost of their travel, origin and destination and travel time. Total 95 (ninety five) students were surveyed. The list of the educational institutions is as follows:

- Mohajonhat School & College
- Jamalpur Madrasha
- Aburhat High School
- Bamonsundar F.A. High School
- Mirzabazar Islami Dakhil Madrasha
- Mirzabar Sorkari Prathomik Biddyaloy
- Shaherkhali High School
- Mithachara High School
- Mirsharai Pilot High School
- Mirsharai Girls High School
- Mirsharai Girls High School
- Mirsharai College
- Baraiyarhat College
- Al Hera School & College
- Baraiyarhat Girls High School
- Baraiyarhat College

Origin-Destination:

The below table describes the institutions where the survey was conducted and the zones from which students originate their trips.

Table 4.6: List of educational institution and trip generate zones

Educational Institutions	Origin Zone ID
Mohajonhat School & College	2, 3, 1, 4
Jamalpur Madrasha	3, 2
Aburhat High School	5, 8, 7
Bamonsundar F.A. High School	10, 7, 15
Mirzabazar Islami Dakhil Madrasha	15
Mirzabar Sorkari Prathomik Biddyaloy	15
Shaherkhali High School	11, 14
Mithachara High School	9, 10, 6
Mirsharai Pilot High School	12, 9, 10
Mirsharai Girls High School	12, 9
Mirsharai Girls High School	9, 10
Mirsharai College	9, 7, 12, 13
Baraiyarhat College	2, 4, 8
Al Hera School & College	2, 4
Baraiyarhat Girls High School	4
Baraiyarhat College	1, 3, 4, 9

Travel mode:

The major mode of travel as seen from the chart below is walking (36%) and CNG (24%) since most of the trips are made within the adjacent areas covering short distances. The trips made from distant places are done by Bus (1%), College Bus (3%) and Leguna (14%). Also, students use different modes to commute to their places of interest; such combinations include CNG+Leguna (5%), Leguna+Walking (3%), Walking+CNG (3%). Again, another vital mode used by the local pupils to commute is Bi-Cycle with a considerable share of 9%.

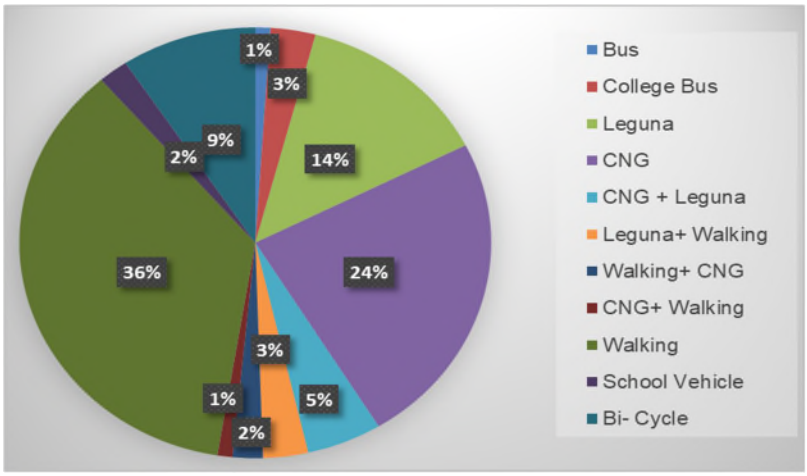


Figure 4-8: Mode of travel of students

Travel Cost:

The cost of commuting is usually cheaper and the average travel cost for students varies from 14 Taka to 43 Taka.

Travel Time:

The survey showed that the students usually start their journey between 8:30 am to 9:30 am and reach their destination between 9:10 am to 10:00 am. In addition, their travel time is in general within 30 to 40 mins on an average.

4.4 Traffic Counts

4.4.1 Traffic Count in Mirsharai Upazila

The consultant team conducted survey for 8 hours for external locations and 2 hours for internal locations. These time durations were the peak times of the typical work days. ***The travel demand model will be constructed for the peak hour focusing on providing enough capacity when the demand is at its peak***. The consultant team consulted with the local people and local survey teams and reconnaissance survey also conducted to ensure that the survey time can fully capture the peak hour from its formation till its dissipation. Combining all the data and information it was found that the peak flow of traffic is between 9:00 am to 12:00 pm and once more again after 3:00 pm to 5:00-6:00 pm for internal locations. Moreover, for external locations morning flow and evening flows are high exhibiting the typical nature of a highway.

Up direction: traffic flow toward the Mirsharai upazila from different locations

Down direction: traffic flow from the Mirsharai upazila toward different locations and through traffic.

Table 4.7 and Table 4.8 presents the hourly distribution of vehicles for count sites 01 to 10 respectively.

Table 4.7: Hourly distribution of vehicles for different directions for sites 01 to 05

Time	Site Number									
	01		02		03		04		05	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
9:00 to 10:00	0	0	0	0	0	0	0	0	141	114
10:00 to 11:00	460	498	324	241	0	0	0	0	113	100
11:00 to 12:00	632	520	314	314	0	0	0	0	0	0
12:00 to 13:00	532	471	244	221	0	0	0	0	0	0
13:00 to 14:00	486	523	273	292	0	0	0	0	0	0
14:00 to 15:00	580	512	336	362	0	0	0	0	0	0
15:00 to 16:00	607	544	370	250	225	219	280	247	0	0
16:00 to 17:00	529	555	327	298	233	240	291	275	0	0
17:00 to 18:00	509	693	344	345	201	244	276	264	0	0
18:00 to 19:00	506	717	203	166	190	220	197	200	0	0
19:00 to 20:00	472	686	220	121	142	161	133	158	0	0
20:00 to 21:00	0	0	196	189	41	63	99	138	0	0
21:00 to 22:00	0	0	54	46	0	0	0	0	0	0
Total	**5313**	**5719**	**3205**	**2845**	**1032**	**1147**	**1276**	**1282**	**254**	**214**

Table 4.8: Hourly distribution of vehicles for different directions for sites 05 to 10

Time	Site Number									
	06		07		08		09		10	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
9:00 to 10:00	103	80	114	104	0	0	147	114	261	498
10:00 to 11:00	95	75	130	109	0	0	142	125	351	551
11:00 to 12:00	95	89	0	0	0	0	16	15	414	633
12:00 to 13:00	76	104	0	0	0	0	0	0	441	558
13:00 to 14:00	81	55	0	0	0	0	0	0	460	540
14:00 to 15:00	97	60	0	0	0	0	0	0	407	535

Time	Site Number									
	06		07		08		09		10	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
15:00 to 16:00	102	67	0	0	143	162	0	0	429	556
16:00 to 17:00	0	0	0	0	174	170	0	0	577	466
17:00 to 18:00	0	0	0	0	0	0	0	0	0	0
18:00 to 19:00	74	85	0	0	0	0	0	0	0	0
19:00 to 20:00	62	77	0	0	0	0	0	0	0	0
20:00 to 21:00	49	67	0	0	0	0	0	0	0	0
21:00 to 22:00	13	23	0	0	0	0	0	0	0	0
Total	**847**	**782**	**244**	**213**	**317**	**332**	**305**	**254**	**3340**	**4337**

Neither traffic flow are same for national highway, regional highway, zila and upazila roads nor modal share. In this report traffic flow for each category of road has been discussed.

4.4.1.1 Traffic Distribution in National Highway (Dhaka-Chittagong, N1)

Two sites are on the National highway, site 01 (Baraiyarhat foot overbridge) and site 10 (Boro Darogar hat). The survey was conducted 10:00 am- 8:00 pm for site 01 and 9:00 am- 6:00 pm for site 10. Though the survey was to be conducted for 8 hours but the surveys were done for extra 2 (two) hours for site 01 and 1 (one) hour for site 10.

Figure 4-10 to Figure 4-12 represents temporal distribution of traffic of different vehicle types on national highway (site- 01 and site- 10) for both directions. From temporal distribution of traffic the parts of the day when the traffic is the highest can be identified. It is observed that peak is varied with the time of the day in the national highway. As Dhaka-Chittagong Highway is one of the busiest highways the traffic flow is always high in both directions. From the survey the peaks are:

	For UP direction	For DOWN direction
Site- 01	Peak 1: 10:00 am to 11:00 am (632)	Peak 1: 12:00 pm to 01:00 pm (523)
	Peak 2: 2:00 pm to 3:00 pm (607)	Peak 2: 5:00 pm to 6:00 pm (717)
Site- 10	Peak 1: 01:00 pm to 02:00 pm (460)	Peak 1: 11:00 am to 12:00 pm (633)
	Peak 2: 04:00 pm to 05:00 pm (577)	Peak 2: 03:00 pm to 04:00 pm (556)

Trucks comprise a major portion of all vehicles considered for the alignment and it has four sub-classes- Trailer, Large/ Heavy, Medium and Small trucks. From the study, it shows that the volume of truck traffic is high during the same period as the total flow is high (See Figure 4-13 to Figure 4-16).

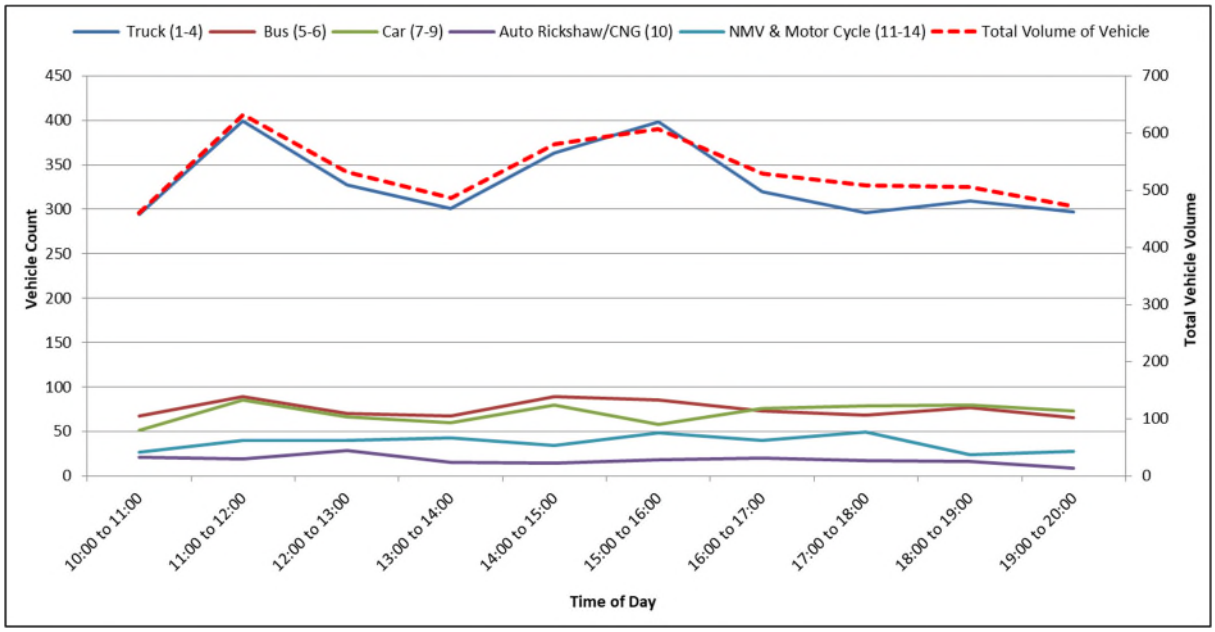


Figure 4-10: Temporal distribution of traffic by vehicle type (Site 01 – Up direction)

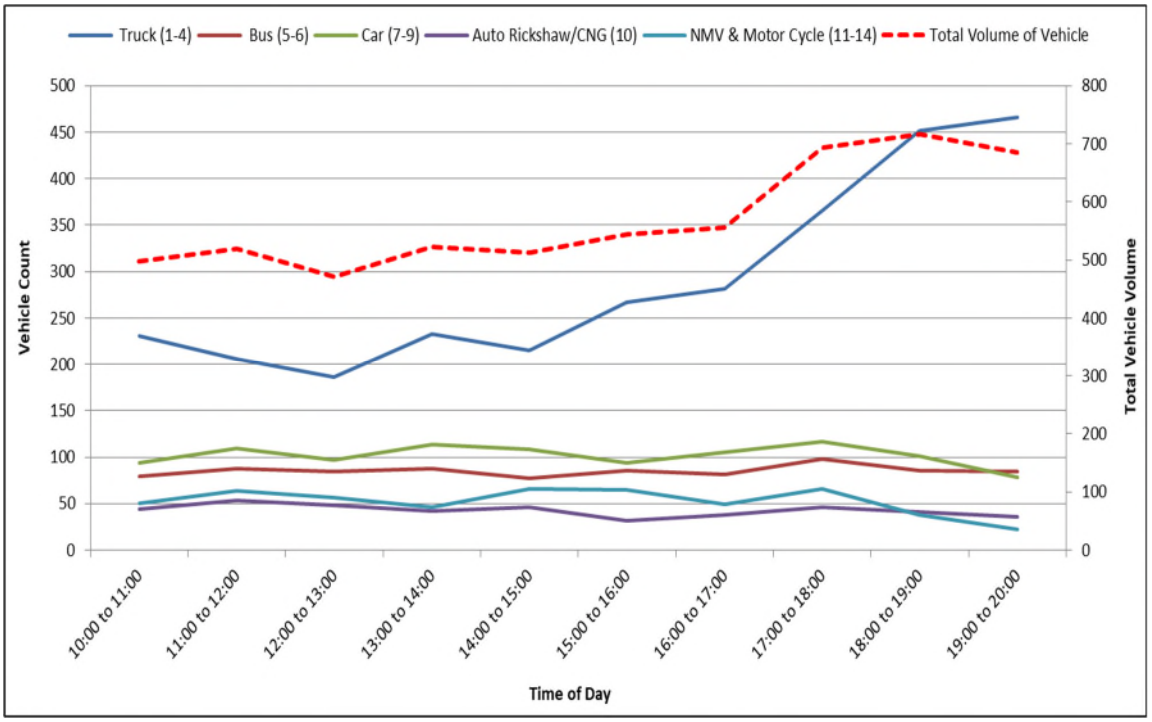


Figure 4-9: Temporal distribution of traffic by vehicle type (Site 01 – Down direction)

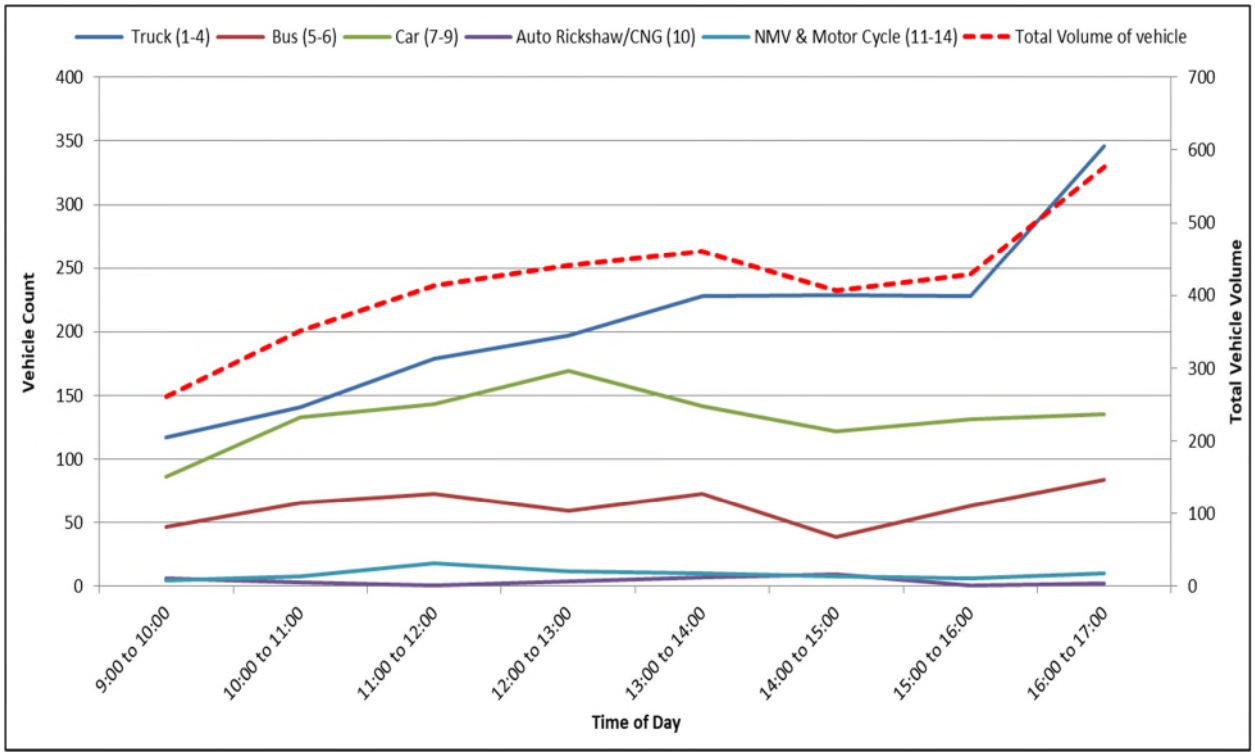


Figure 4-11: Temporal distribution of traffic by vehicle type (Site 10 – Up direction)

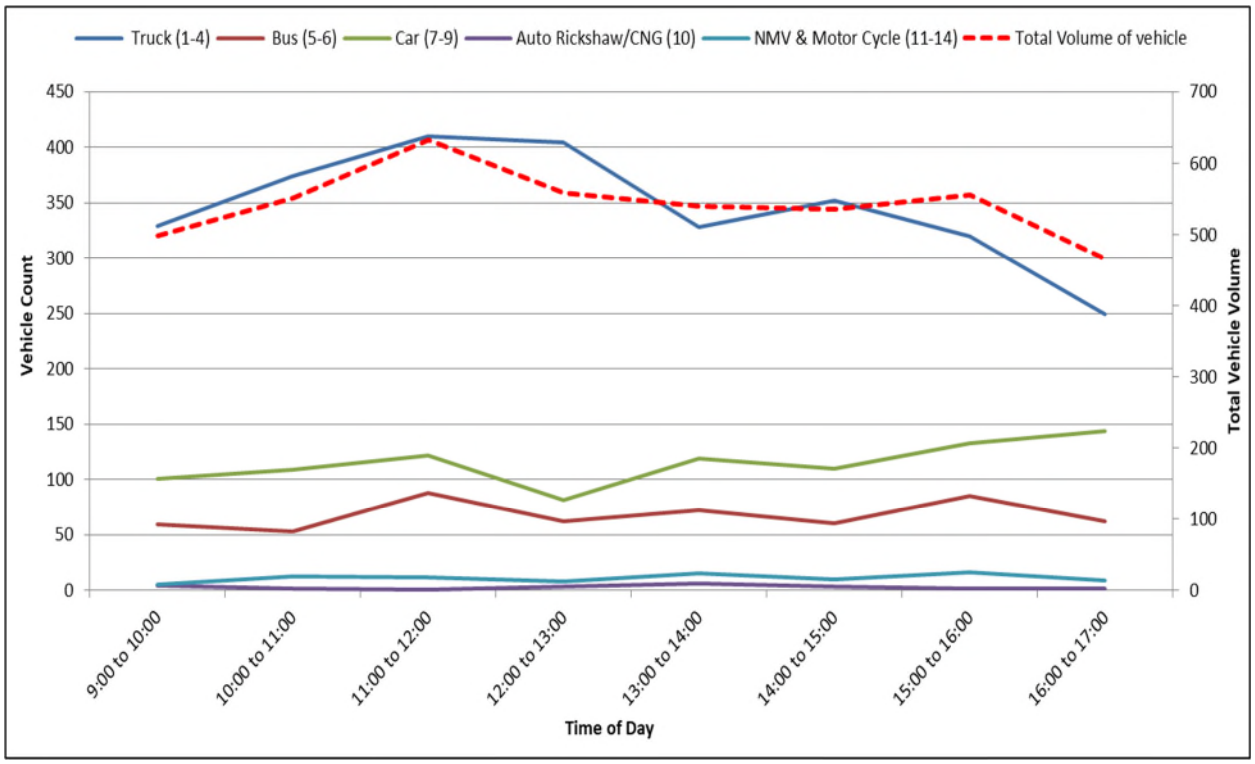


Figure 4-12: Temporal distribution of traffic by vehicle type (Site 10 – Down direction)

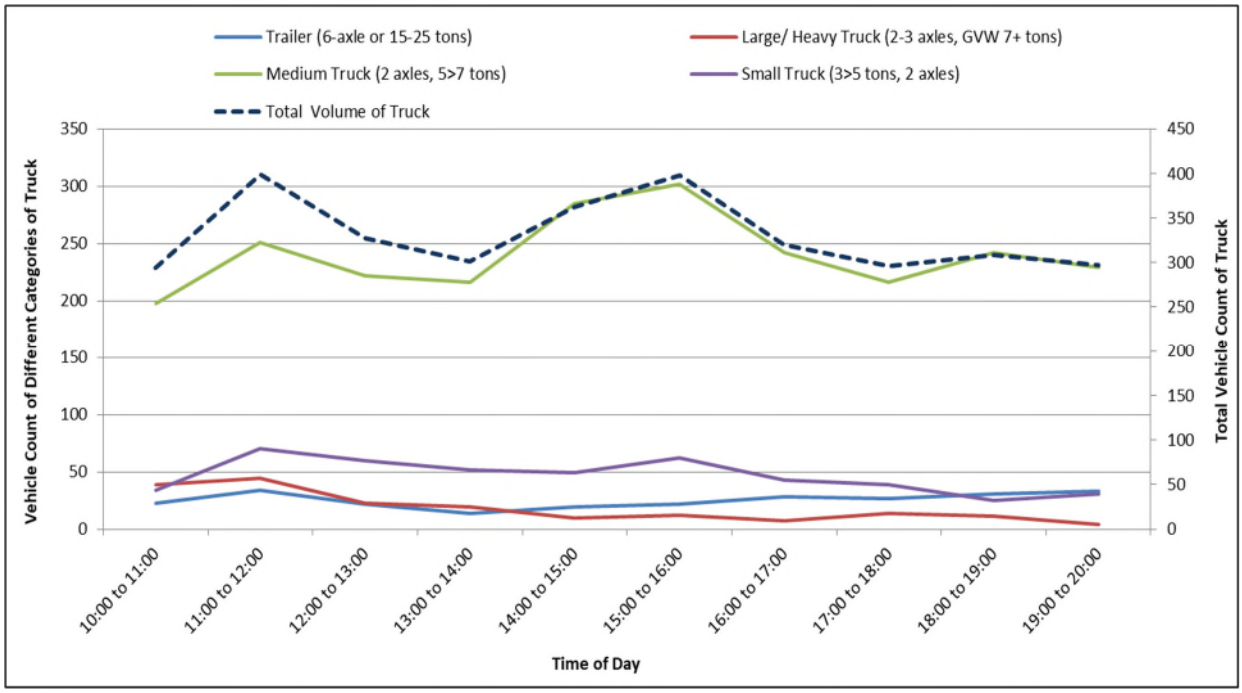


Figure 4-13: Temporal distribution of truck traffic (Site 01 – Up direction)

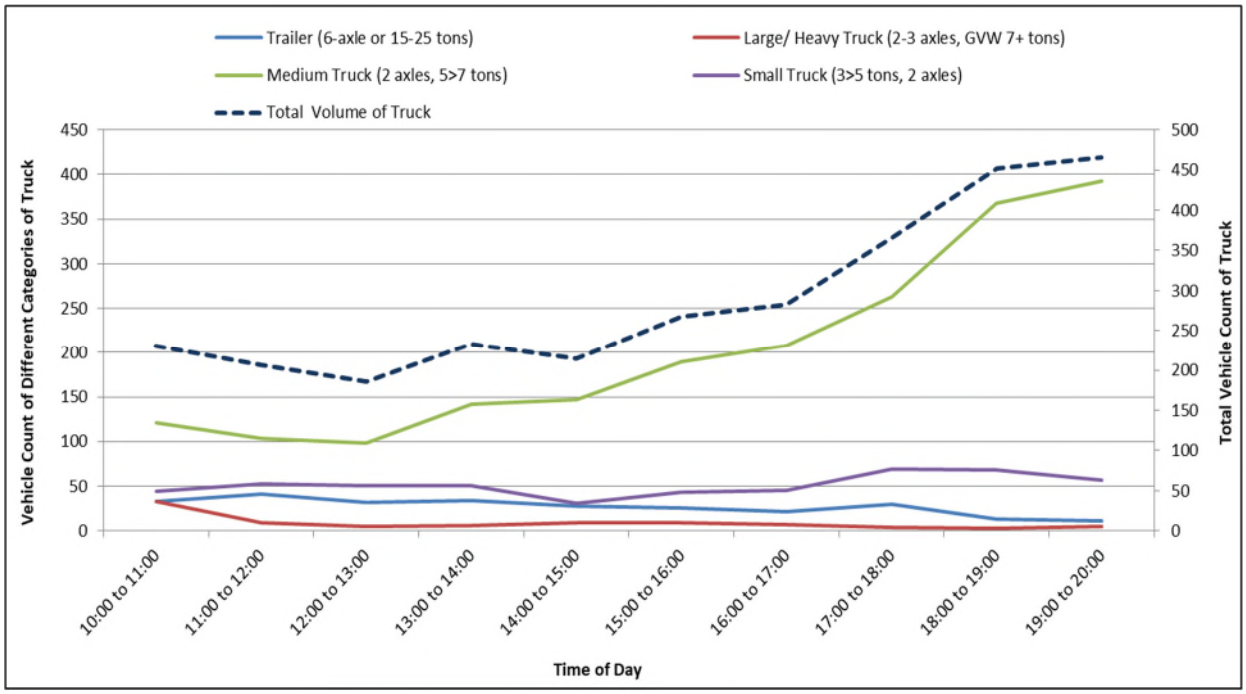


Figure 4-14: Temporal distribution of truck traffic (Site 01 – Down direction)

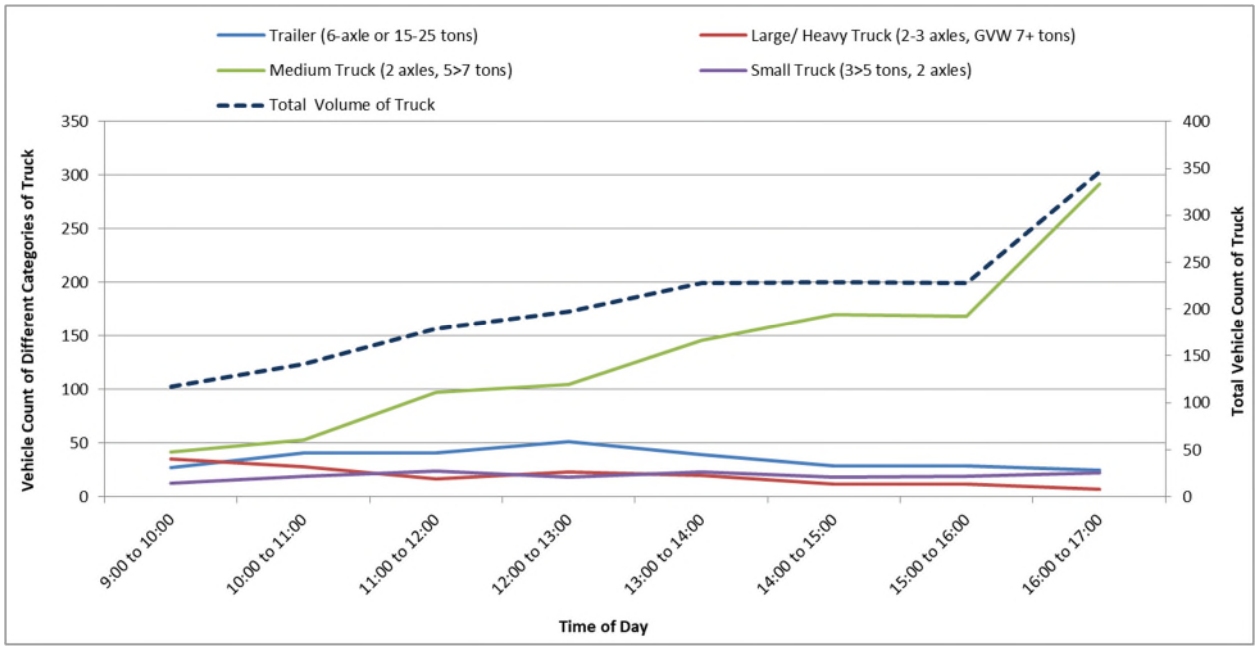


Figure 4-15: Temporal distribution of truck traffic (Site 10 – Up direction)

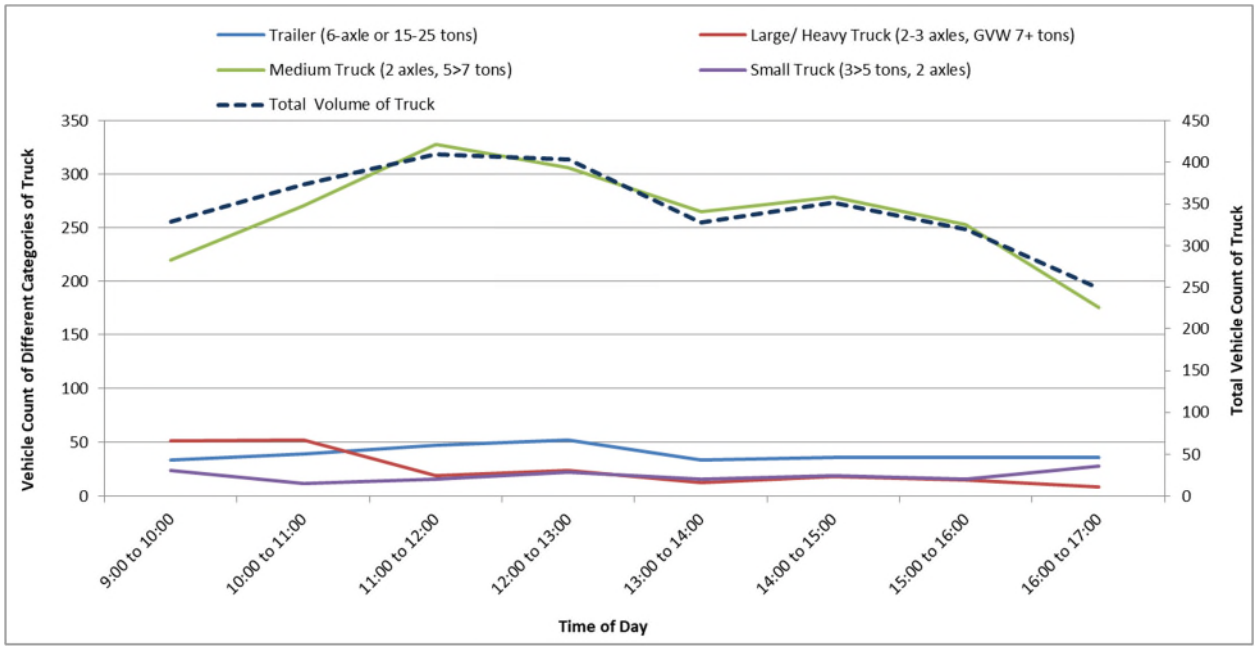


Figure 4-16: Temporal distribution of truck traffic (Site 10 – Down direction)

4.4.1.2 Traffic Distribution in Regional Highway (R151)

To find out the characteristics of the regional road and its flow and connectivity and major vehicle category, survey team selects a location on the regional highway of Mirsharai Upazila. The survey was conducted for 11 hours and 20 min as requested by the client (extra 3 hours and 20 min: 10:00 am to 9:20 pm).

For UP direction	For DOWN direction
Peak 1: 03:00 pm to 04:00 pm (370)	Peak 1: 02:00 pm to 03:00 pm (362)
Peak 2: 05:00 pm to 06:00 pm (344)	Peak 2: 05:00 pm to 06:00 pm (345)

Though it is the regional highway but the volume of non-motorized vehicles and unconventional transport (CNG) is high in this road. Among the truck traffic volume of medium truck is higher than the other truck categories and peak flow seen at 5:00 pm to 6:00 pm.

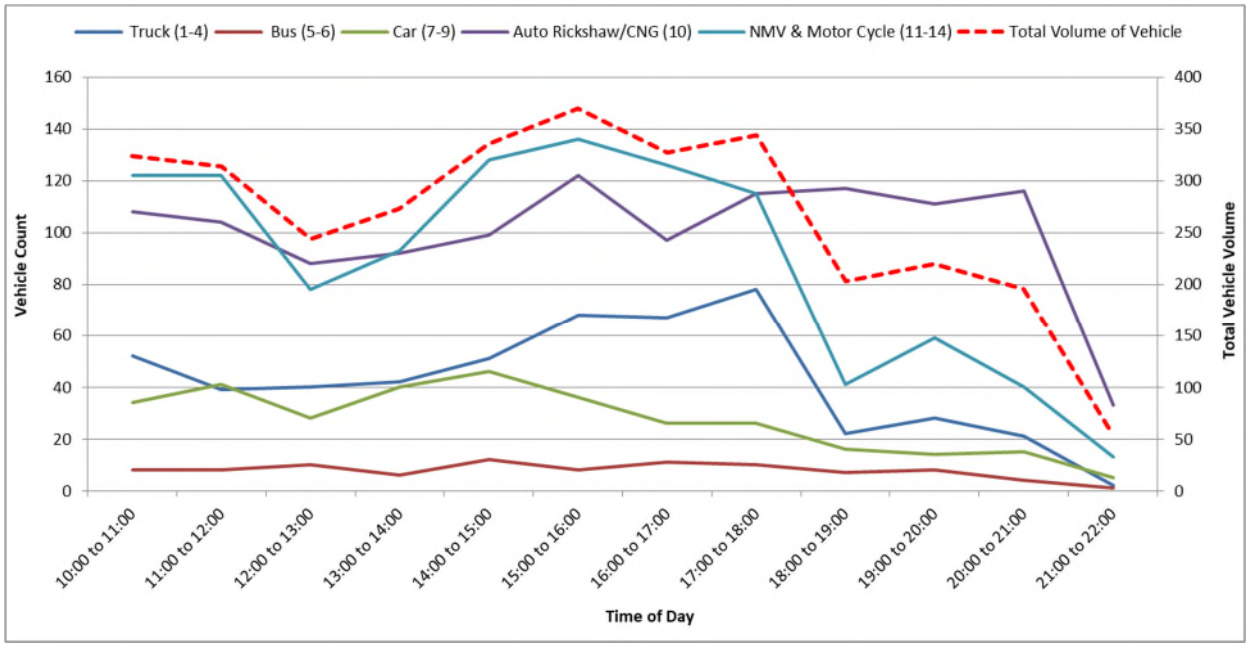


Figure 4-17: Temporal distribution of traffic by vehicle type (Site 02 – Up direction)

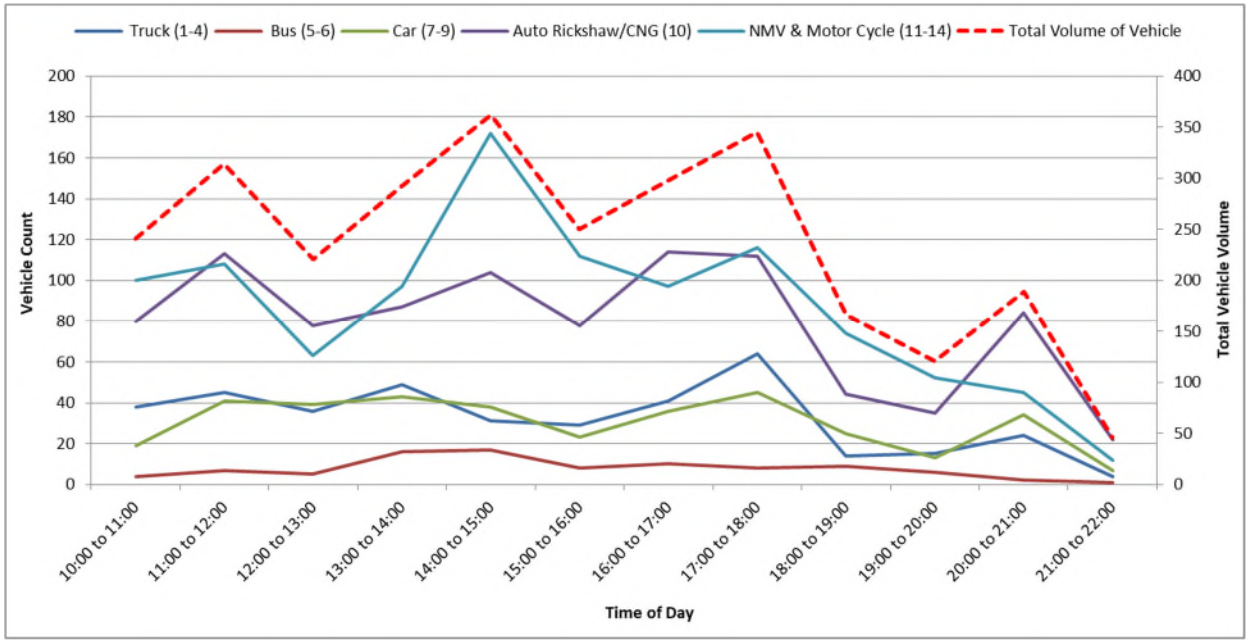


Figure 4-18: Temporal distribution of traffic by vehicle type (Site 02 – Down direction)

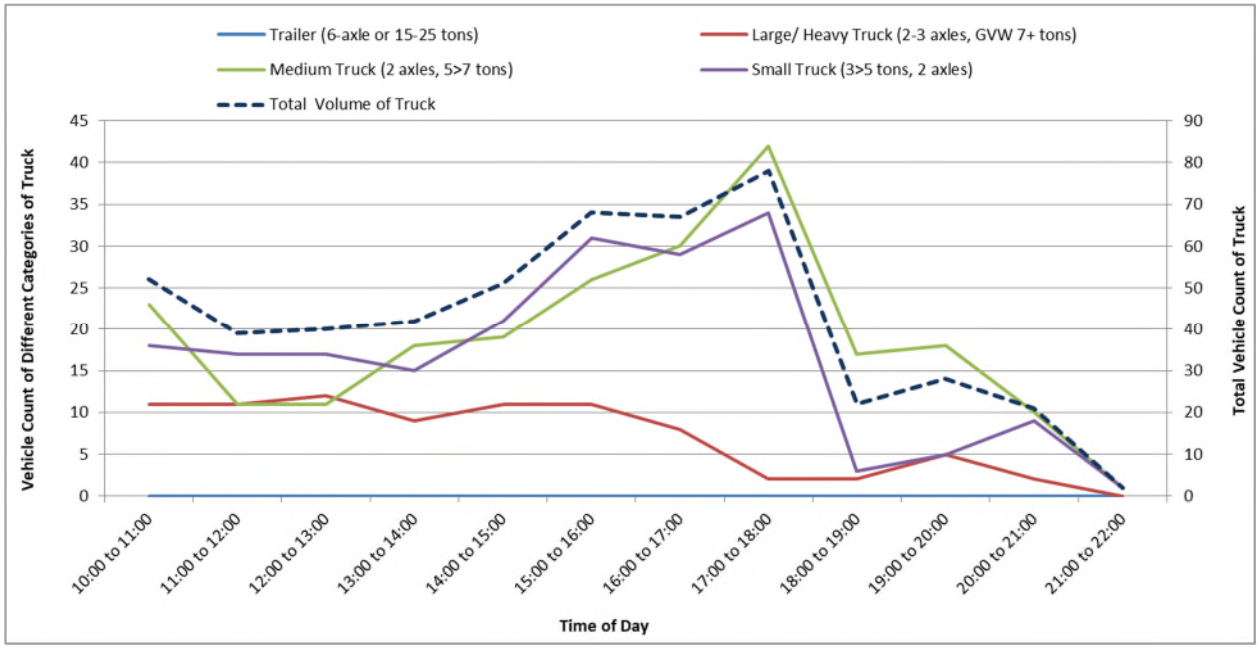


Figure 4-19: Temporal distribution of truck traffic (Site 02 – Up direction)

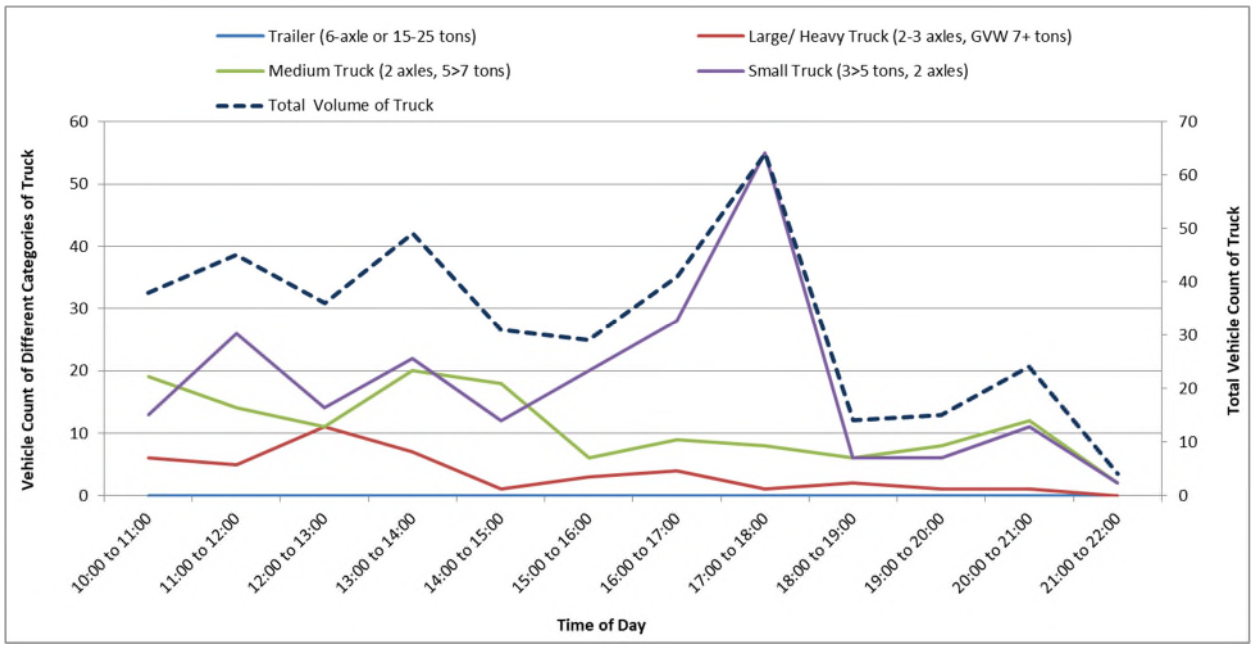


Figure 4-20: Temporal distribution of truck traffic (Site 02 – Down direction)

4.4.1.3 Traffic Distribution in Zila Road (Z1021)

Form the reconnaissance survey it has been observed that the zila road (leading to Fatikchhari) of Mirsharai Upazila is too narrow. Mainly CNG and NMVs are moving through the road rather than other vehicles. If the road can be widened then it can be a direct connectivity to Fatikchhari. And honorable Mayor of Mirsharai Paurashava also has the interest to widen the road and increase the better connectivity with other upazila. So Consultant team select a location on this road and conduct 12 hours survey 9:00 am to 4:00 pm and 6:00 pm to 9:00 pm (extra 3 hours as per request from the client).

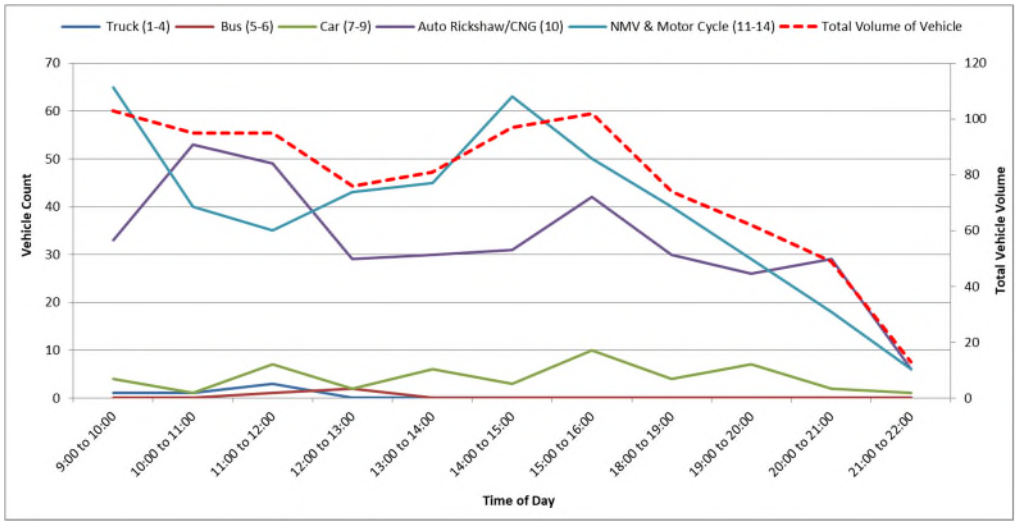


Figure 4-21: Temporal distribution of traffic by vehicle type (Site 06 – Up direction)

From the figures below it is observed that there are more than one peak time when flow is high. In the road CNG/ Auto-rickshaw and NMVs are contain the main volume of the road. The peaks of the typical day on Zila road are as follows:

For UP direction	For DOWN direction
Peak 1: 09:00 am to 10:00 am (103)	Peak 1: 12:00 pm to 01:00 pm (104)
Peak 2: 03:00 pm to 04:00 pm (102)	Peak 2: 11:00 am to 12:00 pm (89)

Volume of truck traffic is low as the road is too much narrow so there is not possible for trucks to move. A small amount of small and medium truck vehicles are seen which are use the road to unload just construction materials or other daily necessity goods in the bazar area.

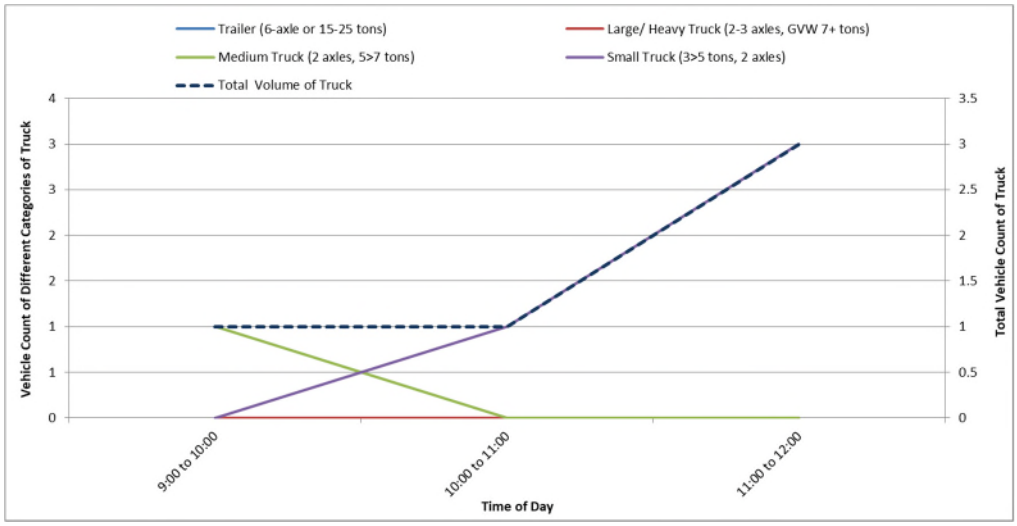


Figure 4-22: Temporal distribution of truck traffic (Site 06 – Up direction)

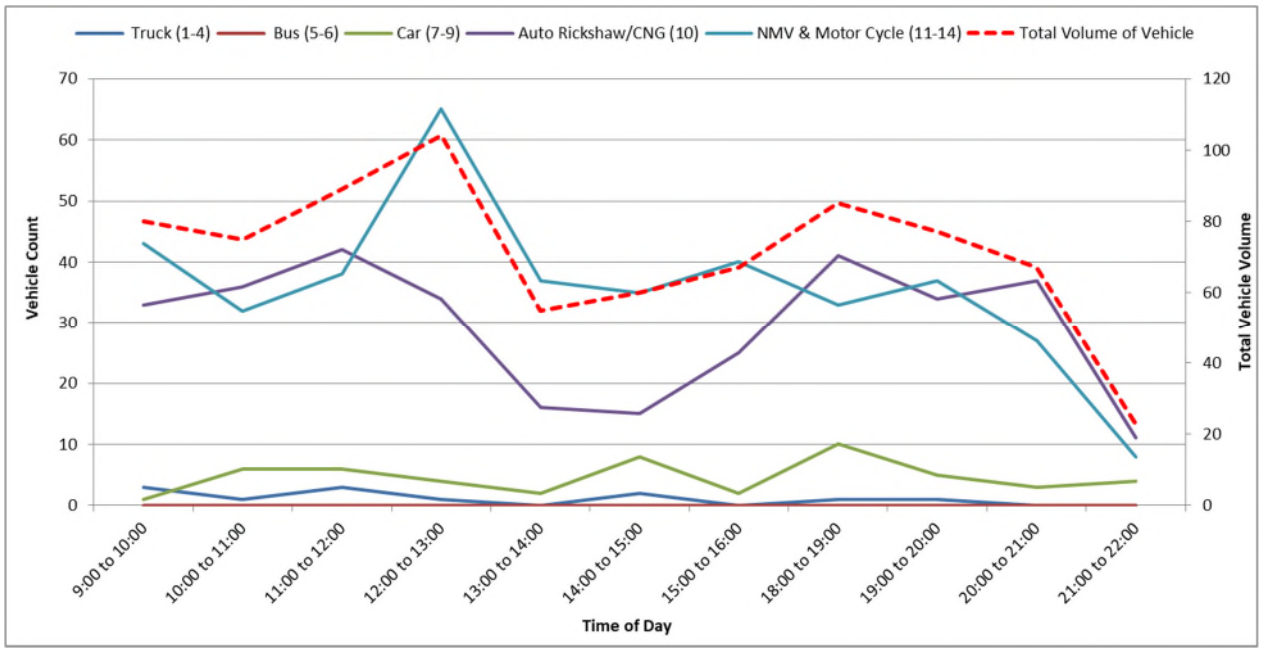


Figure 4-23: Temporal distribution of traffic by vehicle type (Site 06 – Down direction)

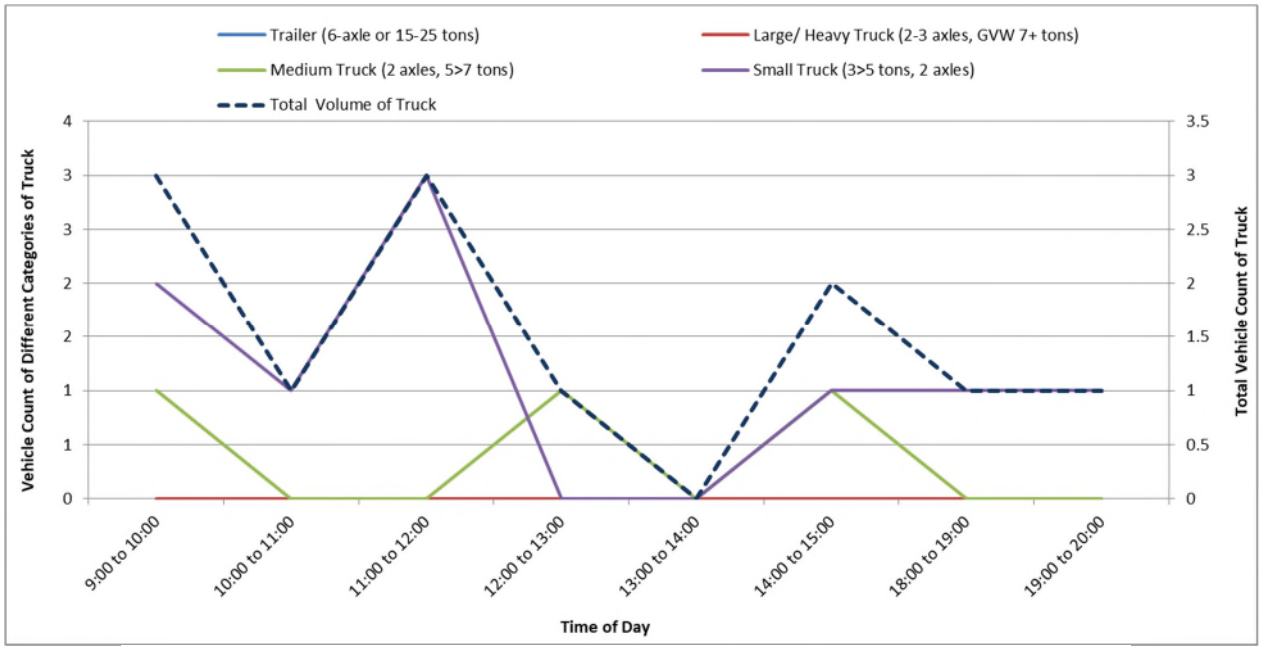


Figure 4-24: Temporal distribution of truck traffic (Site 06 – Down direction)

4.4.1.4 Traffic Distribution in Upazila Road (Internal)

Six internal locations were surveyed. As early said that survey time was fixed after discussion with local people and for two hours, two survey locations were surveyed, site 03 and site 04 more than two hours for the request of the client.

From the survey data of site 03 and 04 it is found that flow is being low after 6:00 pm as the area is rural people are not move as much as the city area. All the shops, bazars, shopping complex are almost closed at 9:00 pm.

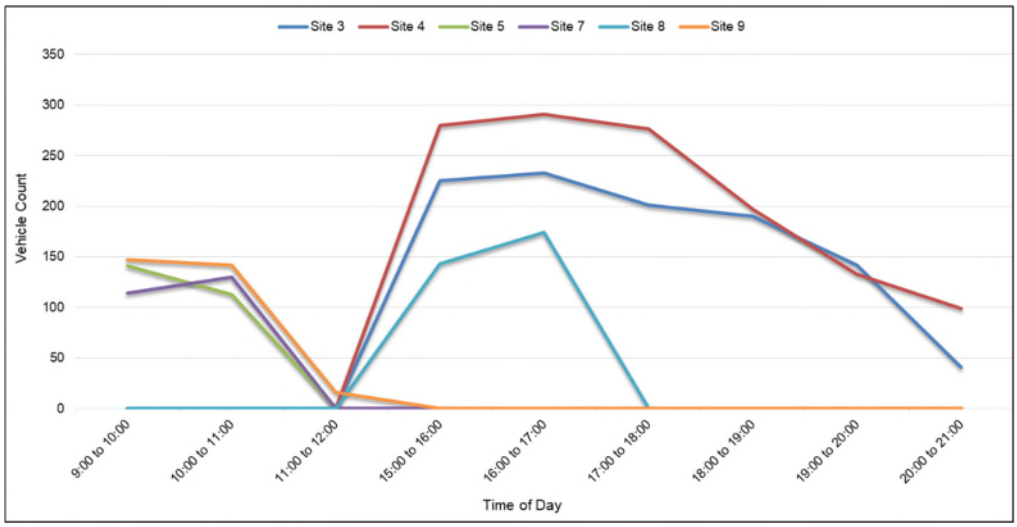


Figure 4-25: Temporal distribution of traffic of all Internal Sites (Up direction)

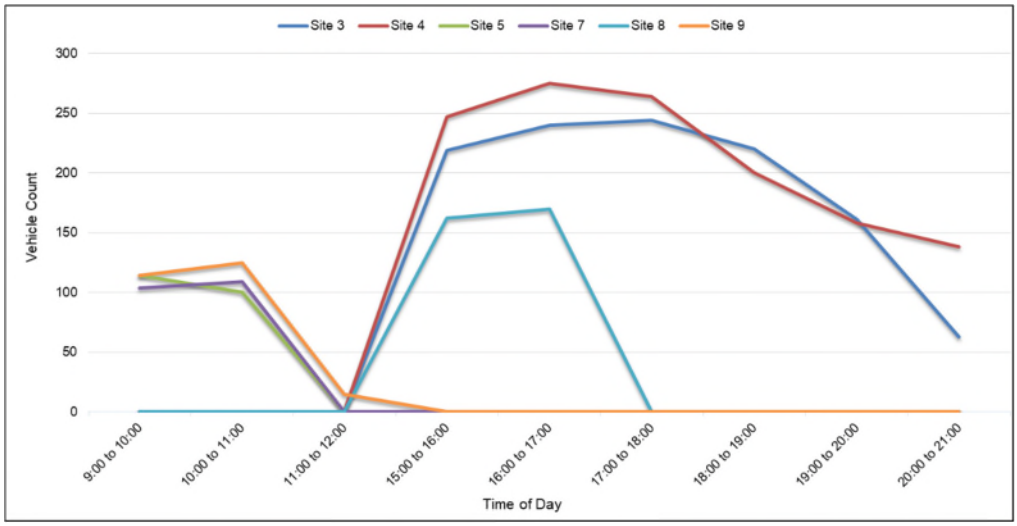


Figure 4-26: Temporal distribution of traffic of all Internal Sites (Down direction)

4.4.1.5 MODAL Share

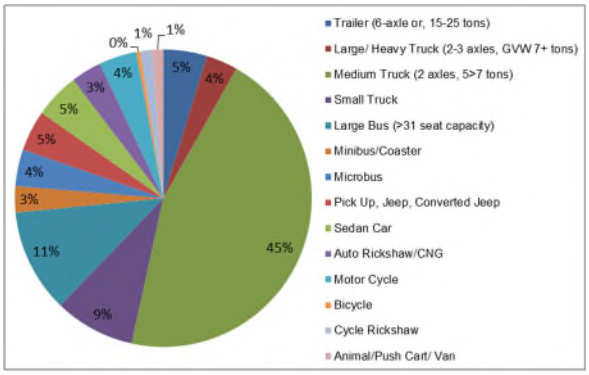
Figure 4-27 to Figure 4-30 represents the modal share of site 01 (external) and site 03 (internal). Rest of the figures have been given in the **Appendix B**. In sites 01 and sites 10 the share of motorized vehicles are high because the locations are on Dhaka-Chittagong highway. Among the vehicles modal share of medium trucks and large bus are high in both directions for both sites. In site 10 considerable amount of pick up and jeeps are observed.

Site 01	Site 10
Medium truck (45%, 36%)	Medium truck (32%, 48%)
Large bus (11% for both directions)	Large bus (14%, 11%)

In the regional highway (site 02) share of auto rickshaw/ CNG, motor cycle, bi-cycle and rickshaw are high. In case of Zila road (site 06) the scenario is same as the scenario of site 02.

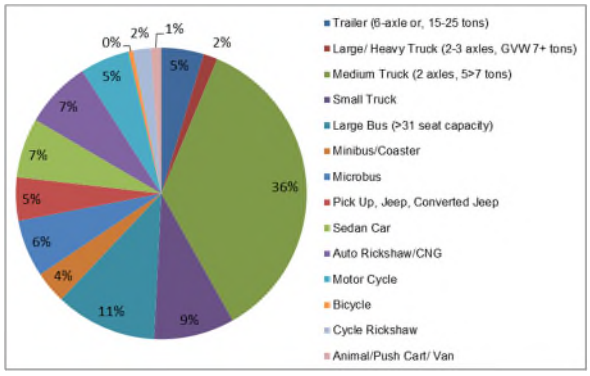
Site 02	Site 06
Auto Rickshaw/ CNG (37%, 33%)	Auto Rickshaw/ CNG (42% for both directions)
Motor-cycle (13%, 16%)	Motor-cycle (20%, 17%)
	Bi-cycle (20% for both directions)

For internal sites (03, 04, 05, 07, 08 and 09) shares of CNG, motor-cycle, rickshaw and bi-cycle are higher than rest of the modes. Shares of CNG varies from 40% to 60% (highest in site 05), motor-cycle 9% to 20% (highest in site 03), rickshaw 3% to 22% (highest in site 03) and bi-cycle 11% to 26% (highest in site 09).



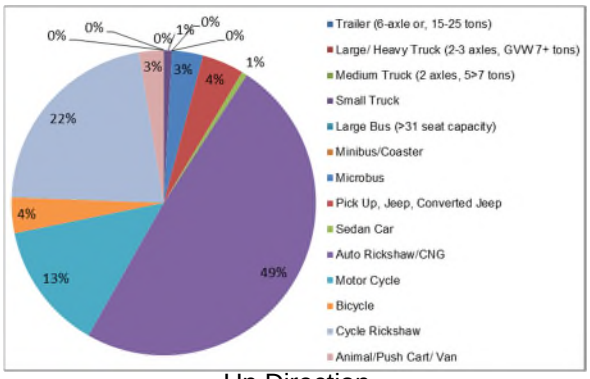
Up Direction

Figure 4-27: Modal share of vehicles on Site 01



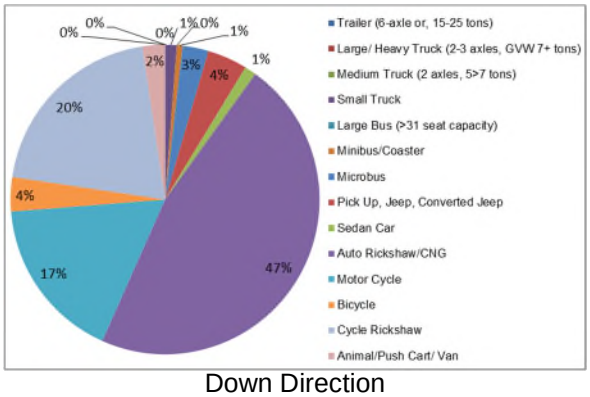
Down Direction

Figure 4-28: Modal share of vehicles on Site 01



Up Direction

Figure 4-29: Modal share of vehicles on Site 03



Down Direction

Figure 4-30: Modal share of vehicles on Site 03

Ranking	Site No.	Peak Hour Volume (Veh/hr)
1	Site- 1	1233
2	Site- 10	1047
3	Site- 2	698
4	Site- 4	566
5	Site- 3	473
6	Site- 8	344
7	Site- 9	261
8	Site- 5	255
9	Site- 7	239
10	Site- 6	184

Figure 4-31: Top Five Location based on Peak Hour Vehicle Volume

Key Findings:
Peak Hour Vehicle Volume at:
- National Highway (N1): 1000- 1250 veh.
- Regional Highway (R151): 600- 700 veh.
- Zila Road (Z1021): 170- 184 veh.
- Upazila Road: 200- 600 veh.

The below table shows the ranking of the survey sites based on the volume of traffic. It is obvious that the sites #1 and #10 has the highest hourly traffic during peak hour because of being on the national highway (N1). The site no. 2 was on the regional highway establishing main connectivity with Khagrachari District and adjacent to a major commercial hub in Hinguli intersection. Therefore, the traffic on that site is understandably high. The site no. 3 also connects Hinguli intersection with a major growth center, Shantir Hat and the condition of that newly improved connecting road is also very good thus making the number of local traffic higher.

The site#4 is located on the old section of Dhaka-Chittagong highway and in the middle of a large bazar in Zorwarganj thana and adjacent to the Baraiyarhat Paurashava. This road which the survey station was located on, is also used for materials and goods movement from the Muhuri project and EZ area; therefore making it the busiest Upazila road in Mirsharai. The location and details of these survey stations are shown in Figure 4-31 and **Table 4.9**.

Table 4.9: Ranking of Survey Locations

Ranking	Site No.	Peak Hour Volume (Veh/hr)
1	**Site- 1**	**1233**
2	**Site- 10**	**1047**
3	**Site- 2**	**698**
4	**Site- 4**	**566**
5	**Site- 3**	**473**
6	Site- 8	344
7	Site- 9	261
8	Site- 5	255
9	Site- 7	239
10	Site- 6	184

4.4.2 Traffic Count in Dhaka EPZ

The following **Table 4.10** and **Table 4.11** show volume of the pedestrian and vehicular traffic at entry and exit points of the Dhaka EPZ and its extension area combined. The pedestrian volume in the peak hour is 25, 602 in total. However, the peaks for entry and exit for vehicular traffic varies depending on the shifting hours and the highest volume at the exit is 807 and 544 at the entry.

Table 4.10: Pedestrian Volume in Dhaka EPZ

Time	Entrance to EPZ	Exit from EPZ
6:00 to 7:00	942	191
7:00 to 8:00	3516	1244
8:00 to 9:00	1035	1074
9:00 to 10:00	641	2172
10:00 to 11:00	500	2777
11:00 to 12:00	384	1895
12:00 to 13:00	436	309
13:00 to 14:00	483	326
14:00 to 15:00	563	1318
15:00 to 16:00	2159	2485
16:00 to 17:00	2961	5197
17:00 to 18:00	**6553**	**19049**
18:00 to 19:00	2946	2970
19:00 to 20:00	2619	2034
20:00 to 21:00	1714	2168
21:00 to 22:00	825	724
22:00 to 23:00	12	53

Table 4.11: Hourly Vehicular Volume in Dhaka EPZ

Time	Entrance to EPZ	Exit from EPZ
6:00 to 7:00	105	49
7:00 to 8:00	478	261
8:00 to 9:00	400	240
9:00 to 10:00	322	366
10:00 to 11:00	355	446
11:00 to 12:00	261	180
12:00 to 13:00	261	198
13:00 to 14:00	318	238
14:00 to 15:00	264	340
15:00 to 16:00	257	496
16:00 to 17:00	194	601
17:00 to 18:00	264	**807**
18:00 to 19:00	135	322
19:00 to 20:00	**544**	343
20:00 to 21:00	282	558
21:00 to 22:00	143	143
22:00 to 23:00	2	4

The Figure 4-32 and Figure 4-33 show the vehicular composition of the traffic movement to and from EPZ. It is found that the Bi-cycle is the most used mode of communication to the EPZ while share of Private Car, Bus and Motorcycle are next.

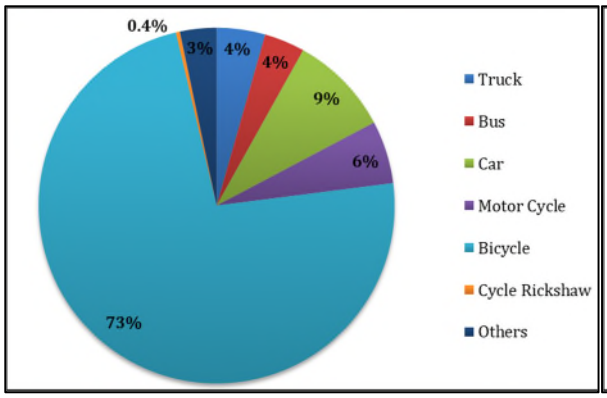


Figure 4-32: Vehicle composition during entrance to EPZ

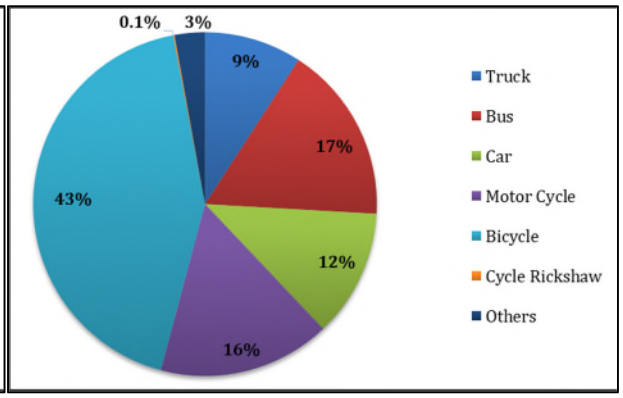


Figure 4-33: Vehicle composition during exit from EPZ

The table below shows the category wise vehicle volume in the 16-hour survey period:

Table 4.12: Volume of EPZ traffic by Category

Category	Entrance	Exit	Total
Truck	576	607	1183
Bus	359	401	760
Car	1290	1383	2673
Motor Cycle	472	661	1133
Bicycle	1617	2263	3880
Cycle Rickshaw	81	79	160
Others	189	198	387

4.5 Origin-Destination Survey

For each site, the OD data collection included information on origin, destination, type of vehicle, purpose of the journey and time of day when the data were collected. Only a fraction of the flow data were obtained as sample for the OD data collection to prepare base year OD matrix for each survey location. In OD matrix origin and destination are aggregated into zones. OD matrices are most important input in Trip Distribution step of Transport modelling. The consultant team has defined 23 zones for preparation of OD matrix. The following section describes how zoning has been done.

4.5.1 Zoning

The first activity involved in a travel demand forecasting is to identify the TAZs for the study area. From the raw OD data for each internal survey locations, the ***catchment areas*** (union, ward, mauza etc.) from which traffic are coming to Mirsharai were identified. Then, the national and regional highways feeding traffic to the study area from outside the internal catchment areas (Other areas outside the Mirsharai such as Dhaka, Chittagong, Rajshahi etc.) were identified. Finally, combining the catchment areas and the relevant road networks, the ODs were aggregated into 23 zones as outlined in Table 4.13. These zoning will be same for the Household survey matrix.

- GIS Map of Mirsharai with all the political boundaries outlined (Union boundaries) was collected from LGED. After that the map was opened in Arc GIS 10.1.
- Also GIS map of Mirsharai including local roads was collected. From that map, all village roads except for RHD roads and the Union and Upazila roads, were eliminated because village roads are too narrow to move vehicle. In most of the case union roads which are too narrow and in poor operating condition were also excluded from the map. This map was also loaded in the same Arc GIS project.

- For ease of analysis, 16 unions were taken into consideration as internal Traffic Assessment Zones.
- External zones were identified based on the national, regional road connectivity.
- Substantial amounts of engineering judgement were also applied by the Consultant team to finalize the 23 zones.

Table 4.13 represents the TAZs for the study area.

Table 4.13: Traffic Assessment Zones (TAZ) for the Study Area

Zone ID	Zonal Catchment
1	Karerhat union
2	Hinguli union
3	Dhum union
4	Zorawargonj union
5	Osmanpur union
6	Durgapur union
7	Katachhara union
8	Ichhakhali union
9	Mirsharai union
10	Mithanala union
11	Shaherkhali union
12	Maghadia union
13	Khaiyachhara union
14	Mayani union
15	Wahedpur union
16	Haitkandi union
17	Chandpur, Noakhali, Lakshmipur
18	Feni, Comilla
19	Dhaka, Rajshahi, Khulna, Mymensingh, Rangpur, Barisal, Sylhet
20	Khagrachhari
21	Fatikchhari
22	Chittagong, Cox's Bazar
23	Mirsharai Economic Zone*

*:Economic zone is still under masterplanning process and requires several years from now to be operational. The zone is supposed to constitute a major portion of the Mirsharai traffic which is currently unavailable and has little effect on the present analyses. This zone is not effective right now and it was created only to be used in the model in a later period.

4.5.2 Household OD Survey

The below table illustrates that the intra-zonal trips is higher in most of the zones except for Khaiyachhara and Mayani where the number of inter-zonal trips is higher than the local trips. Dhum, Durgapur and Shaherkhali also produces considerable amount of inter-zonal trips. The higher number of intra-zonal trips in most cases may be due to the fact that most of the facilities such as rural markets, educational institutions, health facilities, administrative and other offices etc. are available within most zones and the local inhabitants do not usually have to move to other zones or distant places for their day-to-day activities. However, the zones with higher amount of inter-zonal traffic are more dependent on other zones for their day to day activities.

The graphical representation of these statistics and findings can be found in **Appendix B**.

Table 4.14: Intra-zonal and Inter-zonal trip in each zone

Zone Name	Intra-zonal Trips (%)	Inter-zonal Trips (%)
Karerhat	84	16
Hinguli	98	2
Dhum	**51**	**49**
Zorawargonj	70	30
Osmanpur	58	42
Durgapur	53	47
Katachhara	80	20
Ichhakhali	88	12
Mirsharai	89	11
Mithanala	78	22
Shaherkhali	52	48
Maghadia	79	21
Khaiyachhara	**17**	**83**
Mayani	**39**	**61**
Wahedpur	95	5
Haitkandi	59	41

Table 4.15: Origin-Destination Matrix in Zone- 1 (Karerhat)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	84%	5%		1%														2%				
2	5%								1%													
3																						
4	1%																					
5																						
6																						
7																						
8																						
9	1%																					
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18	2%																					
19																						
20																						
21																						
22																						

Table 4.16: Distance from Each Zone to Different Zones in Average Time Value (Minutes)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	18.2	27.8	-	45.0	-	-	-	-	-	-	-	-	-	-	-	-	-	41.3	-	-	-	-
2	-	16.3	30.0	-	-	-	-	-	25.0	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	28.3	17.1	20.0	30.0	-	-	20.0	50.0	-	-	-	-	75.0	45.0	-	-	-	-	-	-	120.0
4	-	15.0	20.0	14.0	-	25.0	-	-	30.0	-	-	-	-	-	-	-	-	-	-	-	-	60.0
5	-	36.7	-	18.6	15.2	-	10.0	-	-	-	-	-	-	-	5.0	-	-	60.0	-	-	-	-
6	-	40.0	-	30.0	-	18.0	30.0	20.0	22.5	-	-	-	-	-	40.0	-	-	-	-	-	-	116.7
7	-	-	-	-	-	14.0	14.3	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	60.0	-	-	30.0	-	-	12.5	30.0	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	60.0	-	-	12.0	23.3	-	-	-	-	30.0	-	30.0	-	-	-	-	120.0
10	-	-	-	-	-	-	10.0	-	26.3	16.8	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	45.0	19.3	-	45.0	9.4	29.0	80.6	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	32.0	60.0	-	17.6	-	15.0	60.0	-	-	30.0	-	-	-	-
13	-	40.0	-	-	-	60.0	-	-	23.4	-	-	-	16.6	-	28.8	-	-	-	-	-	-	92.9
14	-	60.0	-	-	-	60.0	-	-	25.0	-	-	18.9	20.0	17.5	36.7	20.0	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	22.5	-	18.6	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	280.0	-	11.7	-	-	-	29.4	15.3	-	-	-	-	-	90.0
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4.17: Distance toward Each Zone from Different Zones in Average Time Value (Minutes)

Destination	Origin																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	30.0	-	27.7	14.0	36.7	40.0	-	45.0	-	-	-	8.0	40.0	60.0	-	-	-	-	-	-	-	-
3	-	30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	50.0	-	20.0	-	18.5	30.0	-	-	-	-	10.0	-	-	30.0	-	-	-	-	-	-	-	-
5	-	-	40.0	-	-	-	-	30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	25.0	-	-	14.0	-	-	-	-	-	60.0	60.0	-	-	-	-	-	-	-	-
7	-	-	-	-	10.0	30.0	-	-	-	10.0	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	30.0	-	-	20.0	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	75.0	-	32.5	30.0	-	23.1	-	10.0	-	27.5	-	32.0	24.3	11.4	-	40.0	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	23.3	-	45.0	60.0	-	-	-		-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.7	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	-	15.8	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	45.0	-	-	20.0	22.5	-	-	-	-	-	-	-
14	-	-	75.0	-	-	-	-	-	-	-	9.3	15.0	-	-	-	-	-	-	-	-	-	-
15	-	-	45.0	-	5.0	-	-	-	30.0	-	47.0	-	32.5	38.7	-	24.4	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	80.0	-	-	20.0	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	56.7	-	-	-	60.0	-	-	-	-	-	-	30.0	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	120.0	60.0	-	116.7	-	-	120.0	-	-	-	85.7	-	-	60.0	-	-	-	-	-	-

The **Table 4.15** shows the origin-destination matrix for Zone-1, Karerhat that represents the distribution of household trips originating from Karerhat. Similar matrices for other zones are given in **Appendix B**. To represent the trips distance in terms of Time Value (mins) two matrices are shown in **Table 4.16** and **Table 4.17** for outgoing and incoming trips for all zones.

Ranking of Zones/ Functional Relationship

The below tables (**Table 4.18** to **Table 4.20**) show the top zones making Intra-zonal and Inter-zonal trips; and those O-D Pairs having the highest trips in between them. The possible causes for the below zones having highest intra-zonal trips have been already discussed earlier in this section. On the other hand, Khaiyachhara, Mayani, Dhum, Shaherkhali and Durgapur are the top zones that make mostly inter-zonal trips; that is they depend on other zones for day to day activities because of lack of facilities and development within that zone.

The graphical representation of the highest Intra- and Inter-zonal trips can be obtained from **Figure 4-34**.

Table 4.18: Ranking of Zones based on Intra-zonal Trips

Zone Ranking	Zone Name	Intra-zonal Trips (%)
1	Hinguli	98
2	Wahedpur	95
3	Mirsharai	89
4	Ichhakhali	88
5	Karerhat	84
6	Katachhara	80
7	Maghadia	79
8	Mithanala	78
9	Zorawargonj	70
10	Haitkandi	59
11	Osmanpur	58
12	Durgapur	53
13	Shaherkhali	52
14	Dhum	51
15	Mayani	39
16	Khaiyachhara	17

Table 4.19: Ranking of Zones based on Inter-zonal Trips

Zone Ranking	Zone Name	Inter-zonal Trips (%)
1	Khaiyachhara	83
2	Mayani	61
3	Dhum	49
4	Shaherkhali	48
5	Durgapur	47
6	Osmanpur	42
7	Haitkandi	41
8	Zorawargonj	30
9	Mithanala	22
10	Maghadia	21
11	Katachhara	20
12	Karerhat	16
13	Ichhakhali	12
14	Mirsharai	11
15	Wahedpur	5
16	Hinguli	2

The following table shows the top 10 OD Pairs; which means these pair of zones are the highest to make trips in between those. **It is noteworthy that Mirsharai, Hinguli and Zorwarganj are common in most pairs with Mirsharai forming 4 of such pairs (red highlighted).** The reason for this is Mirsharai is the administrative head quarter of the Upazila and is one of the two paurashavas; therefore, most of the govt. and non-govt. offices are located here which attracts people from every corner of the upazila. Whereas, the other Baraiyarhat Paurashava is located in Hinguli and it is a major hub of commercial activities both within the upazila and beyond. The busiest intersection connecting the highway, regional highway and 2 other internal roads; is also in Hinguli. Again, Zorwarganj is a Thana just beside Hinguli and a lot of development is observed around this area. These causes trips to be attracted to these three zones. This fact is graphically presented in **Figure 4-35**.

Table 4.20: Top Ten (10) OD Pairs based on Inter-zonal Trips

Zone	Trip (%)	Zone	Ranking
Khaiyachhara	29	Mirsharai	1
Dhum	15	Hinguli	2
Osmanpur	14	Zorwarganj	3
Durgapur	13	Mirsharai	4
Haitkandi	12	Wahedpur	5
Zorawarganj	11	Hinguli	6
Mithanala	10	Mirsharai	7
Shaherkhali	10	Haidkandi	8
Mayani	10	Maghadia	9
Maghadia	7	Mirsharai	10

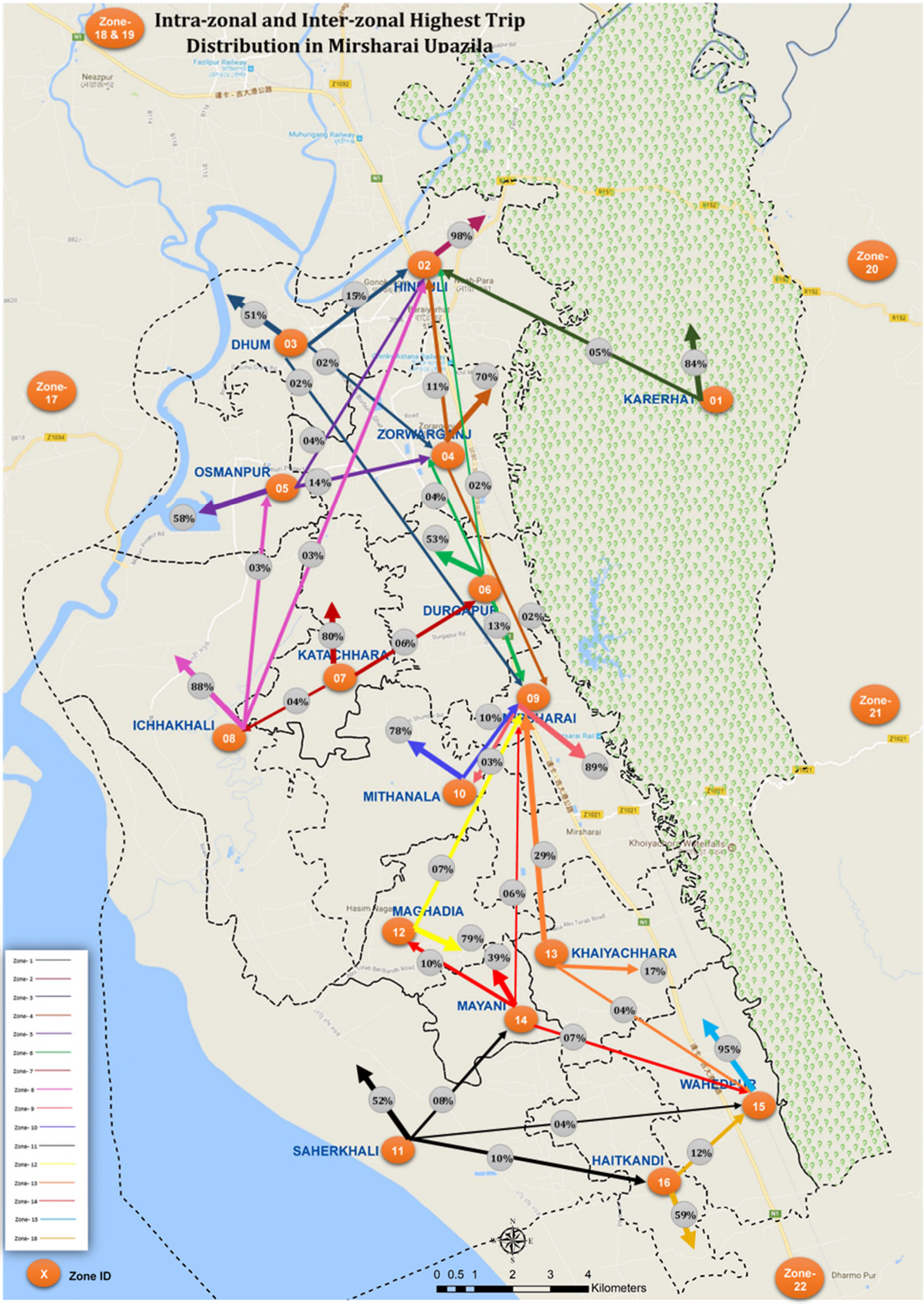


Figure 4-34: Highest Intra-zonal and Inter-zonal Trip Distribution in Mirsharai Upazila

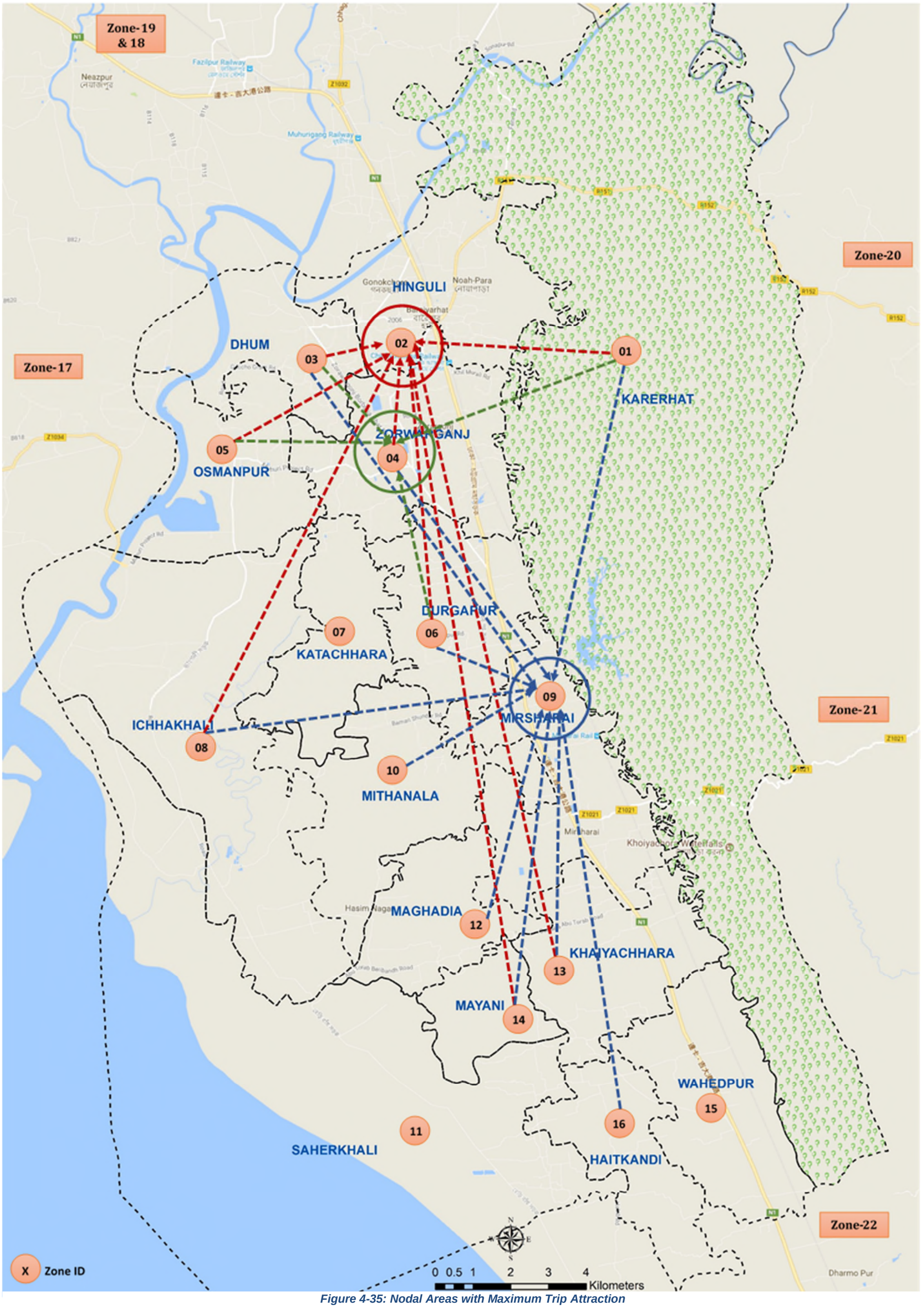


Figure 4-35: Nodal Areas with Maximum Trip Attraction

Strengths

The below table shows the intra-zonal trips by purposes for each zone. The green highlighted cells represent the **very high** and **high** intra-zonal trips within a zone. It indicates that those zones having higher internal trips have **enough facilities** within themselves to serve those purposes.

Table 4.21: Comparison of Zones based on Intra-zonal Trip Purpose

Zone Name/ ID		Karerhat (1)	Hinguli (2)	Dhum (3)	Zorawarganj (4)	Osmanpur (5)	Durgapur (6)	Katachhara (7)	Ichhakhali (8)	Mirsharai (9)	Mithanala (10)	Shaherkhali (11)	Maghadia (12)	Khaiyachhara (13)	Mayani (14)	Wahedpur (15)	Haitkandi (16)
Purpose	Work	Very High	Moderate	Very Low	Moderate	Low	High	Low	Low	Very High	High	Very Low	Very High	Very Low	Low	Very High	Very Low
	Educational	High	Very High	Low	High	Low	High	Moderate	High	Moderate	Very Low	High	Very High	Very Low	Low	Low	Very Low
	Shopping	Very High	Moderate	Very High	Moderate	Very Low	Low	Low	High	Low	Low	Moderate	Moderate	Very Low	Low	Low	Moderate
	Recreational	Very High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
	Others	Moderate	Very Low	Low	Very High	Very High	Very Low	Moderate	Very Low	Very Low	High	Moderate	Moderate	Moderate	Low	High	Very High

Deficiencies

The below table demonstrates the overall picture of inter-zonal trips for different zones. It can be interpreted from the red highlighted (**very high** and **high** inter-zonal trips) cells that those particular zones are dependent on other zones for respective purposes and the required **facilities to serve those purpose lack in that zone**.

Table 4.22: Comparison of Zones based on Inter-zonal Trip Purpose

Zone ID		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Zone Name		Karerhat	Hinguli	Dhum	Zorawarganj	Osmanpur	Durgapur	Katachhara	Ichhakhali	Mirsharai	Mithanala	Shaherkhali	Maghadia	Khaiyachhara	Mayani	Wahedpur	Haitkandi
Purpose	Work	Moderate	Very Low	Very High	Moderate	High	Very High	Very Low	Low	Very Low	Low	Low	Moderate	High	Very High	Very Low	Moderate
	Educational	Low	Very Low	Moderate	Very Low	Low	High	Very Low	Very Low	Low	Very Low	High	Low	High	Very High	Very Low	Moderate
	Shopping	Very Low	Very Low	Very Low	Low	Very Low	Low	Very Low	Very Low	Very Low	Very Low	Moderate	Very Low	Very High	Very Low	Very Low	Very Low
	Recreational	Very High	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Moderate	Very Low	Very Low	Very Low
	Others	Moderate	Very Low	Moderate	High	Low	Very Low	Low	Very Low	Low	Very Low	Very High	Moderate	Very High	Very Low	Very Low	Moderate

4.5.3 Roadside OD Survey

The roadside OD survey was carried out in both the external and internal survey stations along with the traffic count survey. However, for the internal locations only the peak hours were taken into consideration to obtain comprehensive OD information except for two internal stations; Muhuri Project Road (one of the access roads of EZ) and Shantir Hat (connecting Baraiyarhat intersection) where both peak and off-peak traffic were observed. The model will consider highest volume of traffic and so the OD matrices are also prepared accordingly focusing the peak hours at different survey stations.

The Table 4.23 to Table 4.26 show the OD matrices for peak and off-peak hours of one external station (Baraiyarhat Foot Overbridge) and one internal station (Muhuri Project road). Similar tables for other stations are given in **Appendix B**. From the internal OD matrices, it can be observed that trips are mostly within the zone and in between adjacent zones. As seen from the Household OD survey, this can be easily explained as the trips are mostly educational, shopping and work trips and the local people usually do not have to travel distant places for these purposes. In case of the External Locations, different scenario was observed because those stations were located in roads serving regional connectivity; National & Regional Highways and Zilla road. The OD matrices for all the external stations are however not the same. It is explained below:

Baraiyarhat Foot Overbridge and Boro Darogar Hat: These two locations are situated at the entry and exit points of the study area both on the Dhaka-Chittagong National Highway (N1); therefore the OD matrices for these two stations show similar characteristics mainly having External-External trips. The highest OD pair is between Dhaka (Zone ID: 19) and Chittagong (Zone ID: 22) Zones. Several Internal-External movement are also seen.

Baraiyarhat Rail Crossing: this station is located on the regional highway (R151) connecting Khagrachhari district with the National Highway. Therefore, a major portion of the traffic is from that region travelling to distant parts of the country. However, from the matrix it is evident that even in this external point, the highest trips are made within the zone. This may be because people usually move using the available short distance MUCM and for goods, a large portion of the truck traffic is using an alternate route for some reason. Also, there are few bus services along this route.

Mirsharai Stadium: this station is located on the Zilla road (Z1021) connecting Fatikchhari Upazila (Khagrachhari) with Mirsharai. On the contrary, the survey shows that the road serves very few external trips because of its narrow width and congested opening. In addition, this road is restricted for heavy traffic and thus no trucks and buses can enter this road.

Table 4.23: Origin-Destination Matrix: Location- Baraiyarhat Foot Overbridge (Peak Hour)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																						5	
2	5	50				10			5													10	
3																							
4																							
5		5							5														
6																							
7																							
8																							
9	5	5							5													5	
10																							
11		5																					
12																							
13																							
14																							
15																							
16																							
17									5													95	
18	25	150							35				5						5	40		260	
19	5	15							10				10			5			5	10		415	
20																							
21																							
22																				5		5	
23																							

Table 4.24: Origin-Destination Matrix: Location- Baraiyarhat Foot Overbridge (Off-Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																						4	
2	4	40				8			4													8	
3																							
4																							
5		4							4														
6																							
7																							
8																							
9	4	4							4													4	
10																							
11		4																					
12																							
13																							
14																							
15																							
16																							
17									4													75	
18	20	118							28				4						4	32		204	
19	4	12							8				8			4			4	8		325	
20																							
21																							
22																				4		4	
23																							

Table 4.25: Origin-Destination Matrix: Location- Muhuri Project Road (Peak Hour)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2																							
3				26																			
4		26		52		6		6	6													11	
5		57	6	170		6		6	11				6		6				6		6	42	
6																							
7																							
8		11		42	6																		
9		6																					
10																							
11																							
12				6																			
13																							
14																							
15																							
16																							
17				6																			
18		6																6					
19				26	6																		
20																							
21																							
22		6																					
23																						6	

Table 4.26: Origin-Destination Matrix: Location- Muhuri Project Road (Off-Peak Hour)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2																							
3				11																			
4		11		22		3		3	3													5	
5		24	3	72		3		3	5				3		3				3		3	18	
6																							
7																							
8		5		18	3																		
9		3																					
10																							
11																							
12				3																			
13																							
14																							
15																							
16																							
17				3																			
18		3																3					
19				11	3																		
20																							
21																							
22		3																					
23																						3	

4.6 Travel Time Survey

The consultant's survey team has carried out the travel time study for 7 routes within Mirsharai Upazila. The detailed methodology and the description of the selected routes are already described in **Section 3.2.6**. The table below demonstrates the travel time (hour), total distances covered (km) and average speed (in km/ hr) of each route.

Table 4.27: Findings from the Travel Time Survey

Route No.	Total travel time (hour)	Total distance (km) (from GIS map)	Average Speed (km/ hr)
Route 1	2.20	43.39	20
Route 2	Inaccessible via passenger car due to bad road condition		
Route 3	0.28	4.54	16
Route 4	Inaccessible via passenger car due to bad road condition		
Route 5	1.23	14.39	12
Route 6	0.43	9.46	22
Route 7	0.38	7.42	19

However, the team could hardly access two of the 7 study routes- Route 2 and Route 4; and those data are not shown in the table as due to poor road condition it was not possible to travel using a passenger car. The total distance of Route 2 is 6.51 km (calculated from GIS). The survey team only could access the route from Maulavi bazar to Brindabonpur travelling 9 min. In case of route 4, the team could travel from Thakur dighi bazar to Julanpur bazar within 24 min, however, could not access further due to bad road condition. The distance of entire route is 11.53 km (calculated from GIS) and the survey vehicle could travel only 7.71 km approximately.

The average travel speed for different routes varied between 12 kph to 22 kph with Route 6 having highest speed and route 5 the lowest. The roads were observed to have narrow carriage width considering the requirements for two vehicles to pass side by side. The roads had several sharp turns as well. Also, the number of NMV is very high on these roads slowing down the motorized vehicles. The routes going through the bazar areas exhibited low travel speed automatically due to pedestrian movement across the roads and unauthorized parking of CNG/ Auto-rickshaws encroaching the road.

For better understanding a graphical presentation has been given in Figure 4-36.

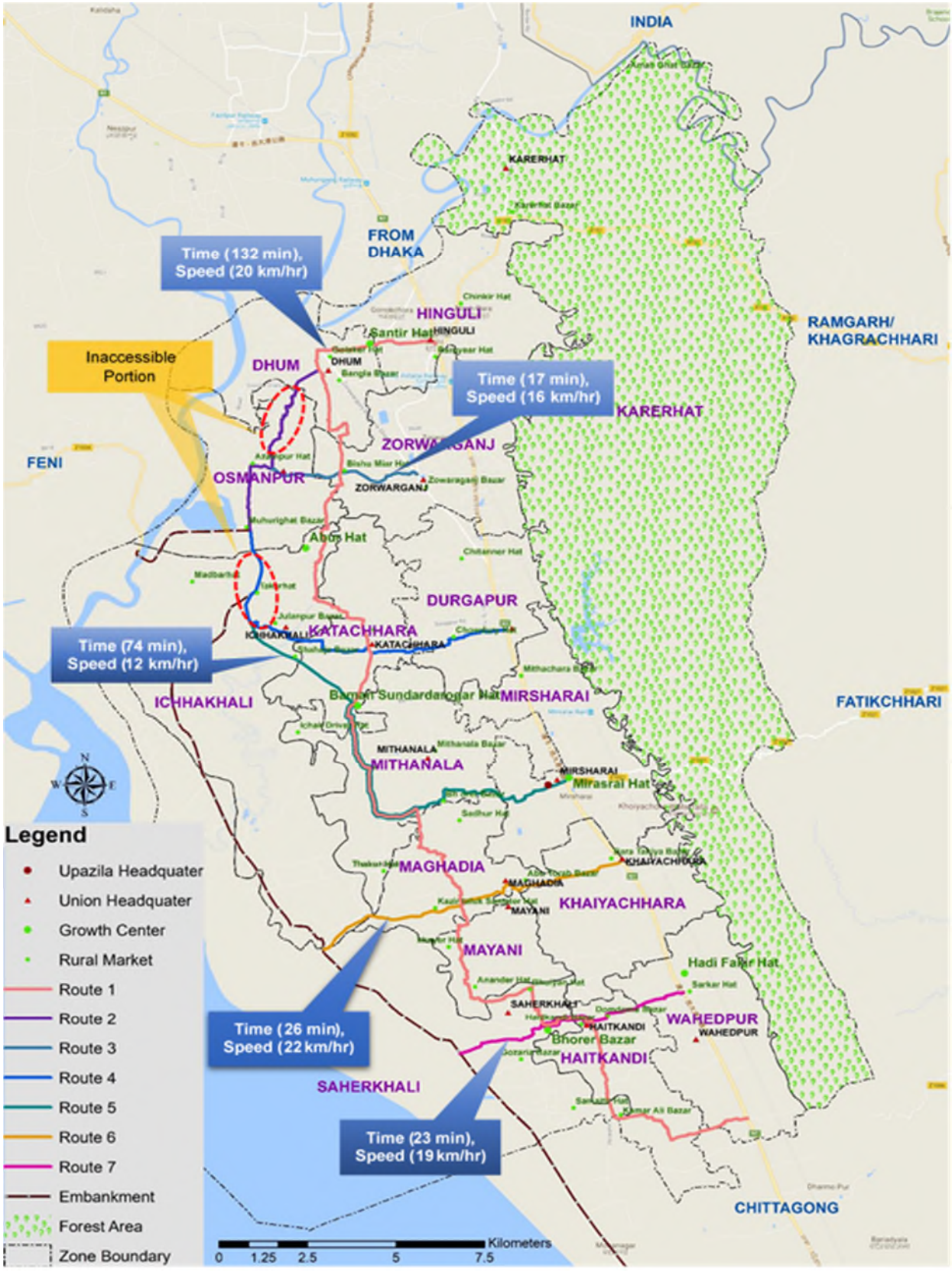


Figure 4-36: Speed and Travel Time in different routes

4.7 Stakeholder Interview

From the stakeholder interviews conducted with various stakeholders has brought about the following findings/ requirements for a comprehensive transportation planning for Mirsharai:

Widening of the Mirsharai-Fatikchhari Road (Z1021) is important for improved regional connectivity
The Regional Highway R151 connects the Ramgarh Land Port and needs improvement (particularly risky bailey bridges)
Accommodation of good drainage system along with road design to eradicate flooding in municipal areas
Increased and safer accessibility to and in between the tourist spots to be ensured to attract foreigners
Provision of Parking facility in the tourist spots
A flyover at Baraiyarhat intersection can reduce congestion & facilitate EZ traffic movement to Ramgarh Land Port
Possible options could be there for accessing the EZ sites; which are **(i) Hinguli-Santir Hat-Dhum-Azampur Hat-Muhurighat Bazar-EZ Embankment;** **(ii) Zorwarganj-Bishu Miar Hat- Azampur Hat-Muhurighat Bazar-EZ Embankment;** **(iii) Mithachhara to Embankment via Baman Sundar Hat GC;** **(iv) Thakur Dighi Bazar to EZ embankment through Chowdury Hat and Julanpur Bazar (Ichhakhali)** **(v) Dhumghat bridge-Golakar Hat-Azampur Hat to EZ via Muhurighat Bazar**
Widening is required for the municipal (LGED) roads to eradicate traffic congestion
The Zorwarganj-Borburia Ghat Road can be reconstructed with a bridge across the river Feni to connect with the national highway with EZ bypassing the Baraiyarthat intersection
Better access to public transport and walking facility for the local people
Designated terminals for public bus, pick-ups, rent-a-cars, and other UCMs/ NMVs
To avoid accidents pedestrian's safety has to be ensured with necessary facilities and law enforcement
All the traffic will be using roadways and the cargos have trips from different ports mainly from Chittagong Port
A rail alignment is required passing through the EZ such as Fazilpur- Mirsharai Economic Zone- Sitakundo

5 PROPOSED TRANSPORTATION NETWORK

It is to be mentioned here that the consulting team found the existing road network to be adequate to satisfy the travel demand exhibited by Mirsharai upazila dwellers. The issue with congestion was mainly on the Dhaka-Chittagong highway, supporting the external-external trips as well as in major intersections connecting with this highway. While the congestion on Dhaka-Chittagong highway can be attributed to both high demand as well as traffic management, the congestion in the internal roads, specially during office hours or at the start or end time of activities of educational institutes can mainly be attributed to traffic management and encroachment of road carriage width by parked vehicles, pedestrians, temporary shops, etc.

As part of the activities of the 'Final Report', a travel demand forecasting model will be constructed satisfying the needs of the future land use. However, for that, it is essential to commence the model iteration with a proposed network. The purpose of this section is to present that proposed network.

After compiling the data and information gathered during the reconnaissance survey and stakeholder interviews along with investigating the findings from various survey, the consulting team ran several brain storming sessions to come to the conclusion that a sustainable transportation system in Mirsharai will vastly depend on strict enforcement of a land use plan based on which the future transportation network can be proposed.

The consultants broadly divided the study area into four parts–

i) The BEZA Economic Zone,

ii) The Model Town to be proposed by UDD at the outskirt of BEZA with Mirsharai HQ on its east,

iii) The existing habitation of Mirsharai, and,

iv) The eco-tourism zone located at the east of the Dhaka-Chittagong highway.

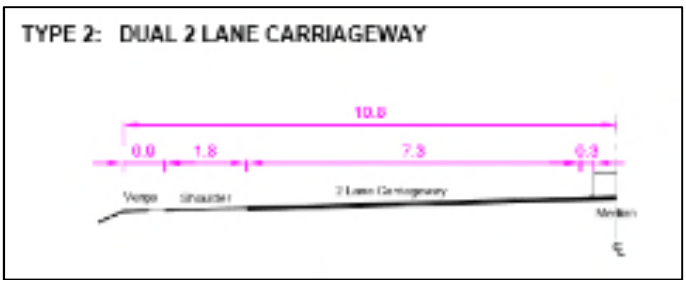
The proposed sustainable transportation plan for the next 20 years will be based on the idea that each of these zones will be able to entertain their internal traffic demand with their internal transportation network. There will be semi access controlled roads connecting between each of these roads with the sole purpose to cater for the inter zonal traffic. Finally, each of these zones will have direct connectivity to the Dhaka-Chittagong highways and a Ring Road encircling the entire Upazila will be proposed to entertain the bypassing EZ traffic, long distance internal trips within Mirsharai and keeping the highway traffic uninterrupted. The western half of the circular road will be used mainly for the EZ traffic movement while the other half along the Dhaka-Chittagong railway alignment on the East will have a major impact in the tourism development. The consulting team also believes that it is imperative that the land use adjacent to the proposed transportation network is strictly maintained so that each component of the proposed network can retain its functional classification.

The possible future road network for Mirsharai proposed by the consultant team also recommends three flyovers connecting Mirsharai to Ramgarh (Khagrachhari), Fatikchari and the third one completing the proposed Circular road without hindering the operation of the Dhaka-Chittagong highway. For connecting the tourist spots walking/ bi-cycle trail has also been proposed along the railway and proposed circular road. The Figure 5-1 represents the possible future road network of Mirsharai.

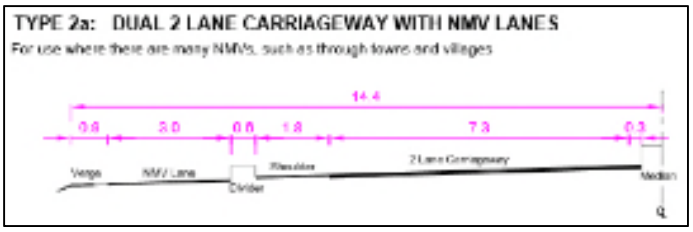
5.1 Choice of Road Design Standard

The consultants have studied the design standards of both RHD and LGED, and the capacity of different classes of the two road authorities. After a thorough review of the same and considering the requirement of the future traffic the newly proposed roads are based on three RHD design standard (Type 2, Type 2a and Type 3a) as presented below:

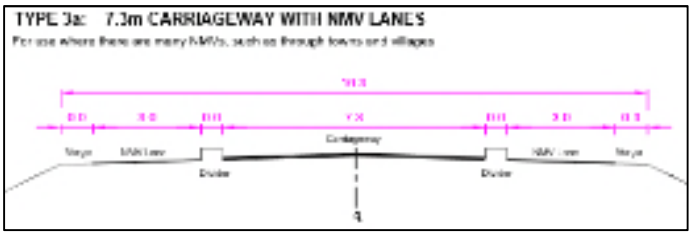
- Road Type 2:
Maximum capacity: 4500 PCU/hr.



- Road Type 2a:
  - For use where there are many NMVs, such as through towns and villages
  - Maximum capacity: 4500 PCU/hr.



- Road Type 3a
  - For use where there are many NMVs, such as through towns and villages
  - Maximum capacity: 2100 PCU/hr.



It is to be mentioned here that the consultants acknowledge that most of the roads within the project area are under the jurisdiction of LGED. At the same time, the national plans summarized in this inception report suggest that seamless connectivity should be provided between the economic zone and the national highway. Acknowledging that, for the development of the travel demand forecasting model, the consulting team will be evaluating both LGED (category 3 and 4 as shown in the table below) and RHD standards. The LGED standards are governed by the peak hour PCU as presented with *Table 5.2*.

Table 5.1: Geometric Design Standards (LGED)

Design Type	Carriageway (m)/ (ft)	Hard shoulder (m)/ (ft)	Verge (m)/ (ft)	Crest Width (m)/ (ft)
8	3.0/ 10	0.0/ 0	1.25/ 4	5.5/ 18
7	3.7/ 12	0.0/ 0	0.90/ 3	5.5/ 18
6	3.7/ 12	0.0/ 0	1.8/ 6	7.3/ 24
5	3.7/ 12	0.9/ 3	0.90/ 3	7.3/ 24
4	5.5/ 18	0.0/ 0	2.15/ 7	9.8/ 32
3	5.5/ 18	1.2/ 4	0.95/ 3	9.8/ 32

Table 5.2: Traffic Criteria for Design of Roads (LGED)

Design Type	Peak hour maximum passenger car units (PCU)	Daily commercial vehicles maximum (trucks and buses)
8	(90)	50
7	(130)	100
6	(210)	200
5	(290)	300
4	530	600
3	800	

Note: For types, 5, 6, 7 and 8 the criterion should be daily commercial vehicles. For types 3 and 4 criterion should be peak hour PCU's.

The consulting team will be evaluating the traffic demand during peak hours from Mirsharai SEZ by comparing the land area and traffic demand from Dhaka EPZ as Mirsharai EZ is currently under construction and there is no traffic to and from it at this moment.

From the Traffic Count Survey at Dhaka EPZ, it was found that the traffic volume at peak hour is 1071 veh./hr. and that of the commercial vehicles (truck and bus) for 16 hours is 1943 veh. (see Table 4.12). Moreover, the number of pedestrian traffic is 25, 602 in the peak hour and the largest share of the vehicular traffic is occupied by Bi-cycle. These numbers will multiply 3-4 times in case of Mirsharai EPZ (BEPZA zone) by 2025 and 7-8 times for Mirsharai SEZ (BEZA zone) within 25 years. These figures indicates that the LGED standard roads (*Table 5.1* and *Table 5.2*) will not be sufficient to carry the traffic of the EZ let alone the traffic of whole Mirsharai in future. Moreover, the LGED roads do not have the provision for NMV lanes where NMVs form a major portion of the EZ traffic. These facts led the consultants to follow the RHD design standards while proposing the future road network for Mirsharai.

5.2 Future Road Network

The future road network is planned and being proposed keeping in mind the four major aspects as described in the previous section. The proposal also emphasizes on the SDG 11 targets of providing access to public transport for the mass people and walkability improvement with pedestrian safety. Different components of the proposed road network, their features and necessary justification are discussed in the following sub-sections:

5.2.1 Circular Road and Interchanges

Circular Road *(marked as dark violet)*

This proposed circular/ ring road will encircle entire Mirsharai Upazila.

Alignment: The tentative alignment will mainly be composed of mainly the EZ embankment road and along the existing Dhaka-Chittagong railway. It will go through the major locations of the Upazila such as; Hinguli, Mohamaya, Mirsharai, Hadi Fakir Hat, Boro Darogar Hat, Samitir Hat, EZ Embankment, Muhurighat Bazar, Azampur Hat and Shantir Hat.

Road Features: It will be a 4-lane road with service road on both sides (RHD standard- type 2a). A 40 feet pedestrian walkway on the inner part will also be there to accommodate the large pedestrian traffic of EZ and Mirsharai.

Purpose:

- to establish smooth vehicular traffic circulation through and around Mirsharai, with an overall improvement of the regional connectivity
- to bypass the EZ traffic via possible Baraiyarhat Bypass towards Feni and via Marine Drive road to Chittagong

Interchanges/ Flyovers *(marked as red circle)*

The proposed future road network for Mirsharai recommends three flyovers connecting Mirsharai to Ramgarh (Khagrachhari), Mirsharai to Fatikchari (an alternative access to Chittagong) and the third one completing the proposed Circular road without hindering the operation of the Dhaka-Chittagong highway. The tentative location of the interchanges are shown in Figure 5-1 in red circles along the highway N1.

Interchange 1: Hinguli Intersection

This interchange is intended to connect the two ends of the proposed circular road intersected by the highway and the overpass the regional traffic from Ramgarh and Feni from R151.

Interchange 2: Mirsharai Intersection

This interchange will establish a direct connection between the two parts of the Mirsharai Paurashava divided by the highway and a direct communication from EZ to Fatikchhari and

Chittagong later on. The interchange will also facilitate the foreigners from EZ to easily access the tourist spots and related development on the East.

Interchange 3: Boro Darogar Hat

The interchange will complete the southern end of the circular road.

5.2.2 Network Connectivity with Economic Zone

East-West Highways Connecting Dhaka-Chittagong Highway (RHD Road Type 2a) *(marked as brown line)*

- These roads will be access controlled connecting Dhaka-Chittagong highway (N1) on the East and EZ on the West
- Width of these roads will be 28.8 m and will be designed following RHD Road Type 2a standard
- There will be 4 lanes and NMV service roads (NMV) including 30 feet pedestrian walkway on both sides

Alignment:

Alignment 1: Zorwargonj - Bishu Miar Hat- Osmanpur-Azampur Hat- Murhrighat Bazar-Embankment (Already been proposed by BEZA as access road to EZ)
Alignment 2: Chowdury Hat-Katachara-Julanpur Bazar-Embankment
Alignment 3: Mirsharai- Mithanala Bhorer bazar- Embankment
Alignment 4: Boro Takiya Bazar- Abu Torab Bazar- Kazir Taluk- Embankment which is now under construction
Alignment 5: Sarkar Hat - Domdoma Bazar – Shaherkhali Bhorer Bazar - Embankment
Alignment 6: Boro Darogar Bazar-Kamar Ali Bazar-Samaitir Hat-Embankment

Purpose:

- These roads will mainly connect the Economic Zone (EZ) and the Model Town with the Highway and also serve the internal traffic of Mirsharai with service roads.
- These roads will be heavily access controlled and North-South local traffic movement will be allowed only at intersections where North-South major highway intersects with these roads.

Rail Road

Proposal of possible railroad connection shall have to be planned after the discussion with Bangladesh Railway (BR) especially after completion of the Economic Zone Masterplan by BEZA. However, the probable rail connectivity could be from Fazilpur (Feni) or, Old/ New Muhuriganj Station to the EZ along the embankment.

Port Connectivity

The embankment road is connected with Marine Drive road and Dhaka-Chittagong Highway on the South eventually connecting with the Chittagong and Sitakunda Port. On the North, the Circular road and the Interchange at Hinguli will connect EZ with Ramgarh and Belonia Land Ports.

5.2.3 Network Connectivity within Mirsharai

North-South Highways (RHD Type 2a) *(marked as purple color line)*

- These roads will form artery for the local traffic generated from Mirsharai and destined to various parts of Mirsharai where trip length is high
- These will act as collector and distributor of trips from the habitat within Mirsharai
- Through these roads local traffic will cross the East-West roads connecting Economic Zone.
- The road width and components will be as same as that of East-West Highways

Alignment:

The proposed roads are:

Alignment 1: Kamar Ali Bazar-Samaitir Hat-Gozaria Bazar-Anander Hat-Khayer Hat-Kazir taluk-Thakur Hat-Sufia Bazar-Ichak Driver Hat-Shahaje Bazar-Julanpur Bazar-Abur Hat-Bishu Miar Hat-Bangla Bazar-Golaker Hat
Alignment 2: Chaitanner Hat-Chowdhury Hat-Mithanala Bazar-Mithanala Bhorer Bazar-Shadhur Hat-Abu Torab Bazar-Haidkandi Bazar-Kamar Ali Bazar.

East-West Roads Connecting North-South Highways (RHD Road Type 2) *(marked as red color line)*

These roads will be connected with the North-South roads to increase mobility of local traffic and the width of such links will be 21.6m including service roads. These roads will also have 30 feet wide pedestrian walkways on both sides.
Alignment:

Proposed links are:
Alignment 1: Chitanner hat-Abur hat
Alignment 2: Chowdhury hat-Katachara-Shahaji Bazar
Alignment 3: Mithanala Bazar-Sufia Bazar
Alignment 4: Bhuiya hat-Anander hat

Purpose: increase mobility and linkage between North-South highways

5.2.4 Connectivity with Proposed Model Town

There will be another circular road encircling the proposed model town, which will be aligned with the outer circular road/ EZ embankment. The road will have 4 lanes and a width of 28.8m with 30feet pedestrian walkway. The road is identifiable by the blue colored line around the model town shown in Figure 5-1.

5.2.5 Network Connectivity with Tourist Spots

Vehicular Access to Mohamaya and Khaiyachara; 2 Lane Undivided Road (RHD Road Type 3a) *(marked as dark green color line)*

The existing access roads to Mohamaya Eco Park and Khaiyachhara Waterfalls are proposed to be widened to two-lane undivided 16.3m wide roads with 30' pedestrian walkway/ NMV lanes.

Alternative Access to Khaiyachhara and Bolalia Waterfalls (RHD Road Type 3a) *(marked as olive green color line)***:**

A new alignment is proposed to access the two waterfalls; Boalia and Khaiyachhara. The alignment starts from Mirsharai Bazar following the existing Mirsharai-Narayanhat-Fatikchari Road (Z1021) alignment.

The width of the proposed access will be 16.3 m undivided pavement with good drainage on both sides.

Benefits:

The access through Mirsharai bazar will help tourism development in manifolds, such as:

- It will take the tourists vehicles especially groups including **elderly, disabled and infants;** straight to the middle portion of the 13 stepped waterfall; whereas following the existing access road, they have to walk a long way to reach to bottom of the waterfall and trek further to the top.
- This road will ensure safety of the tourists with prompt medical and police support in case of any event.
- The access will cover two major waterfalls at a time and also entertain the regional connectivity (with Fatikchari)

Walkway/ Bi-cycle Trail *(marked as black color line)*

A paved walkway or bi-cycle trail (40 feet) has been proposed parallel to the railway track and next to Circular Road; so that tourists can easily access the sites and enjoy the beauty of the village site without affecting the environment. The road will start from from Baraiyarhat and continue to Boro Darogar Hat touching most of the tourist spots of Mirsharai.

Ropeway *(marked as blue dotted line)*

Following the technologies used in modern countries, it is recommended that a ropeway is built on the hill tops. It will connect all the tourist spots in a line such as Mohamaya lake, Boalia Waterfall, Khaiyachhara waterfall, Napittachhara Waterfall and other such places.

Parking Facility:

The facilities for parking in the tourist spots are found insufficient and requires expansion. The possible parking areas are shown in the Figure 5-1.

5.2.6 Regional Connectivity

In view of the possible major socioeconomic development in the study area and available options, it is suggested that alternatives for regional connectivity should be there in case of any emergency and ensuring better regional communication. Such alternatives can be as follows:

- **Zorawargonj - Burburia ghat –Feni (Fazilpur)**; an LGED 300ft right of way is already there and it used to be the original Dhaka-Chittagong Trunk Road in British period. However some 300m bridge across the Feni river should be built to establish direct communication between the two districts.
- **Shantir hat-Dhumghat Bridge;** this link can be used to move the EZ traffic to and from the highway N1 bypassing the busy Baraiyarhat intersection.
- **Baraiyarhat-Feni via karerhat (R151);** this route is already there and is being used mainly by truck traffic from Khagrachhari. However, improvement of the road and bridges on it will make the communication easier towards Chagalnaiya, Feni and the Belonia Land Port afterwards.
- **Mirsharai-Narayanhat-Fatikchhari (Z1021);** the alignment is already there however, the ongoing MGSP project is at a halt on this road making it inaccessible for large motorized traffic. If the road is widened, it can be a major and shorter link to Khagrachhari (Fatikchhari and Manikchhari) and Chittagong via Najirhat and Bibirhat. This can be an alternative to the existing Baraiyarhat-Karerhat-Ramgarh route.

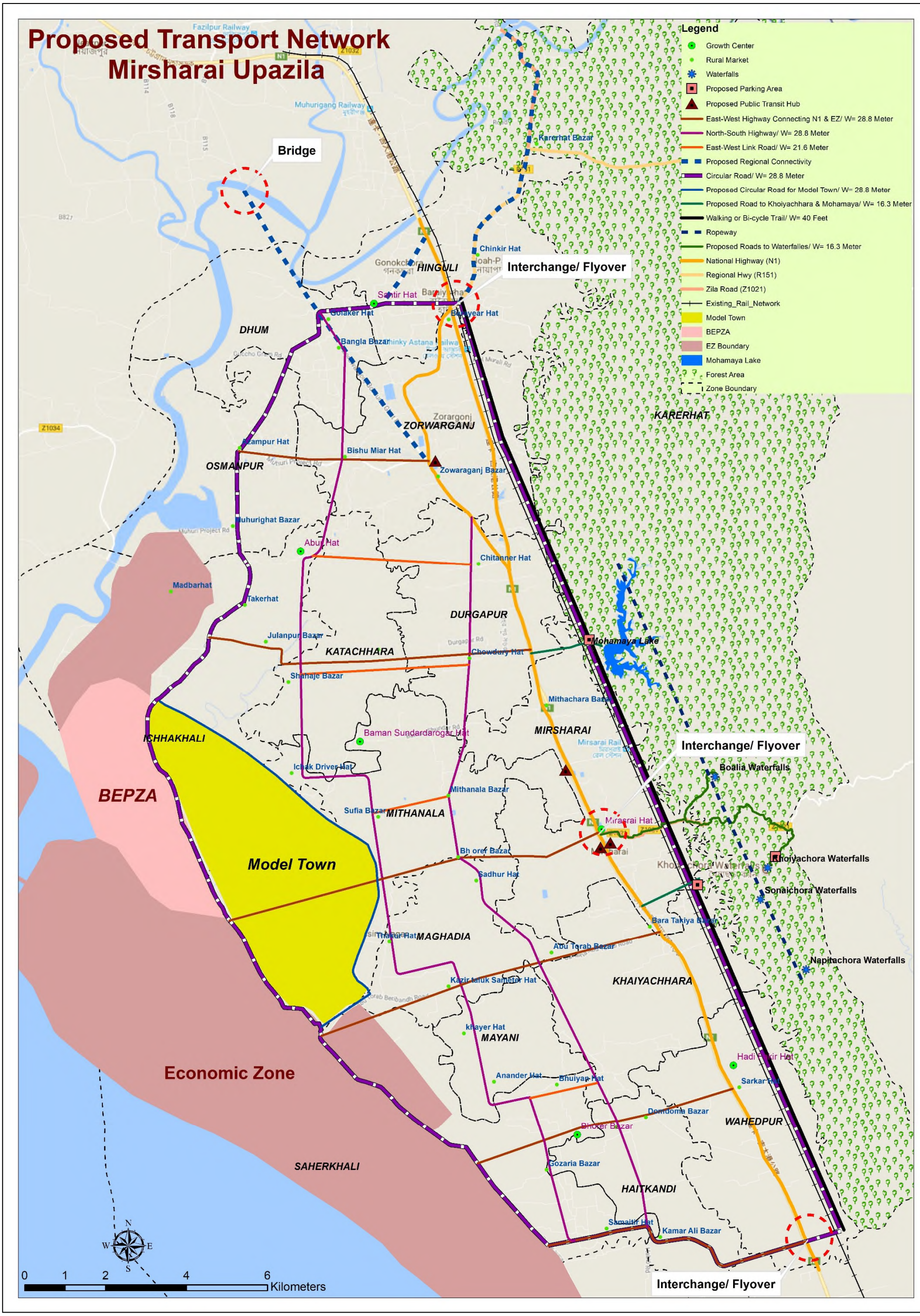


Figure 5-1: Tentative Future Road Network of Mirsharai Upazila

5.2.7 Public Transport Network

At present, the interzonal public transport demand is being served by unconventional modes of transport, such as, CNGs. Many of the land areas in Mirsharai at this moment are not being used for residential or commercial purposes. However, it is expected that within the next 20 years the landscape will change vastly due to the projects by BEZA and BEPZA. Mirsharai upazila itself will turn into a vibrant city from a humble small town and its unused land area will be converted into residential, commercial or recreational areas. Therefore, the interzonal trips will increase vastly. To meet that demand, it is essential that the planners think seriously about a public transport network in order to reduce the demand for car ownership. The following subsections discuss the proposed major public transport routes. The main objective was to ensure that a traveler can visit to any union from any union without needing to access trip interchange pointes more than twice.

Public Transport Routes

There are 10 public transport routes proposed in the public transport network. The modes of public transport can be City/ Mini bus, Leguna, CNG etc. The routes have been designed keeping in mind the following matters:

- Each route will connect the western portion of the Circular Road (EZ Embankment road) and the National Highway, N1
- Each route will intersect the North-South highways acting as the collector/ distributor of local passengers
- The routes will establish communication with all the unions and major growth centers
- The routes have been proposed following the naturally developed Para transit routes
- A route around the periphery of the Upazila has been proposed (along the circular road) to ensure communication between distant portions of the Upazila
- An inner circular route has been proposed to connect with most of the internal routes

Stoppage Locations

- The stoppages have been planned collect passengers throughout the Upazila particularly from near the growth centers and rural marketplaces.
- The stoppage locations are generally at the optimum locations of major road intersections of the proposed plan.

Public Transit Hub/ Terminal

The Public Transport Hubs need to be planned beforehand to avoid future problems with land acquisition, congestion at intersections and proper operation of the public transports. Tentative location options for the Hubs/ Terminals are as follows:

Option 1: Alternate sides of the Dhaka-Chittagong Highway; beside the Post Office at Mirsharai Bazar. There are available lands owned by the Roads and Highways Department (RHD).

Option 2: Opposite to Mirsharai BSCIC Industrial Estate; there is an available land of approx. 3 acres of RHD which can be used to set up the terminal. It is opposite to the Mirsharai Rail Station access road.

Option 3: Beside Zorwarganj Bazar; there is a 12 acre land of RHD lying useless opposite to Zorwarganj Police Fari and along the old Dhaka-Chittagong Highway section which can be used as the public transport hub.

The proposed public transport network has been shown in Figure 5-2. If found sufficient by the travel demand forecasting model, the appropriate authority (e.g., Mirsharai upazila authority along with BRTA) can come up with services with schedules to be introduced on the proposed routes.

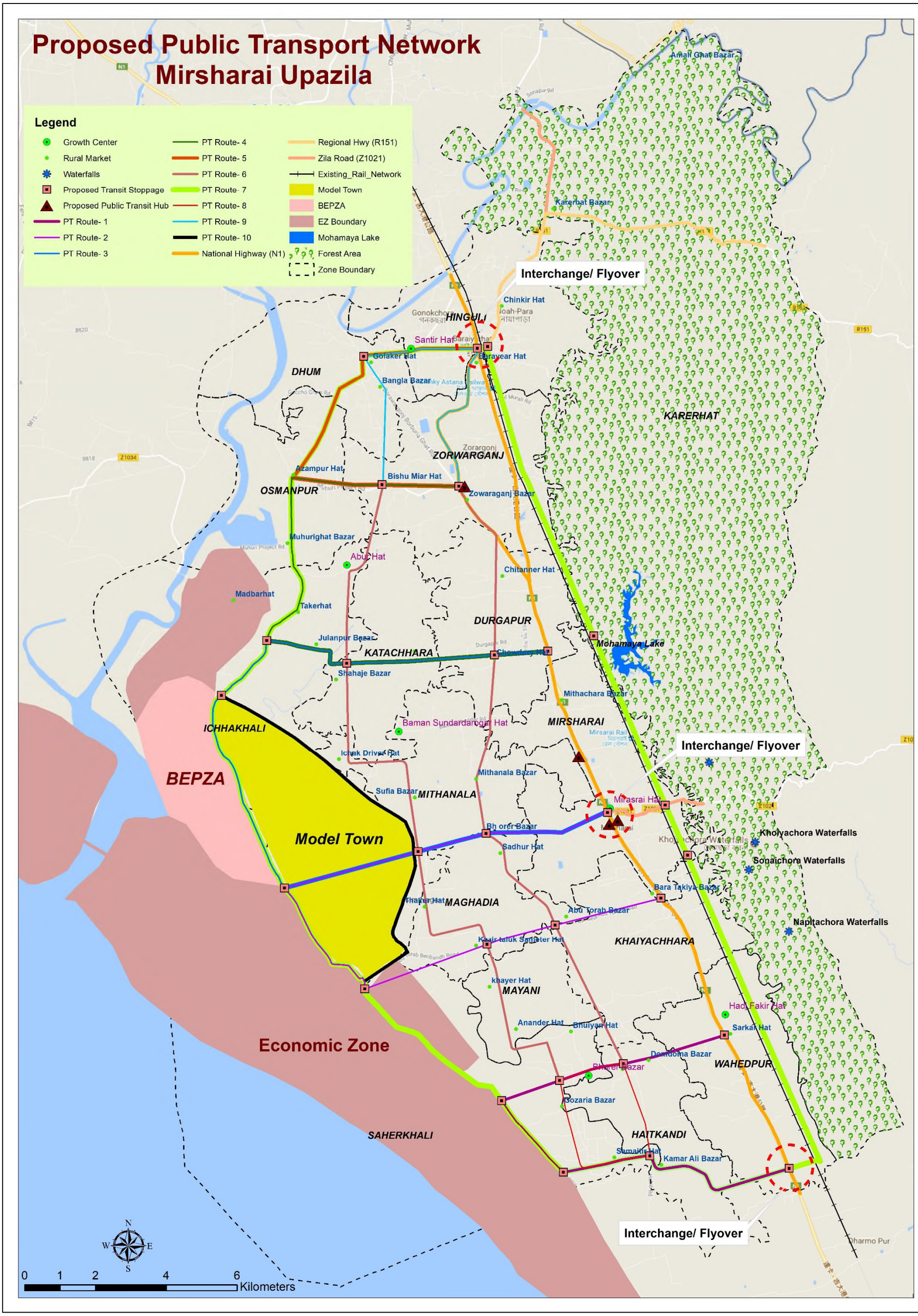


Figure 5-2: Proposed Public Transport Network for Mirsharai Upazila

6 ARRANGEMENT OF DATA

The collected survey and secondary data, analyses working papers, existing and proposed transport network and correspondences between consultants, client and other entities are arranged in following manner. A digital copy of the whole dataset along with the analysis files are being submitted to the client herewith this draft final report.

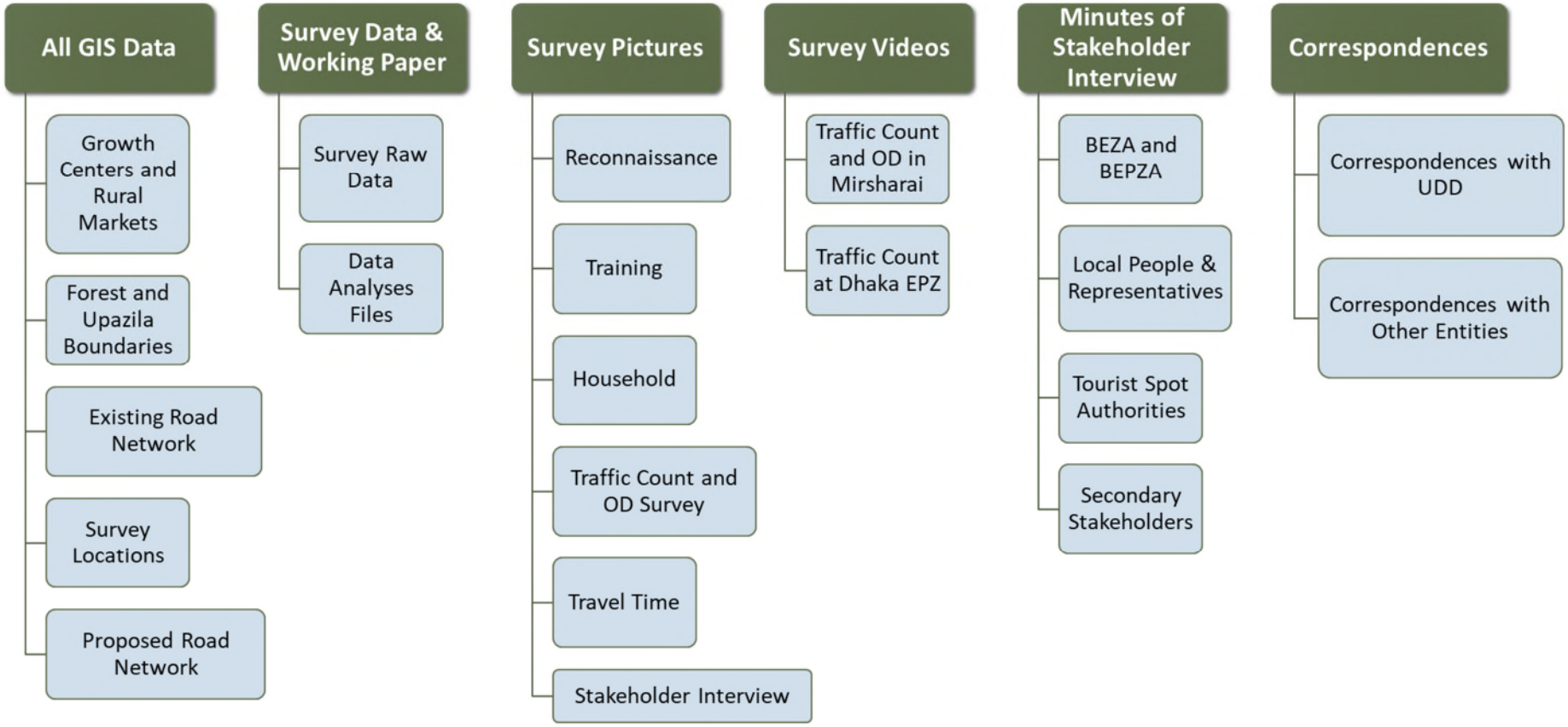


Figure 6-1: Database Schema

7 CONCLUSION

The main purpose of the project is to develop land use integrated new and improved affordable and effective transportation network for Mirsharai Upazila using modern transportation modelling software after a thorough traffic survey carried out in the project area. To fulfill the purpose, Urban Development Directorate (UDD), the Client has taken initiatives and vested DevConsultants Limited (DevCon), Bangladesh with the responsibilities of required consultancy services. On the way of the mission and up to submission of the Interim Report, the consultants have identified and reviewed the secondary sources for data collection, shortlisted and discussed with the primary stakeholders, reviewed ongoing as well as future projects having impact on the study area, developed traffic survey design & final methodology followed by execution of different traffic surveys such as; Attraction, Traffic Count, O-D, Travel Time and Stakeholder Interviews for the assignment.

Since the submission of the Interim Report, the following progresses have been made:

- *Traffic Survey at DEPZ:* A daylong traffic count survey at Dhaka EPZ was conducted in order to find a similar peak hour factor for Mirsharai EZ and to estimate the daily traffic volume.
- *A Larger Scale Household Survey:* sampling from the socio-economic survey database was done for a better understanding and representation of the trip making behavior of local people, present condition of walking as a mode and access to public transports.
- *Data Analyses:* The survey data were analyzed union-wise and the results indicated a ranking of the unions/ zones based on transportation perspectives (can be found in Chapter- 4).
- *Finding Better Access to Tourist Spots:* A further rigorous reconnaissance was made to investigate alternative options to access the Khaiyachhara and Boalia Falls and resulting information have been updated in the plan.
- In addition, a tentative future transportation network has also been proposed combining all these data and information available for now. The network plan also includes proposed routes, stoppages and terminals for public transport development within the study area. Description of each components of the network with necessary justifications can be found in Chapter- 5)

Works to Follow:

- The consultants with the Draft Survey Report being submitted; will now look forward to a final land use plan from UDD in order to develop the 4-step Transportation Model for the study area
- A thorough meeting comprising BEZA, UDD and their consultants to coordinate and plan for a integrated master plan for Mirsharai and the Economic Zone.

APPENDIX A: SURVEY QUESTIONNAIRE

Production Survey (Household Interview Survey)

Preparation of Development Plan for Mirsharai Upazila under Chittagong District (MUDP)
Urban Development Directorate (UDD)

HOUSEHOLD INTERVIEW SURVEY

Surveyor Information

Name: Mobile No.: Date:

Household Information

Address: Household ID: Z __ H__ Geo-Code: Latitude _____

Mobile No.: Picture taken: House ☐ Longitude _____

Survey ☐

Family Information

Member	Age (Years)	Profession	Income (TK)	Remarks
Member 1				
Member 2				
Member 3				
Member 4				
Member 5				
Member 6				
Member 7				
Member 8				
Member 9				
Member 10				

Vehicle Ownership: (Name of Veh./ No. of Veh.)

Household ID: Z___H___

Preparation of Development Plan for Mirsharai Upazila under Chittagong District (MUDP)
Urban Development Directorate (UDD)

HOUSEHOLD INTERVIEW SURVEY

Trip Information

Member No.	Origin	Destination	Start time	End time	Mode (s) Used	Purpose*	Cost (TK)
Route:							
Route:							
Route:							
Route:							

**Purpose: Work/ Education/ Shopping/ Recreation/Others*

**Mode: Walking (W)/ Rickshaw-Cycle (R)/ Bi-Cycle (Bi)/ Auto-rickshaw (A)/CNG (C)/ Bus (B)/ Others (O)*

Household ID: Z___H___

Attraction Survey

A. Information of Commercial facility

1. Survey Date:
2. Survey Time:
3. Type of Facility (tick the type):
    - Bazar
    - Government office
    - Private office
    - Shopping complex
    - Shops
    - Hospital
    - Educational Institutions*
4. Trip Details (one hour data collection):

Facility Type	Mode	Occupancy	Arrival Time

B. Information for Educational Institution*

Institution Type and Name	Origin	Destination	Mode	Start time	End time	Cost

OD Survey Form

Site No: **Site Name:**

Direction (Code): **Date:** _____/_____/_____ **Time:** _____ – _____

Surveyor: **Contact No.**

Time	From	To	Vehicle[1]	Purpose [2]	Occupancy

Remarks: (weather/interruption due to crash/VIP movement/others)

[1] Vehicle: Passenger Vehicle (C); Bus (B), Truck (T), Auto rickshaw/CNG (A/CNG), Cycle rickshaw (CR), Bi-cycle (BC), Van (V), Leguna (L), Motor-cycle (M), Micorbus (MB), Pick-up/Jeep (PJ), Other T (T). If the vehicle is Govt. then circle it

[2] Purpose: Daily Work (D), Other Work (W), Pleasure (P), School (S), Hospital (H), Shopping (SH), Others (O)

Travel Time Study

Route No.: 01

Name of Driver:

Site Name: Janata super market to Boro Daragar Hat via Baman Sundardarogar Hat GC and Haidkandi Bazar

Reg. No.

Date:

Vehicle Model:

Time:

Signature:

Run No:

Cell No.:

Kilometer Reading:

Kilometer Reading:

Location	Time
Janata super market	
Santir Hat	
Golaker Hat	
Bishu Miar Hat	
Baman Sundardarogar Hat GC	
Sufia Bazar	
Kazir Taluk Sameter Hat	
Anander Hat	
Shaherkhali Bhorer Bazar GC	
Haidkandi Bazar	
Kamar Ali Bazar	
Boro Daragar Hat	

Kilometer Reading:

Kilometer Reading:

Scrutinizer:

Signature:

Travel Time Study

Route No.: 02

Site Name: Maulabhi bazar to BEZA embankment via Azampur hat

Date:

Time:

Run No:

Kilometer Reading:

Name of Driver:

Reg. No.

Vehicle Model:

Signature:

Cell No.:

Kilometer Reading:

Location	Time
Maulabhi Bazar	
Osmanpur road	
Azampur Hat	
Muhurighat Bazar	
BEZA Embankment	

Kilometer Reading:

Scrutinizer:

Kilometer Reading:

Signature:

Travel Time Study

Route No.: 03

Site Name: Zorawargonj intersection to Azampur hat via Bishu Miar hat

Date:

Time:

Run No:

Kilometer Reading:

Name of Driver:

Reg. No.

Vehicle Model:

Signature:

Cell No.:

Kilometer Reading:

Location	Time
Intersection of Zorawargonj	
Borburia ghat road and Muhuri project road (M. Rahman Store)	
Bishu Miar Hat	
Azampur Hat	

Kilometer Reading:

Kilometer Reading:

Scrutinizer:

Signature:

Travel Time Study

Route No.: 04

Name of Driver:

Site Name: Thakur dighi bazar to BEZA embankment via Muhurighat bazar

Reg. No.

Date:

Vehicle Model:

Time:

Signature:

Run No:

Cell No.:

Kilometer Reading:

Kilometer Reading:

Location	Time
Thakur Dighi Bazar	
Chowdhuri Hat	
Julanpur Bazar	
Takerhat	
Muhurighat Bazar	
BEZA Embankment	

Kilometer Reading:

Kilometer Reading:

Scrutinizer:

Signature:

Travel Time Study

Route No.: 05

Name of Driver:

Site Name: Mirsharai Paurashava HQ to Takerhat bazar via julanpur bazar

Reg. No.

Date:

Vehicle Model:

Time:

Signature:

Run No:

Cell No.:

Kilometer Reading:

Kilometer Reading:

Location	Time
Mirsharai Paurashava HQ	
Mithanala Bhorer Bazar	
Sufia Bazar	
Baman Sundardarogar Hat GC	
Shahaje Bazar	
Julanpur Bazar	
Takerhat Bazar	

Kilometer Reading:

Kilometer Reading:

Scrutinizer:

Signature:

Travel Time Study

Route No.: 06

Name of Driver:

Site Name: Bara Takiya bazar to BEZA embankment via Abu Torab bazar

Reg. No.

Date:

Vehicle Model:

Time:

Signature:

Run No:

Cell No.:

Kilometer Reading:

Kilometer Reading:

Location	Time
Bara Takiya Bazar	
Abu Torab Bazar	
Kazir Taluk Sameter Hat	
BEZA Embankment	

Kilometer Reading:

Kilometer Reading:

Scrutinizer:

Signature:

Travel Time Study

Route No.: 07

Site Name: Sarkar hat to BEZA embankment via Haidkandi bazar

Date:

Time:

Run No:

Kilometer Reading:

Name of Driver:

Reg. No.

Vehicle Model:

Signature:

Cell No.:

Kilometer Reading:

Location	Time
Sarkar Hat	
Domdoma Bazar	
Haidkandi Bazar	
Shaherkhali Bhorer Bazar Growth Center	
BEZA Embankment	

Kilometer Reading:

Scrutinizer:

Kilometer Reading:

Signature:

APPENDIX B: SURVEY RESULTS

Table of Contents

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Appendix B: Survey Result Analysis

B.1 Results of Household Survey:

Table 1: General Household Information of Zone- 1 (Karerhat)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
1	Z1,H-1	4	4 to 5	1	0	2	30000	15000 to 30000	Yes	8	130	16.25	165	21
1	Z1,H-2	3	3 or below 3	1	1	0	15000	15000 or Less	No	6	0	0.00	60	10
1	Z1,H-3	3	3 or below 3	1	0	1	15000	15000 or Less	No	2	40	20.00	40	20
1	Z1,H-4	3	3 or below 3	1	0	0	25000	15000 to 30000	No	4	40	10.00	60	15
1	Z1,H-5	6	above 5	1	2	1	15000	15000 or Less	No	4	15	3.75	40	10
1	Z1,H-6	5	4 to 5	2	2	0	20000	15000 to 30000	No	6	5	0.83	80	13
1	Z1,H-7	7	above 5	1	1	0	30000	15000 to 30000	No	8	80	10.00	80	10
1	Z1,H-8	3	3 or below 3	1	1	0	15000	15000 or Less	No	6	110	18.33	139	23
1	Z1,H-9	4	4 to 5	1	2	0	15000	15000 or Less	Yes	10	40	4.00	150	15
1	Z1,H-10	4	4 to 5	1	0	0	10000	15000 or Less	No	5	105	21.00	245	49
1	Z1,H-11	4	4 to 5	1	0	2	20000	15000 to 30000	No	9	75	8.33	195	22
1	Z1,H-12	6	above 5	1	2	0	25000	15000 to 30000	No	8	125	15.63	220	28
1	Z1,H-13	5	4 to 5	1	2	1	20000	15000 to 30000	No	7	75	10.71	185	26
1	Z1,H-14	4	4 to 5	1	2	0	10000	15000 or Less	No	6	0	0.00	140	23
1	Z1,H-15	5	4 to 5	1	1	1	10000	15000 or Less	No	6	0	0.00	140	23
1	Z1,H-16	4	4 to 5	1	2	0	17000	15000 to 30000	No	6	170	28.33	240	40
1	Z1,H-17	5	4 to 5	1	2	0	30000	15000 to 30000	No	11	84	7.64	260	24
1	Z1,H-18	3	3 or below 3	1	1	0	20000	15000 to 30000	No	6	80	13.33	140	23
1	Z1,H-19	3	3 or below 3	1	1	0	20000	15000 to 30000	No	4	20	5.00	80	20
1	Z1,H-20	3	3 or below 3	1	1	0	25000	15000 to 30000	No	6	40	6.67	140	23
1	Z1,H-21	6	above 5	1	1	0	30000	15000 to 30000	No	6	30	5.00	90	15
1	Z1,H-22	6	above 5	1	0	0	50000	more than 30000	No	4	60	15.00	50	13
1	Z1,H-23	6	above 5	1	2	0	15000	15000 or Less	Yes	8	80	10.00	180	23
1	Z1,H-24	4	4 to 5	1	1	0	20000	15000 to 30000	No	4	94	23.50	160	40
1	Z1,H-25	3	3 or below 3	1	0	1	36000	more than 30000	No	2	40	20.00	40	20
1	Z1,H-26	3	3 or below 3	1	0	1	38000	more than 30000	No	2	40	20.00	40	20
1	Z1,H-27	6	above 5	1	2	0	12000	15000 or Less	No	4	0	0.00	80	20
1	Z1,H-28	6	above 5	1	1	1	17000	15000 to 30000	No	4	40	10.00	90	23
1	Z1,H-29	2	3 or below 3	1	0	0	12000	15000 or Less	No	2	0	0.00	40	20
1	Z1,H-30	5	above 5	1	0	1	30000	15000 to 30000	No	2	0	0.00	40	20

Table 2: General Household Information of Zone- 2 (Hinguli)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
2	Z2,H-1	4	4 to 5	1	2	0	30000	15000 to 30000	No	8	10	1.25	90	11
2	Z2,H-2	4	4 to 5	1	0	1	25000	15000 to 30000	No	2	0	0.00	20	10
2	Z2,H-3	5	4 to 5	1	2	0	20000	15000 to 30000	No	2	24	12.00	60	30
2	Z2,H-4	6	above 5	3	2	0	45000	more than 30000	No	6	50	8.33	130	22
2	Z2,H-5	3	3 or below 3	1	1	0	12000	15000 or Less	No	2	0	0.00	10	5
2	Z2,H-6	4	4 to 5	1	2	0	25000	15000 to 30000	No	4	0	0.00	80	20
2	Z2,H-7	5	4 to 5	1	0	0	25000	15000 to 30000	No	2	0	0.00	20	10
2	Z2,H-8	4	4 to 5	1	2	0	45000	more than 30000	No	4	0	0.00	40	10
2	Z2,H-9	6	above 5	1	1	0	12000	15000 or Less	No	2	0	0.00	60	30
2	Z2,H-10	3	3 or below 3	2	0	0	20000	15000 to 30000	No	4	0	0.00	60	15
2	Z2,H-11	8	above 5	6	0	0	65000	more than 30000	No	4	0	0.00	60	15
2	Z2,H-12	5	4 to 5	1	3	0	10000	15000 or Less	No	8	0	0.00	160	20
2	Z2,H-13	3	3 or below 3	1	1	0	20000	15000 to 30000	No	2	40	20.00	50	25
2	Z2,H-14	4	4 to 5	1	1	0	30000	15000 to 30000	No	2	0	0.00	40	20
2	Z2,H-15	3	3 or below 3	1	1	0	30000	15000 to 30000	No	6	0	0.00	100	17
2	Z2,H-16	5	4 to 5	1	2	0	12000	15000 or Less	No	6	40	6.67	70	12
2	Z2,H-17	6	above 5	4	0	0	47000	more than 30000	No	2	0	0.00	10	5
2	Z2,H-18	5	4 to 5	2	0	0	25000	15000 to 30000	No	2	10	5.00	30	15
2	Z2,H-19	3	3 or below 3	1	1	0	12000	15000 or Less	No	2	0	0.00	10	5
2	Z2,H-20	3	3 or below 3	1	1	0	26000	15000 to 30000	No	4	40	10.00	120	30
2	Z2,H-21	4	4 to 5	1	2	0	10000	15000 or Less	No	2	0	0.00	20	10
2	Z2,H-22	5	4 to 5	1	3	0	14000	15000 or Less	No	2	0	0.00	30	15
2	Z2,H-23	4	4 to 5	2	0	0	25000	15000 to 30000	No	2	0	0.00	56	28
2	Z2,H-24	6	above 5	1	2	0	32000	more than 30000	No	2	0	0.00	10	5
2	Z2,H-25	3	3 or below 3	3	0	0	32000	more than 30000	No	2	40	20.00	40	20
2	Z2,H-26	3	3 or below 3	1	1	0	32000	more than 30000	No	2	0	0.00	20	10
2	Z2,H-27	11	above 5	3	1	0	30000	15000 to 30000	No	2	0	0.00	30	15
2	Z2,H-28	4	4 to 5	1	1	0	10000	15000 or Less	No	2	10	5.00	30	15
2	Z2,H-29	4	4 to 5	3	0	0	14000	15000 or Less	No	2	0	0.00	40	20
2	Z2,H-30	3	3 or below 3	1	2	0	10000	15000 or Less	No	1	0	0.00	60	60

Table 3: General Household Information of Zone- 3 (Dhum)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
3	Z3,H-1	5	4 to 5	2	2	0	44000	more than 30000	No	4	100	25.00	120	30
3	Z3,H-2	5	4 to 5	1	2	0	20000	15000 to 30000	No	4	0	0.00	80	20
3	Z3,H-3	2	3 or below 3	1	0	0	8000	15000 or Less	No	2	20	10.00	40	20
3	Z3,H-4	6	above 5	2	1	1	19000	15000 to 30000	No	2	200	100.0	50	25
3	Z3,H-5	5	4 to 5	2	0	0	70000	more than 30000	No	4	800	200.0	120	30
3	Z3,H-6	7	above 5	1	4	0	10000	15000 or Less	Yes	4	0	0.00	30	7
3	Z3,H-7	4	4 to 5	1	1	0	5000	15000 or Less	No	2	40	20.00	120	60
3	Z3,H-8	6	above 5	2	1	1	35000	more than 30000	No	5	0	0.00	80	16
3	Z3,H-9	3	3 or below 3	1	1	0	15000	15000 or Less	No	2	0	0.00	10	5
3	Z3,H-10	6	above 5	1	2	2	25000	15000 to 30000	Yes	6	0	0.00	80	13
3	Z3,H-11	5	4 to 5	1	2	1	50000	more than 30000	No	4	60	15.00	70	18
3	Z3,H-12	7	above 5	3	0	0	44000	more than 30000	No	4	20	5.00	125	31
3	Z3,H-13	10	above 5	4	0	0	99000	more than 30000	Yes	4	400	100.0	150	38
3	Z3,H-14	3	3 or below 3	1	0	0	25000	15000 to 30000	No	2	300	150.0	80	40
3	Z3,H-15	6	above 5	2	1	1	14000	15000 or Less	No	4	0	0.00	70	18
3	Z3,H-16	4	4 to 5	2	1	0	25000	15000 to 30000	No	2	20	10.00	20	10
3	Z3,H-17	3	3 or below 3	1	0	0	12000	15000 or Less	No	2	30	15.00	80	40
3	Z3,H-18	6	above 5	1	1	1	12000	15000 or Less	No	4	0	0.00	90	23
3	Z3,H-19	4	4 to 5	1	2	0	15000	15000 or Less	No	4	40	10.00	100	25
3	Z3,H-20	5	4 to 5	1	2	1	15000	15000 or Less	No	4	380	95.00	280	70
3	Z3,H-21	5	4 to 5	1	0	1	-	15000 or Less	No	2	0	0.00	30	15
3	Z3,H-22	5	4 to 5	1	2	0	-	15000 or Less	No	4	44	11.00	190	48
3	Z3,H-23	6	above 5	1	0	2	80000	more than 30000	No	2	80	40.00	30	15
3	Z3,H-24	4	4 to 5	1	2	0	17000	15000 to 30000	No	4	0	0.00	50	13
3	Z3,H-25	5	4 to 5	2	3	0	8000	15000 or Less	No	4	0	0.00	100	25
3	Z3,H-26	4	4 to 5	1	1	0	1500	15000 or Less	No	4	40	10.00	55	14
3	Z3,H-27	7	above 5	3	0	2	15000	15000 or Less	No	2	0	0.00	30	15
3	Z3,H-28	6	above 5	1	3	1	13000	15000 or Less	No	2	50	25.00	125	63
3	Z3,H-29	3	3 or below 3	2	0	1	60000	more than 30000	No	2	30	15.00	110	55
3	Z3,H-30	3	3 or below 3	2	0	0	15000	15000 or Less	No	2	0	0.00	30	15

Table 4: General Household Information of Zone- 4 (Zorawargonj)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
4	Z4,H-1	6	above 5	2	2	0	13000	15000 or Less	No	6	0	0.00	160	27
4	Z4,H-2	4	4 to 5	1	2	0	15000	15000 or Less	No	4	20	5.00	140	35
4	Z4,H-3	7	above 5	4	1	0	32000	more than 30000	No	6	0	0.00	40	7
4	Z4,H-4	5	4 to 5	2	1	1	25000	15000 to 30000	No	4	0	0.00	40	10
4	Z4,H-5	3	3 or below 3	1	1	0	8000	15000 or Less	No	4	0	0.00	80	20
4	Z4,H-6	3	3 or below 3	1	0	0	15000	15000 or Less	Yes	4	0	0.00	30	8
4	Z4,H-7	7	above 5	2	4	0	17000	15000 to 30000	No	6	0	0.00	120	20
4	Z4,H-8	4	4 to 5	1	1	0	10000	15000 or Less	No	2	0	0.00	30	15
4	Z4,H-9	5	4 to 5	2	0	0	80000	more than 30000	No	2	0	0.00	20	10
4	Z4,H-10	7	above 5	4	0	0	29000	15000 to 30000	No	4	0	0.00	60	15
4	Z4,H-11	6	above 5	1	3	0	15000	15000 or Less	No	6	40	6.67	80	13
4	Z4,H-12	3	3 or below 3	1	1	0	32000	more than 30000	No	2	20	10.00	30	15
4	Z4,H-13	5	4 to 5	1	3	0	15000	15000 or Less	No	6	120	20.00	170	28
4	Z4,H-14	4	4 to 5	1	0	0	10000	15000 or Less	No	2	20	10.00	30	15
4	Z4,H-15	4	4 to 5	1	2	0	10000	15000 or Less	Yes	6	20	3.33	90	15
4	Z4,H-16	5	4 to 5	1	1	2	7000	15000 or Less	No	2	50	25.00	60	30
4	Z4,H-17	2	3 or below 3	1	0	0	5000	15000 or Less	No	2	20	10.00	30	15
4	Z4,H-18	6	above 5	3	1	0	60000	more than 30000	No	2	20	10.00	30	15
4	Z4,H-19	6	above 5	1	4	0	8000	15000 or Less	Yes	6	40	6.67	170	28
4	Z4,H-20	6	above 5	1	0	2	8000	15000 or Less	No	4	40	10.00	120	30
4	Z4,H-21	5	4 to 5	2	1	0	32000	more than 30000	No	4	20	5.00	70	18
4	Z4,H-22	10	above 5	5	0	0	59000	more than 30000	No	4	0	0.00	20	5
4	Z4,H-23	5	4 to 5	2	0	0	16000	15000 to 30000	No	4	0	0.00	40	10
4	Z4,H-24	9	above 5	2	0	3	58000	more than 30000	No	2	0	0.00	40	20
4	Z4,H-25	3	3 or below 3	1	0	0	20000	15000 to 30000	No	2	0	0.00	60	30
4	Z4,H-26	3	3 or below 3	1	1	0	32000	more than 30000	No	2	0	0.00	60	30
4	Z4,H-27	6	above 5	1	2	2	8000	15000 or Less	No	2	20	10.00	20	10
4	Z4,H-28	10	above 5	2	4	0	27000	15000 to 30000	No	6	60	10.00	60	10
4	Z4,H-29	8	above 5	1	3	0	-	15000 or Less	No	6	80	13.33	100	17
4	Z4,H-30	10	above 5	3	2	0	33000	more than 30000	No	2	20	10.00	30	15

Table 5: General Household Information of Zone- 5 (Osmanpur)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
5	Z5,H-1	5	4 to 5	2	1	0	49000	more than 30000	No	2	0	0.00	40	20
5	Z5,H-2	6	above 5	1	2	0	35000	more than 30000	No	4	100	25.00	160	40
5	Z5,H-3	4	4 to 5	1	1	0	24000	15000 to 30000	No	2	50	25.00	60	30
5	Z5,H-4	4	4 to 5	1	2	0	10000	15000 or Less	No	2	0	0.00	20	10
5	Z5,H-5	4	4 to 5	3	0	0	40000	more than 30000	No	2	0	0.00	30	15
5	Z5,H-6	3	3 or below 3	2	0	0	25000	15000 to 30000	No	2	0	0.00	40	20
5	Z5,H-7	4	4 to 5	1	2	0	7000	15000 or Less	No	4	0	0.00	40	10
5	Z5,H-8	3	3 or below 3	2	0	0	7000	15000 or Less	No	2	0	0.00	30	15
5	Z5,H-9	4	4 to 5	1	2	0	9000	15000 or Less	No	4	0	0.00	20	5
5	Z5,H-10	4	4 to 5	2	0	0	16000	15000 to 30000	No	4	20	5.00	90	23
5	Z5,H-11	4	4 to 5	1	2	0	70000	more than 30000	No	4	40	10.00	60	15
5	Z5,H-12	10	above 5	3	2	0	32000	more than 30000	No	4	20	5.00	40	10
5	Z5,H-13	3	3 or below 3	1	1	0	12000	15000 or Less	No	2	0	0.00	20	10
5	Z5,H-14	3	3 or below 3	1	0	1	10000	15000 or Less	No	2	0	0.00	8	4
5	Z5,H-15	2	3 or below 3	1	0	0	15000	15000 or Less	No	4	0	0.00	40	10
5	Z5,H-16	2	3 or below 3	1	0	0	15000	15000 or Less	No	2	30	15.00	120	60
5	Z5,H-17	4	4 to 5	2	0	0	20000	15000 to 30000	No	4	40	10.00	80	20
5	Z5,H-18	4	4 to 5	2	0	0	22000	15000 to 30000	No	2	0	0.00	20	10
5	Z5,H-19	7	above 5	2	1	0	20000	15000 to 30000	No	2	0	0.00	20	10
5	Z5,H-20	3	3 or below 3	1	1	0	55000	more than 30000	No	2	40	20.00	60	30
5	Z5,H-21	6	above 5	2	0	0	40000	more than 30000	No	2	20	10.00	60	30
5	Z5,H-22	6	above 5	1	2	0	20000	15000 to 30000	No	4	0	0.00	100	25
5	Z5,H-23	5	4 to 5	1	3	0	30000	15000 to 30000	No	2	0	0.00	20	10
5	Z5,H-24	3	3 or below 3	1	1	0	-	15000 or Less	No	4	0	0.00	40	10
5	Z5,H-25	4	4 to 5	1	2	0	10000	15000 or Less	No	2	0	0.00	50	25
5	Z5,H-26	5	4 to 5	2	0	0	12000	15000 or Less	No	2	0	0.00	40	20
5	Z5,H-27	5	4 to 5	2	1	0	27000	15000 to 30000	No	2	0	0.00	40	20
5	Z5,H-28	4	4 to 5	1	0	0	20000	15000 to 30000	No	2	20	10.00	60	30
5	Z5,H-29	3	3 or below 3	1	1	0	20000	15000 to 30000	No	4	0	0.00	50	13

Table 6: General Household Information of Zone- 6 (Durgapur)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
6	Z6,H-1	4	4 to 5	1	1	0	40000	more than 30000	Yes	4	330	82.50	360	90
6	Z6,H-2	5	4 to 5	2	1	0	10000	15000 or Less	Yes	6	70	11.67	140	23
6	Z6,H-3	3	3 or below 3	1	0	0	25000	15000 to 30000	No	4	220	55.00	360	90
6	Z6,H-4	4	4 to 5	1	2	0	25000	15000 to 30000	No	6	100	16.67	160	27
6	Z6,H-5	5	4 to 5	1	2	0	12000	15000 or Less	No	4	60	15.00	80	20
6	Z6,H-6	6	above 5	4	0	1	30000	15000 to 30000	No	4	10	2.50	50	13
6	Z6,H-7	3	3 or below 3	1	1	0	35000	more than 30000	No	4	50	12.50	100	25
6	Z6,H-8	6	above 5	1	3	0	23000	15000 to 30000	Yes	6	30	5.00	90	15
6	Z6,H-9	7	above 5	4	1	0	50000	more than 30000	No	4	50	12.50	90	23
6	Z6,H-10	8	above 5	1	1	1	50000	more than 30000	No	4	30	7.50	80	20
6	Z6,H-11	10	above 5	4	2	0	60000	more than 30000	No	2	60	30.00	80	40
6	Z6,H-12	8	above 5	3	1	0	15000	15000 or Less	No	4	50	12.50	120	30
6	Z6,H-13	3	3 or below 3	1	0	0	40000	more than 30000	No	2	0	0.00	10	5
6	Z6,H-14	3	3 or below 3	2	0	0	27000	15000 to 30000	No	2	60	30.00	60	30
6	Z6,H-15	6	above 5	1	0	0	14000	15000 or Less	No	4	0	0.00	80	20
6	Z6,H-16	5	4 to 5	1	3	0	12000	15000 or Less	No	6	50	8.33	100	17
6	Z6,H-17	3	3 or below 3	1	1	0	10000	15000 or Less	No	4	30	7.50	100	25
6	Z6,H-18	4	4 to 5	1	2	0	20000	15000 to 30000	No	6	30	5.00	120	20
6	Z6,H-19	6	above 5	2	1	0	14000	15000 or Less	No	4	30	7.50	100	25
6	Z6,H-20	6	above 5	3	1	0	35000	more than 30000	No	4	10	2.50	80	20
6	Z6,H-21	5	4 to 5	1	2	1	12000	15000 or Less	No	6	70	11.67	140	23
6	Z6,H-22	5	4 to 5	1	2	1	12000	15000 or Less	No	6	10	1.67	150	25
6	Z6,H-23	5	4 to 5	2	0	0	16000	15000 to 30000	No	4	10	2.50	30	7
6	Z6,H-24	3	3 or below 3	1	0	0	-	15000 or Less	No	2	30	15.00	40	20
6	Z6,H-25	3	3 or below 3	1	1	0	17000	15000 to 30000	No	4	60	15.00	80	20
6	Z6,H-26	7	above 5	2	1	0	40000	more than 30000	No	4	40	10.00	100	25
6	Z6,H-27	3	3 or below 3	1	0	1	-	15000 or Less	No	2	0	0.00	20	10
6	Z6,H-28	3	3 or below 3	1	0	0	37000	more than 30000	No	2	30	15.00	60	30
6	Z6,H-29	6	above 5	1	2	0	16000	15000 to 30000	No	6	70	11.67	180	30
6	Z6,H-30	2	3 or below 3	1	1	0	10000	15000 or Less	No	2	0	0.00	40	20

Table 7: General Household Information of Zone- 7 (Katachhara)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
7	Z7,H-1	9	above 5	2	3	1	70000	more than 30000	No	4	0	0.00	40	10
7	Z7,H-2	10	above 5	4	2	0	50000	more than 30000	No	4	0	0.00	40	10
7	Z7,H-3	7	above 5	2	2	0	30000	15000 to 30000	No	2	0	0.00	40	20
7	Z7,H-4	9	above 5	3	2	0	21000	15000 to 30000	No	2	0	0.00	60	30
7	Z7,H-5	4	4 to 5	1	0	0	15000	15000 or Less	No	2	0	0.00	40	20
7	Z7,H-6	5	4 to 5	1	2	0	8000	15000 or Less	No	2	0	0.00	20	10
7	Z7,H-7	3	3 or below 3	1	1	0	10000	15000 or Less	No	2	0	0.00	20	10
7	Z7,H-8	4	4 to 5	1	2	0	8000	15000 or Less	No	4	0	0.00	60	15
7	Z7,H-9	4	4 to 5	1	2	0	16000	15000 to 30000	No	2	0	0.00	60	30
7	Z7,H-10	9	above 5	2	3	2	28000	15000 to 30000	No	2	0	0.00	10	5
7	Z7,H-11	6	above 5	2	1	0	15000	15000 or Less	Yes	2	0	0.00	30	15
7	Z7,H-12	4	4 to 5	2	0	0	65000	more than 30000	No	2	0	0.00	30	15
7	Z7,H-13	3	3 or below 3	2	0	0	7000	15000 or Less	No	2	0	0.00	40	20
7	Z7,H-14	3	3 or below 3	2	0	0	32000	more than 30000	No	2	60	30.00	50	25
7	Z7,H-15	3	3 or below 3	1	1	0	2000	15000 or Less	No	2	0	0.00	20	10
7	Z7,H-16	6	above 5	2	3	0	14000	15000 or Less	No	2	0	0.00	8	4
7	Z7,H-17	3	3 or below 3	1	1	0	5000	15000 or Less	No	2	0	0.00	4	2
7	Z7,H-18	4	4 to 5	1	1	0	40000	more than 30000	Yes	4	0	0.00	80	20
7	Z7,H-19	9	above 5	3	3	0	50000	more than 30000	No	2	0	0.00	30	15
7	Z7,H-20	7	above 5	1	4	1	10000	15000 or Less	No	2	0	0.00	40	20
7	Z7,H-21	7	above 5	3	1	1	15000	15000 or Less	No	4	0	0.00	100	25
7	Z7,H-22	3	3 or below 3	2	0	0	16000	15000 to 30000	No	2	0	0.00	20	10
7	Z7,H-23	5	4 to 5	3	1	0	35000	more than 30000	No	2	0	0.00	20	10
7	Z7,H-24	5	4 to 5	1	3	0	20000	15000 to 30000	No	2	0	0.00	20	10
7	Z7,H-25	3	3 or below 3	1	1	0	18000	15000 to 30000	No	2	0	0.00	30	15
7	Z7,H-26	3	3 or below 3	2	0	0	41000	more than 30000	No	2	160	80.00	40	20
7	Z7,H-27	5	4 to 5	1	0	0	37000	more than 30000	No	2	0	0.00	6	3
7	Z7,H-28	4	4 to 5	1	2	0	15000	15000 or Less	Yes	2	0	0.00	50	25
7	Z7,H-29	5	4 to 5	3	0	0	32000	more than 30000	No	2	0	0.00	10	5
7	Z7,H-30	4	4 to 5	1	2	0	10000	15000 or Less	No	2	0	0.00	6	3

Table 8: General Household Information of Zone- 8 (Ichhakhali)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
8	Z8,H-1	7	above 5	3	0	1	56000	more than 30000	No	4	100	25.00	70	18
8	Z8,H-2	6	above 5	1	1	1	15000	15000 or Less	No	2	0	0.00	10	5
8	Z8,H-3	4	4 to 5	1	0	2	14000	15000 or Less	Yes	2	0	0.00	60	30
8	Z8,H-4	8	above 5	1	0	2	50000	more than 30000	No	2	0	0.00	10	5
8	Z8,H-5	6	above 5	1	1	0	6000	15000 or Less	No	2	20	10.00	20	10
8	Z8,H-6	5	4 to 5	1	3	0	60000	more than 30000	No	2	0	0.00	90	45
8	Z8,H-7	5	4 to 5	0	1	0	-	15000 or Less	No	2	0	0.00	20	10
8	Z8,H-8	5	4 to 5	1	2	0	14000	15000 or Less	No	4	0	0.00	20	5
8	Z8,H-9	5	4 to 5	1	1	0	12000	15000 or Less	No	2	40	20.00	60	30
8	Z8,H-10	5	4 to 5	2	2	0	45000	more than 30000	Yes	4	0	0.00	80	20
8	Z8,H-11	6	above 5	3	0	0	35000	more than 30000	No	4	80	20.00	120	30
8	Z8,H-12	3	3 or below 3	1	1	0	12000	15000 or Less	No	2	0	0.00	10	5
8	Z8,H-13	7	above 5	2	0	0	22000	15000 to 30000	No	4	55	13.75	75	19
8	Z8,H-14	3	3 or below 3	1	1	0	8000	15000 or Less	No	4	60	15.00	70	18
8	Z8,H-15	3	3 or below 3	1	0	1	12000	15000 or Less	No	2	60	30.00	50	25
8	Z8,H-16	2	3 or below 3	1	0	0	18000	15000 to 30000	No	2	0	0.00	20	10
8	Z8,H-17	3	3 or below 3	1	1	0	10000	15000 or Less	No	2	0	0.00	20	10
8	Z8,H-18	3	3 or below 3	1	1	0	40000	more than 30000	No	2	0	0.00	60	30
8	Z8,H-19	4	4 to 5	1	2	0	60000	more than 30000	No	4	0	0.00	40	10
8	Z8,H-20	3	3 or below 3	0	2	0	-	15000 or Less	No	4	0	0.00	30	7
8	Z8,H-21	4	4 to 5	1	2	0	50000	more than 30000	No	4	0	0.00	80	20
8	Z8,H-22	4	4 to 5	2	1	0	30000	15000 to 30000	No	2	0	0.00	120	60
8	Z8,H-23	5	4 to 5	1	2	1	30000	15000 to 30000	No	4	0	0.00	40	10
8	Z8,H-24	6	above 5	2	1	0	20000	15000 to 30000	No	2	0	0.00	10	5
8	Z8,H-25	4	4 to 5	1	2	0	50000	more than 30000	No	2	0	0.00	20	10
8	Z8,H-26	4	4 to 5	1	2	0	18000	15000 to 30000	No	2	0	0.00	20	10
8	Z8,H-27	5	4 to 5	1	2	0	15000	15000 or Less	No	2	0	0.00	10	5
8	Z8,H-28	5	4 to 5	1	1	0	20000	15000 to 30000	No	2	0	0.00	10	5
8	Z8,H-29	3	3 or below 3	0	0	0	-	15000 or Less	No	2	0	0.00	10	5
8	Z8,H-30	4	4 to 5	1	1	0	20000	15000 to 30000	No	2	0	0.00	10	5

Table 9: General Household Information of Zone- 9 (Mirsharai)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
9	Z9,H-1	8	above 5	3	0	1	42000	more than 30000	No	2	40	20.00	60	30
9	Z9,H-2	5	4 to 5	2	1	0	13000	15000 or Less	No	6	90	15.00	180	30
9	Z9,H-3	6	above 5	2	2	0	60000	more than 30000	No	3	80	26.67	110	37
9	Z9,H-4	3	3 or below 3	1	1	0	8000	15000 or Less	Yes	4	0	0.00	40	10
9	Z9,H-5	4	4 to 5	2	1	0	20000	15000 to 30000	No	2	0	0.00	10	5
9	Z9,H-6	5	4 to 5	1	3	0	10000	15000 or Less	No	2	0	0.00	20	10
9	Z9,H-7	3	3 or below 3	1	1	0	15000	15000 or Less	No	2	0	0.00	20	10
9	Z9,H-8	5	4 to 5	1	2	0	20000	15000 to 30000	No	4	0	0.00	260	65
9	Z9,H-9	7	above 5	1	2	0	50000	more than 30000	No	2	0	0.00	30	15
9	Z9,H-10	4	4 to 5	1	2	0	12000	15000 or Less	No	2	0	0.00	10	5
9	Z9,H-11	5	4 to 5	1	2	0	22000	15000 to 30000	No	2	0	0.00	10	5
9	Z9,H-12	5	4 to 5	2	0	0	18000	15000 to 30000	No	4	0	0.00	40	10
9	Z9,H-13	8	above 5	1	4	0	40000	more than 30000	No	2	0	0.00	20	10
9	Z9,H-14	4	4 to 5	2	0	0	65000	more than 30000	No	4	0	0.00	40	10
9	Z9,H-15	4	4 to 5	1	1	1	10000	15000 or Less	Yes	2	0	0.00	60	30
9	Z9,H-16	5	4 to 5	1	1	1	28000	15000 to 30000	Yes	6	0	0.00	40	7
9	Z9,H-17	4	4 to 5	1	1	0	30000	15000 to 30000	Yes	2	0	0.00	20	10
9	Z9,H-18	3	3 or below 3	1	0	1	16000	15000 to 30000	No	2	0	0.00	20	10
9	Z9,H-19	6	above 5	1	1	0	50000	more than 30000	No	2	0	0.00	20	10
9	Z9,H-20	4	4 to 5	3	0	0	6000	15000 or Less	No	6	0	0.00	51	9
9	Z9,H-21	4	4 to 5	1	1	0	35000	more than 30000	No	2	0	0.00	30	15
9	Z9,H-22	7	above 5	1	0	0	5000	15000 or Less	No	2	50	25.00	20	10
9	Z9,H-23	9	above 5	2	2	1	25000	15000 to 30000	No	4	0	0.00	40	10
9	Z9,H-24	3	3 or below 3	1	1	0	80000	more than 30000	No	2	0	0.00	20	10
9	Z9,H-25	5	4 to 5	1	1	1	12000	15000 or Less	No	4	0	0.00	20	5
9	Z9,H-26	6	above 5	1	3	1	25000	15000 to 30000	No	4	0	0.00	50	13
9	Z9,H-27	3	3 or below 3	1	1	0	35000	more than 30000	Yes	2	0	0.00	60	30
9	Z9,H-28	6	above 5	1	2	0		15000 or Less	No	4	0	0.00	60	15
9	Z9,H-29	6	above 5	2	0	1	11000	15000 or Less	No	2	0	0.00	20	10
9	Z9,H-30	6	above 5	1	2	1	80000	more than 30000	No	2	0	0.00	20	10
9	Z9,H-31	3	3 or below 3	1	1	0	12000	15000 or Less	Yes	4	0	0.00	60	15
9	Z9,H-32	6	above 5	1	3	0	700	15000 or Less	No	6	10	1.67	125	21
9	Z9,H-33	3	3 or below 3	1	1	0	50000	more than 30000	No	2	10	5.00	20	10
9	Z9,H-34	3	3 or below 3	1	1	0	10000	15000 or Less	No	4	0	0.00	20	5

Table 10: General Household Information of Zone- 10 (Mithanala)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
10	Z10,H-1	5	4 to 5	2	0	0	55000	more than 30000	No	2	60	30.00	80	40
10	Z10,H-2	4	4 to 5	1	0	0	30000	15000 to 30000	No	2	30	15.00	55	28
10	Z10,H-3	11	above 5	3	1	0	55000	more than 30000	No	4	0	0.00	50	13
10	Z10,H-4	7	above 5	3	0	0	95000	more than 30000	No	2	0	0.00	10	5
10	Z10,H-5	8	above 5	5	0	0	128000	more than 30000	No	2	0	0.00	30	15
10	Z10,H-6	3	3 or below 3	1	0	0	13000	15000 or Less	No	2	0	0.00	20	10
10	Z10,H-7	3	3 or below 3	1	2	0	10000	15000 or Less	No	4	40	10.00	100	25
10	Z10,H-8	8	above 5	3	0	0	67000	more than 30000	No	2	50	25.00	30	15
10	Z10,H-9	4	4 to 5	2	1	0	35000	more than 30000	No	4	50	12.50	245	61
10	Z10,H-10	3	3 or below 3	1	1	0	15000	15000 or Less	No	2	10	5.00	20	10
10	Z10,H-11	4	4 to 5	1	2	0	45000	more than 30000	No	4	0	0.00	40	10
10	Z10,H-12	3	3 or below 3	1	0	0	20000	15000 to 30000	No	2	0	0.00	5	3
10	Z10,H-13	10	above 5	3	0	0	30000	15000 to 30000	No	4	0	0.00	20	5
10	Z10,H-14	6	above 5	2	0	0	27000	15000 to 30000	Yes	4	0	0.00	85	21
10	Z10,H-15	4	4 to 5	2	0	0	25000	15000 to 30000	No	4	0	0.00	60	15
10	Z10,H-16	4	4 to 5	1	2	0	15000	15000 or Less	No	2	0	0.00	40	20
10	Z10,H-17	3	3 or below 3	1	1	0	25000	15000 to 30000	No	6	0	0.00	125	21
10	Z10,H-18	5	4 to 5	2	0	0	60000	more than 30000	No	2	0	0.00	80	40
10	Z10,H-19	3	3 or below 3	1	0	0	20000	15000 to 30000	No	2	0	0.00	30	15
10	Z10,H-20	4	4 to 5	1	0	0	12000	15000 or Less	No	2	0	0.00	120	60
10	Z10,H-21	4	4 to 5	1	1	1	12000	15000 or Less	No	2	0	0.00	90	45
10	Z10,H-22	5	4 to 5	1	3	0	13000	15000 or Less	No	2	0	0.00	30	15
10	Z10,H-23	3	3 or below 3	1	1	0	30000	15000 to 30000	No	2	0	0.00	20	10
10	Z10,H-24	3	3 or below 3	4	0	0	25000	15000 to 30000	No	2	0	0.00	30	15
10	Z10,H-25	2	3 or below 3	2	0	0	32000	more than 30000	No	4	0	0.00	20	5
10	Z10,H-26	6	above 5	2	0	0	14000	15000 or Less	No	2	0	0.00	30	15
10	Z10,H-27	3	3 or below 3	1	1	0	35000	more than 30000	No	2	0	0.00	60	30
10	Z10,H-28	4	4 to 5	2	0	0	30000	15000 to 30000	No	2	0	0.00	20	10
10	Z10,H-29	5	4 to 5	1	0	3	8000	15000 or Less	No	2	0	0.00	50	25
10	Z10,H-30	3	3 or below 3	1	1	0	-	15000 or Less	No	2	0	0.00	20	10

Table 11: General Household Information of Zone- 11 (Shaherkhali)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
11	Z11,H-1	6	above 5	1	4	0	12000	15000 or Less	Yes	6	40	6.67	100	17
11	Z11,H-2	3	3 or below 3	1	1	0	25000	15000 to 30000	No	4	0	0.00	40	10
11	Z11,H-3	4	4 to 5	3	0	0	50000	more than 30000	No	6	40	6.67	110	18
11	Z11,H-4	4	4 to 5	2	0	0	16000	15000 to 30000	No	2	0	0.00	20	10
11	Z11,H-5	5	4 to 5	1	2	0	10000	15000 or Less	No	6	0	0.00	87	15
11	Z11,H-6	3	3 or below 3	1	1	0	10000	15000 or Less	Yes	6	0	0.00	100	17
11	Z11,H-7	5	4 to 5	1	2	0	25000	15000 to 30000	No	4	0	0.00	110	28
11	Z11,H-8	4	4 to 5	1	1	0		15000 or Less	No	4	0	0.00	100	25
11	Z11,H-9	3	3 or below 3	1	1	0	10000	15000 or Less	No	4	0	0.00	50	13
11	Z11,H-10	4	4 to 5	1	1	0	12000	15000 or Less	Yes	4	0	0.00	190	48
11	Z11,H-11	3	3 or below 3	1	1	0	3500	15000 or Less	No	2	0	0.00	20	10
11	Z11,H-12	5	4 to 5	1	1	0	87000	more than 30000	No	2	0	0.00	10	5
11	Z11,H-13	5	4 to 5	4	0	0	35000	more than 30000	No	4	40	10.00	90	23
11	Z11,H-14	5	4 to 5	1	3	0	12000	15000 or Less	No	4	0	0.00	70	18
11	Z11,H-15	3	3 or below 3	1	3	0	12000	15000 or Less	No	4	0	0.00	60	15
11	Z11,H-16	3	3 or below 3	1	1	0	12000	15000 or Less	No	4	0	0.00	150	38
11	Z11,H-17	5	4 to 5	1	2	0	25000	15000 to 30000	No	6	0	0.00	120	20
11	Z11,H-18	5	4 to 5	1	3	0	10000	15000 or Less	No	6	0	0.00	110	18
11	Z11,H-19	5	4 to 5	1	4	0	10000	15000 or Less	No	4	0	0.00	90	23
11	Z11,H-20	3	3 or below 3	1	3	0	30000	15000 to 30000	No	4	0	0.00	90	22
11	Z11,H-21	5	4 to 5	1	1	0	45000	more than 30000	Yes	4	0	0.00	273	68
11	Z11,H-22	3	3 or below 3	3	1	0	30000	15000 to 30000	No	2	0	0.00	10	5
11	Z11,H-23	4	4 to 5	1	0	0	16000	15000 to 30000	No	4	0	0.00	260	65
11	Z11,H-24	5	4 to 5	1	2	0	16000	15000 to 30000	No	4	0	0.00	30	8
11	Z11,H-25	4	4 to 5	1	2	0	30000	15000 to 30000	No	2	0	0.00	30	15
11	Z11,H-26	5	4 to 5	2	1	0	20000	15000 to 30000	No	2	0	0.00	20	10
11	Z11,H-27	4	4 to 5	1	2	0	25000	15000 to 30000	No	3	0	0.00	30	10
11	Z11,H-28	7	above 5	2	1	0	40000	more than 30000	No	2	0	0.00	20	10
11	Z11,H-29	3	3 or below 3	1	1	0	15000	15000 or Less	No	4	0	0.00	30	7
11	Z11,H-30	6	above 5	4	0	0	10000	15000 or Less	No	2	40	20.00	90	45

Table 12: General Household Information of Zone- 12 (Maghadia)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
12	Z12,H-1	6	above 5	1	3	0	20000	15000 to 30000	Yes	6	60	10.00	210	35
12	Z12,H-2	6	above 5	2	1	1	41000	more than 30000	No	6	0	0.00	70	12
12	Z12,H-3	8	above 5	3	0	1	8000	15000 or Less	No	4	0	0.00	240	60
12	Z12,H-4	6	above 5	3	0	1	30000	15000 to 30000	Yes	4	0	0.00	80	20
12	Z12,H-5	9	above 5	5	2	0	68000	more than 30000	Yes	10	110	11.00	211	21
12	Z12,H-6	6	above 5	3	0	1	20000	15000 to 30000	No	2	40	20.00	60	30
12	Z12,H-7	7	above 5	1	4	0	20000	15000 to 30000	No	8	0	0.00	200	25
12	Z12,H-8	5	4 to 5	2	2	0	20000	15000 to 30000	No	6	0	0.00	86	14
12	Z12,H-9	8	above 5	2	0	3	13000	15000 or Less	Yes	4	0	0.00	40	10
12	Z12,H-10	9	above 5	2	3	1	20000	15000 to 30000	Yes	6	120	20.00	270	45
12	Z12,H-11	6	above 5	2	1	1	40000	more than 30000	Yes	4	40	10.00	70	18
12	Z12,H-12	4	4 to 5	1	2	0	5000	15000 or Less	Yes	4	0	0.00	60	15
12	Z12,H-13	4	4 to 5	1	2	0	4000	15000 or Less	No	6	0	0.00	110	18
12	Z12,H-14	10	above 5	4	1	2	27000	15000 to 30000	Yes	8	0	0.00	220	28
12	Z12,H-15	7	above 5	2	2	1	7000	15000 or Less	No	10	60	6.00	220	22
12	Z12,H-16	6	above 5	1	2	1	20000	15000 to 30000	No	6	40	6.67	58	10
12	Z12,H-17	4	4 to 5	1	1	1	10000	15000 or Less	Yes	4	0	0.00	50	13
12	Z12,H-18	7	above 5	2	2	1	20000	15000 to 30000	No	6	60	10.00	120	20
12	Z12,H-19	6	above 5	1	3	0	14000	15000 or Less	Yes	8	20	2.50	80	10
12	Z12,H-20	7	above 5	2	1	1	10000	15000 or Less	No	2	0	0.00	10	5
12	Z12,H-21	5	4 to 5	1	4	0	16000	15000 to 30000	No	6	0	0.00	120	20
12	Z12,H-22	4	4 to 5	1	2	0	18500	15000 to 30000	Yes	4	20	5.00	30	7
12	Z12,H-23	3	3 or below 3	1	0	0	15000	15000 or Less	No	2	0	0.00	20	10
12	Z12,H-24	4	4 to 5	1	1	0	20000	15000 to 30000	No	4	40	10.00	34	9
12	Z12,H-25	5	4 to 5	1	2	0	10000	15000 or Less	No	10	40	4.00	180	18
12	Z12,H-26	2	3 or below 3	1	0	0	10000	15000 or Less	No	2	0	0.00	40	20
12	Z12,H-27	3	3 or below 3	1	0	0		15000 or Less	No	2	0	0.00	40	20
12	Z12,H-28	4	4 to 5	1	2	0		15000 or Less	No	4	0	0.00	70	18
12	Z12,H-29	3	3 or below 3	2	0	0	30000	15000 to 30000	No	2	40	20.00	60	30
12	Z12,H-30	2	3 or below 3	1	0	0	15000	15000 or Less	No	2	0	0.00	30	15

Table 13: General Household Information of Zone- 13 (Khaiyachhara)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
13	Z13,H-1	4	4 to 5	1	2	0	3000	15000 or Less	No	4	0	0.00	50	13
13	Z13,H-2	4	4 to 5	2	0	0	35000	more than 30000	No	2	0	0.00	40	20
13	Z13,H-3	3	3 or below 3	1	1	0	50000	more than 30000	No	2	20	10.00	60	30
13	Z13,H-4	6	above 5	4	0	0	18500	15000 to 30000	No	6	260	43.33	340	57
13	Z13,H-5	5	4 to 5	2	1	0	12000	15000 or Less	No	4	20	5.00	140	35
13	Z13,H-6	5	4 to 5	2	0	0	26000	15000 to 30000	No	4	0	0.00	85	21
13	Z13,H-7	4	4 to 5	1	2	0		15000 or Less	No	4	0	0.00	50	13
13	Z13,H-8	4	4 to 5	1	1	0	50000	more than 30000	No	4	0	0.00	30	8
13	Z13,H-9	5	4 to 5	3	0	0	85000	more than 30000	No	4	70	17.50	180	45
13	Z13,H-10	6	above 5	4	1	0	210000	more than 30000	No	2	20	10.00	85	43
13	Z13,H-11	3	3 or below 3	2	1	0	10000	15000 or Less	No	4	30	7.50	100	25
13	Z13,H-12	6	above 5	1	4	0	14000	15000 or Less	No	4	40	10.00	90	23
13	Z13,H-13	7	above 5	1	4	0	20000	15000 to 30000	No	4	188	47.00	260	65
13	Z13,H-14	5	4 to 5	0	0	1		15000 or Less	No	2	10	5.00	20	10
13	Z13,H-15	3	3 or below 3	1	0	1	20000	15000 to 30000	No	2	240	120.0	230	115
13	Z13,H-16	3	3 or below 3	1	1	0	5000	15000 or Less	No	2	60	30.00	120	60
13	Z13,H-17	6	above 5	1	2	0	25000	15000 to 30000	No	4	190	47.50	300	75
13	Z13,H-18	6	above 5	2	0	1	40000	more than 30000	No	4	110	27.50	100	25
13	Z13,H-19	2	3 or below 3	1	0	0	30000	15000 to 30000	No	2	30	15.00	80	40
13	Z13,H-20	2	3 or below 3	1	0	0	20000	15000 to 30000	No	2	60	30.00	120	60
13	Z13,H-21	5	4 to 5	2	2	0	29000	15000 to 30000	No	4	10	2.50	135	34
13	Z13,H-22	5	4 to 5	2	2	0	30000	15000 to 30000	No	4	20	5.00	120	30
13	Z13,H-23	10	above 5	3	2	0	70000	more than 30000	No	4	20	5.00	120	30
13	Z13,H-24	8	above 5	1	1	1	15000	15000 or Less	No	4	30	7.50	80	20
13	Z13,H-25	5	4 to 5	1	3	0	1200	15000 or Less	No	4	20	5.00	120	30
13	Z13,H-26	3	3 or below 3	1	1	0	40000	more than 30000	No	2	10	5.00	30	15
13	Z13,H-27	3	3 or below 3	1	0	0	10000	15000 or Less	No	2	40	20.00	20	10
13	Z13,H-28	8	above 5	2	0	0	22000	15000 to 30000	No	4	0	0.00	20	5
13	Z13,H-29	10	above 5	3	3	0	30000	15000 to 30000	No	4	40	10.00	130	33

Table 14: General Household Information of Zone- 14 (Mayani)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
14	Z14,H-1	4	4 to 5	1	1	1	12000	15000 or Less	No	6	0	0.00	50	8
14	Z14,H-2	4	4 to 5	2	1	0	25000	15000 to 30000	No	4	30	7.50	60	15
14	Z14,H-3	3	3 or below 3	2	0	0	15000	15000 or Less	No	4	20	5.00	40	10
14	Z14,H-4	5	4 to 5	1	2	1	25000	15000 to 30000	No	4	50	12.50	120	30
14	Z14,H-5	4	4 to 5	2	0	0	27000	15000 to 30000	Yes	4	0	0.00	70	18
14	Z14,H-6	6	above 5	2	1	0	14000	15000 or Less	No	6	140	23.33	360	60
14	Z14,H-7	7	above 5	1	3	0	20000	15000 to 30000	No	2	0	0.00	40	20
14	Z14,H-8	6	above 5	2	3	0	35000	more than 30000	No	10	90	9.00	460	46
14	Z14,H-9	2	3 or below 3	1	0	0	5000	15000 or Less	No	2	0	0.00	60	30
14	Z14,H-10	7	above 5	1	3	0	35000	more than 30000	No	8	0	0.00	110	14
14	Z14,H-11	8	above 5	2	2	0	45000	more than 30000	No	4	20	5.00	80	20
14	Z14,H-12	4	4 to 5	1	2	0	50000	more than 30000	Yes	4	10	2.50	60	15
14	Z14,H-13	5	4 to 5	1	0	0	12000	15000 or Less	No	2	0	0.00	40	20
14	Z14,H-14	6	above 5	1	3	0	15000	15000 or Less	No	8	10	1.25	130	16
14	Z14,H-15	4	4 to 5	1	0	0	13000	15000 or Less	No	2	30	15.00	60	30
14	Z14,H-16	5	4 to 5	1	3	0	11000	15000 or Less	No	6	70	11.67	230	38
14	Z14,H-17	3	3 or below 3	1	1	0	20000	15000 to 30000	No	6	30	5.00	105	18
14	Z14,H-18	6	above 5	1	2	0	17000	15000 to 30000	No	6	20	3.33	150	25
14	Z14,H-19	3	3 or below 3	1	1	0	30000	15000 to 30000	No	4	0	0.00	50	12
14	Z14,H-20	3	3 or below 3	1	1	0	10000	15000 or Less	Yes	4	0	0.00	160	40
14	Z14,H-21	6	above 5	2	1	1	27000	15000 to 30000	No	6	54	9.00	300	50
14	Z14,H-22	6	above 5	2	0	0	26000	15000 to 30000	No	2	54	27.00	120	60
14	Z14,H-23	3	3 or below 3	1	1	0	12000	15000 or Less	No	6	0	0.00	95	16
14	Z14,H-24	3	3 or below 3	1	0	0	20000	15000 to 30000	No	2	80	40.00	60	30
14	Z14,H-25	4	4 to 5	1	0	0	20000	15000 to 30000	No	4	0	0.00	80	20
14	Z14,H-26	8	above 5	2	0	0	40000	more than 30000	No	4	0	0.00	40	10
14	Z14,H-27	4	4 to 5	1	2	0	15000	15000 or Less	No	4	0	0.00	80	20
14	Z14,H-28	3	3 or below 3	1	1	0	8000	15000 or Less	No	4	20	5.00	82	21
14	Z14,H-29	5	4 to 5	2	1	0	12000	15000 or Less	No	6	70	11.67	113	19
14	Z14,H-30	3	3 or below 3	1	1	0	10000	15000 or Less	No	2	0	0.00	63	32

Table 15: General Household Information of Zone- 15 (Wahedpur)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
15	Z15,H-1	6	above 5	2	0	0	42000	more than 30000	Yes	4	0	0.00	50	13
15	Z15,H-2	4	4 to 5	1	2	0	7000	15000 or Less	No	4	60	15.00	70	18
15	Z15,H-3	7	above 5	1	4	0	10000	15000 or Less	No	2	20	10.00	40	20
15	Z15,H-4	6	above 5	1	1	0	12000	15000 or Less	No	4	40	10.00	120	30
15	Z15,H-5	3	3 or below 3	1	1	0	20000	15000 to 30000	No	2	0	0.00	20	10
15	Z15,H-6	3	3 or below 3	1	0	0	10000	15000 or Less	No	2	0	0.00	30	15
15	Z15,H-7	3	3 or below 3	1	1	0	10000	15000 or Less	No	2	0	0.00	35	18
15	Z15,H-8	4	4 to 5	1	1	0	11000	15000 or Less	No	2	20	10.00	30	15
15	Z15,H-9	4	4 to 5	2	0	0	16000	15000 to 30000	No	4	0	0.00	100	25
15	Z15,H-10	3	3 or below 3	1	1	0	7000	15000 or Less	No	4	0	0.00	70	18
15	Z15,H-11	7	above 5	2	1	0	32000	more than 30000	No	2	20	10.00	40	20
15	Z15,H-12	4	4 to 5	1	2	0	16000	15000 to 30000	No	6	10	1.67	80	13
15	Z15,H-13	3	3 or below 3	1	1	0	32000	more than 30000	No	4	0	0.00	60	15
15	Z15,H-14	3	3 or below 3	1	1	0	35000	more than 30000	No	2	40	20.00	60	30
15	Z15,H-15	5	4 to 5	2	0	0	40000	more than 30000	No	2	0	0.00	60	30
15	Z15,H-16	11	above 5	4	3	0	82000	more than 30000	No	2	0	0.00	20	10
15	Z15,H-17	2	3 or below 3	1	1	0	20000	15000 to 30000	No	2	0	0.00	20	10
15	Z15,H-18	5	4 to 5	1	1	0	30000	15000 to 30000	No	2	0	0.00	40	20
15	Z15,H-19	3	3 or below 3	1	1	0	35000	more than 30000	No	2	0	0.00	60	30
15	Z15,H-20	4	4 to 5	1	2	0	20000	15000 to 30000	No	2	40	20.00	60	30
15	Z15,H-21	2	3 or below 3	1	0	0	6000	15000 or Less	No	2	0	0.00	17	8
15	Z15,H-22	5	4 to 5	1	3	0	50000	more than 30000	No	4	0	0.00	40	10
15	Z15,H-23	2	3 or below 3	1	0	0	35000	more than 30000	No	2	0	0.00	30	15
15	Z15,H-24	4	4 to 5	1	0	0	-	15000 or Less	No	2	0	0.00	60	30
15	Z15,H-25	3	3 or below 3	1	1	0	-	15000 or Less	No	2	0	0.00	70	35
15	Z15,H-26	5	4 to 5	2	0	0	55000	more than 30000	No	2	0	0.00	20	10
15	Z15,H-27	3	3 or below 3	1	0	0	15000	15000 or Less	No	2	40	20.00	60	30
15	Z15,H-28	3	3 or below 3	2	0	0	30000	15000 to 30000	No	2	50	25.00	45	23
15	Z15,H-29	5	4 to 5	2	1	0	41000	more than 30000	No	2	20	10.00	40	20
15	Z15,H-30	5	4 to 5	1	3	0	30000	15000 to 30000	No	2	0	0.00	20	10

Table 16: General Household Information of Zone- 16 (Haitkandi)

Zone	HH ID	HH Size	HHS Category	Employed	Student	Non-School going Children	Income	Income Category	Vehicle Ownership	Total Trip	Total Cost (tk.)	Avg. Cost (tk.)	Total Trip Length (min)	Avg. Trip Length (min)
16	Z16,H-1	3	3 or below 3	1	1	0	20000	15000 to 30000	Yes	2	0	0.00	30	15
16	Z16,H-2	4	4 to 5	1	2	0	20000	15000 to 30000	No	1	0	0.00	0	0
16	Z16,H-3	6	above 5	1	1	0	20000	15000 to 30000	No	4	10	2.50	60	15
16	Z16,H-4	4	4 to 5	2	1	0	32000	more than 30000	No	2	0	0.00	30	15
16	Z16,H-5	4	4 to 5	1	1	0	20000	15000 to 30000	No	2	20	10.00	60	30
16	Z16,H-6	3	3 or below 3	1	1	0	50000	more than 30000	No	2	20	10.00	120	60
16	Z16,H-7	3	3 or below 3	2	0	0	35000	more than 30000	No	2	0	0.00	120	60
16	Z16,H-8	3	3 or below 3	1	0	0	15000	15000 or Less	No	2	0	0.00	20	10
16	Z16,H-9	4	4 to 5	1	1	0	20000	15000 to 30000	No	2	20	10.00	60	30
16	Z16,H-10	4	4 to 5	1	2	0	10000	15000 or Less	No	4	0	0.00	90	23
16	Z16,H-11	6	above 5	2	1	0	55000	more than 30000	No	2	0	0.00	30	15
16	Z16,H-12	6	above 5	2	1	0	40000	more than 30000	No	2	20	10.00	60	30
16	Z16,H-13	5	4 to 5	1	3	0	5000	15000 or Less	No	4	40	10.00	130	33
16	Z16,H-14	4	4 to 5	1	2	0	10000	15000 or Less	No	4	0	0.00	90	23
16	Z16,H-15	3	3 or below 3	1	1	0	10000	15000 or Less	No	2	0	0.00	30	15
16	Z16,H-16	4	4 to 5	1	0	0	12000	15000 or Less	Yes	2	0	0.00	20	10
16	Z16,H-17	6	above 5	1	1	1	12000	15000 or Less	No	4	0	0.00	90	23
16	Z16,H-18	6	above 5	1	2	0	10000	15000 or Less	No	2	0	0.00	10	5
16	Z16,H-19	4	4 to 5	1	0	2	20000	15000 to 30000	Yes	2	0	0.00	30	15
16	Z16,H-20	6	above 5	1	4	0	10000	15000 or Less	No	2	40	20.00	20	10
16	Z16,H-21	4	4 to 5	1	2	0	20000	15000 to 30000	Yes	2	0	0.00	30	15
16	Z16,H-22	4	4 to 5	1	2	0	12000	15000 or Less	No	2	20	10.00	30	15
16	Z16,H-23	4	4 to 5	1	1	0	40000	more than 30000	No	2	40	20.00	60	30
16	Z16,H-24	8	above 5	4	0	0	168000	more than 30000	No	3	0	0.00	130	43
16	Z16,H-25	5	4 to 5	1	3	0	15000	15000 or Less	Yes	4	40	10.00	140	35
16	Z16,H-26	3	3 or below 3	1	1	0	16000	15000 to 30000	No	2	40	20.00	60	30
16	Z16,H-27	4	4 to 5	1	0	0	35000	more than 30000	No	4	0	0.00	40	10
16	Z16,H-28	3	3 or below 3	1	1	0	8000	15000 or Less	No	2	0	0.00	15	8
16	Z16,H-29	4	4 to 5	2	2	0	45000	more than 30000	No	2	0	0.00	20	10
16	Z16,H-30	4	4 to 5	1	1	0	10000	15000 or Less	No	4	0	0.00	80	20

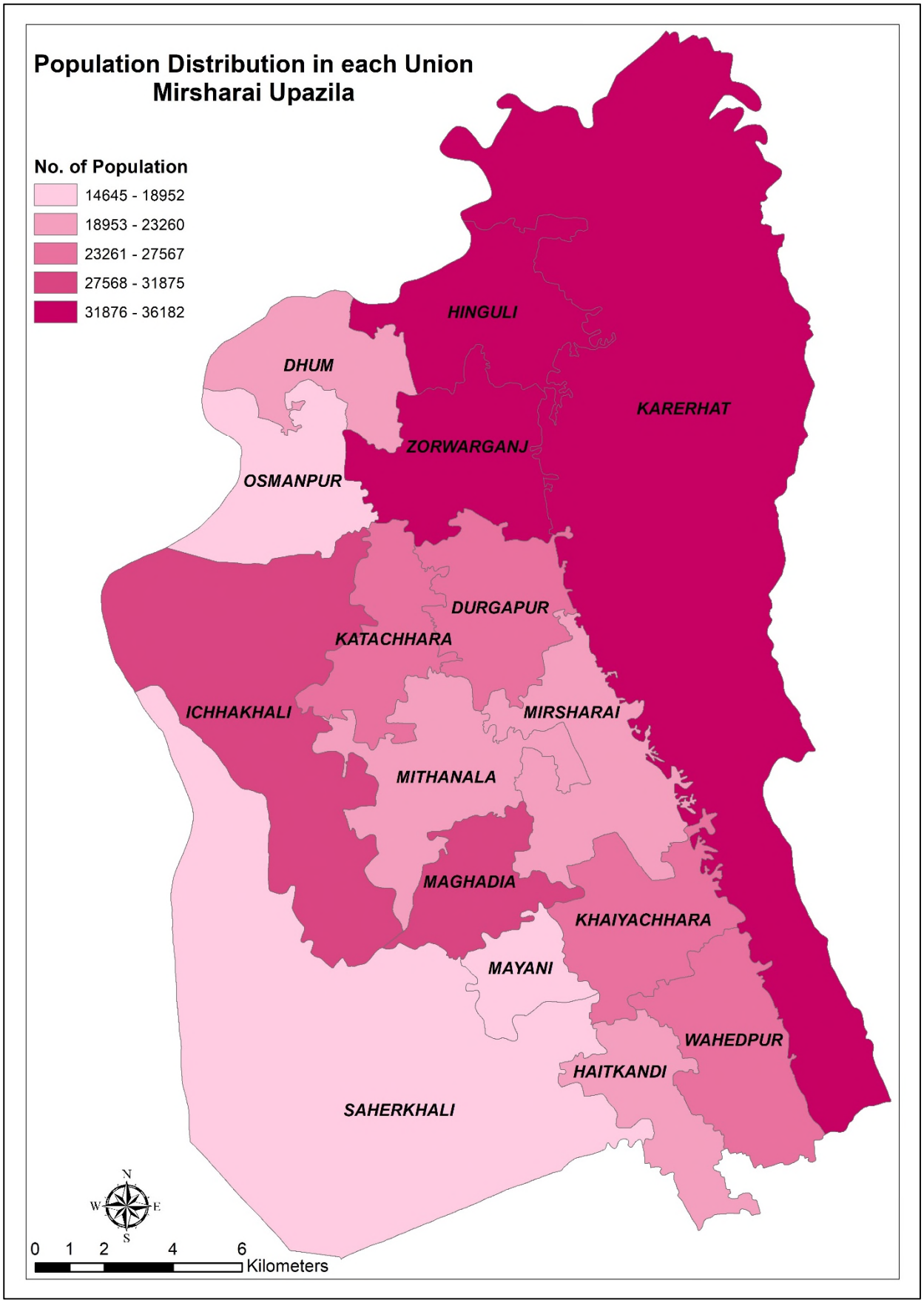


Figure 1: Population Distribution in each Union, Mirsharai Upazila

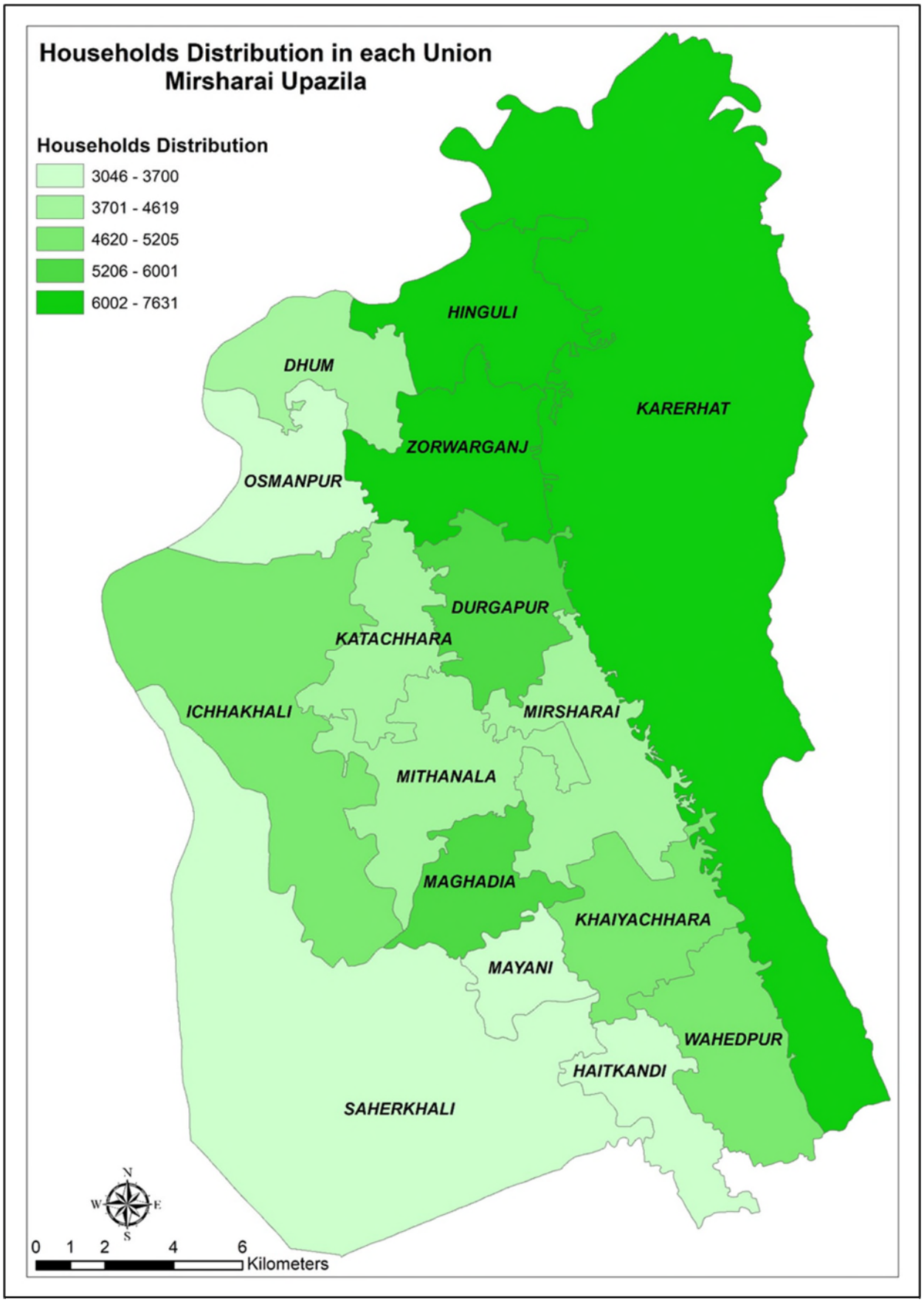


Figure 2: Households Distribution in each Union, Mirsharai Upazila

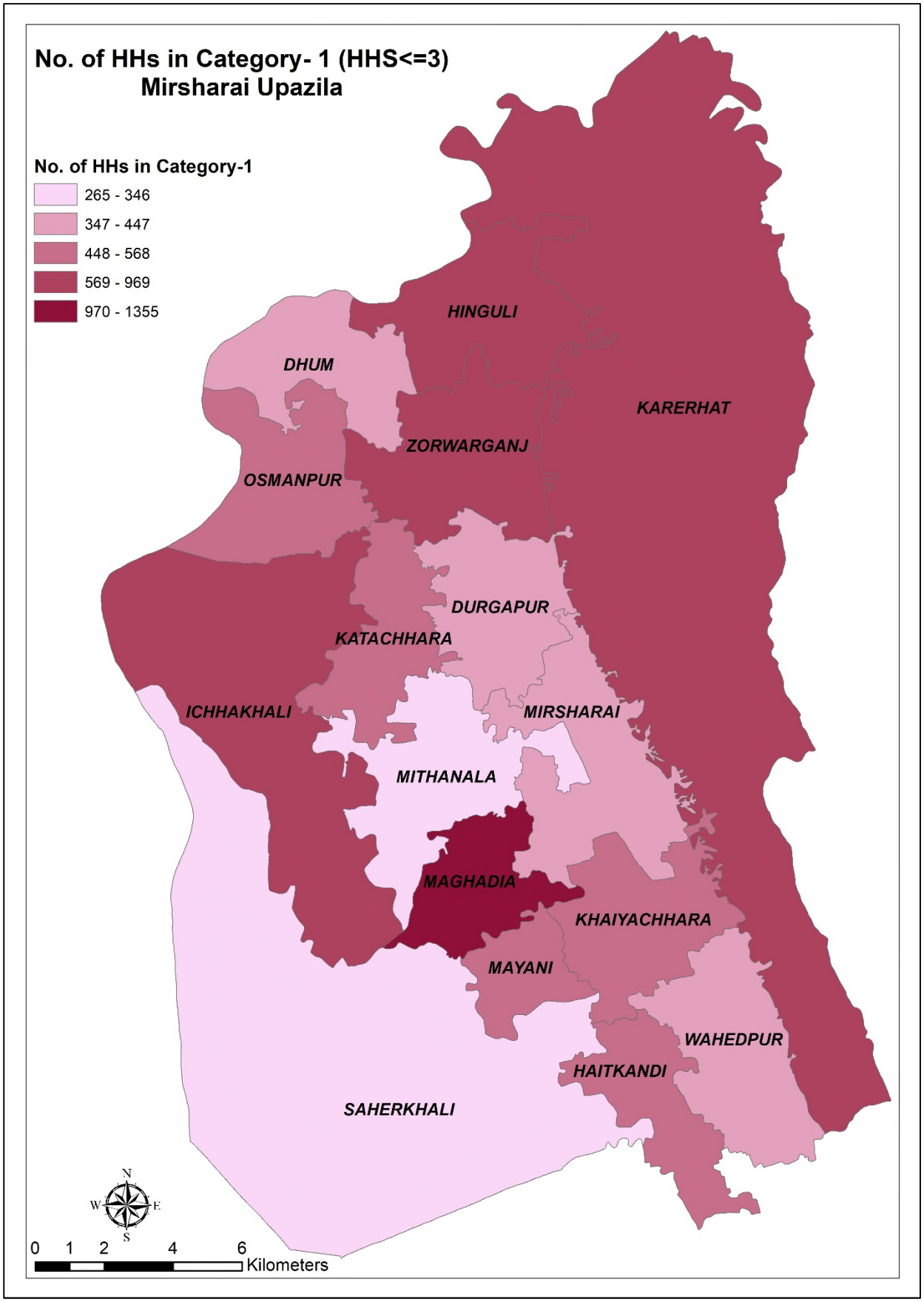


Figure 3: No. of HHs in Category -1 (HH<=3), Mirsharai Upazila

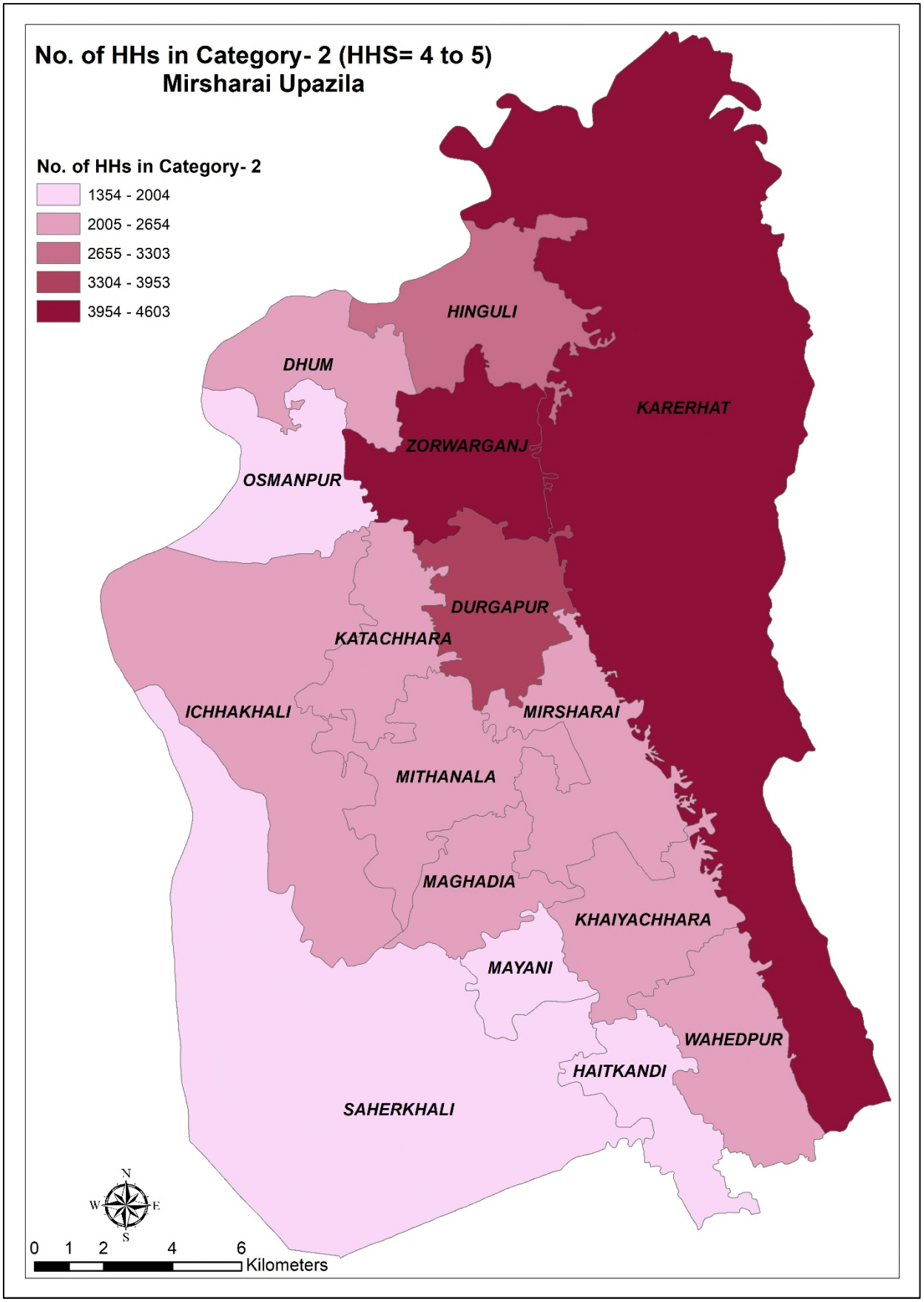


Figure 4: No. of HHs in Category -2 (HH = 4 to5), Mirsharai Upazila

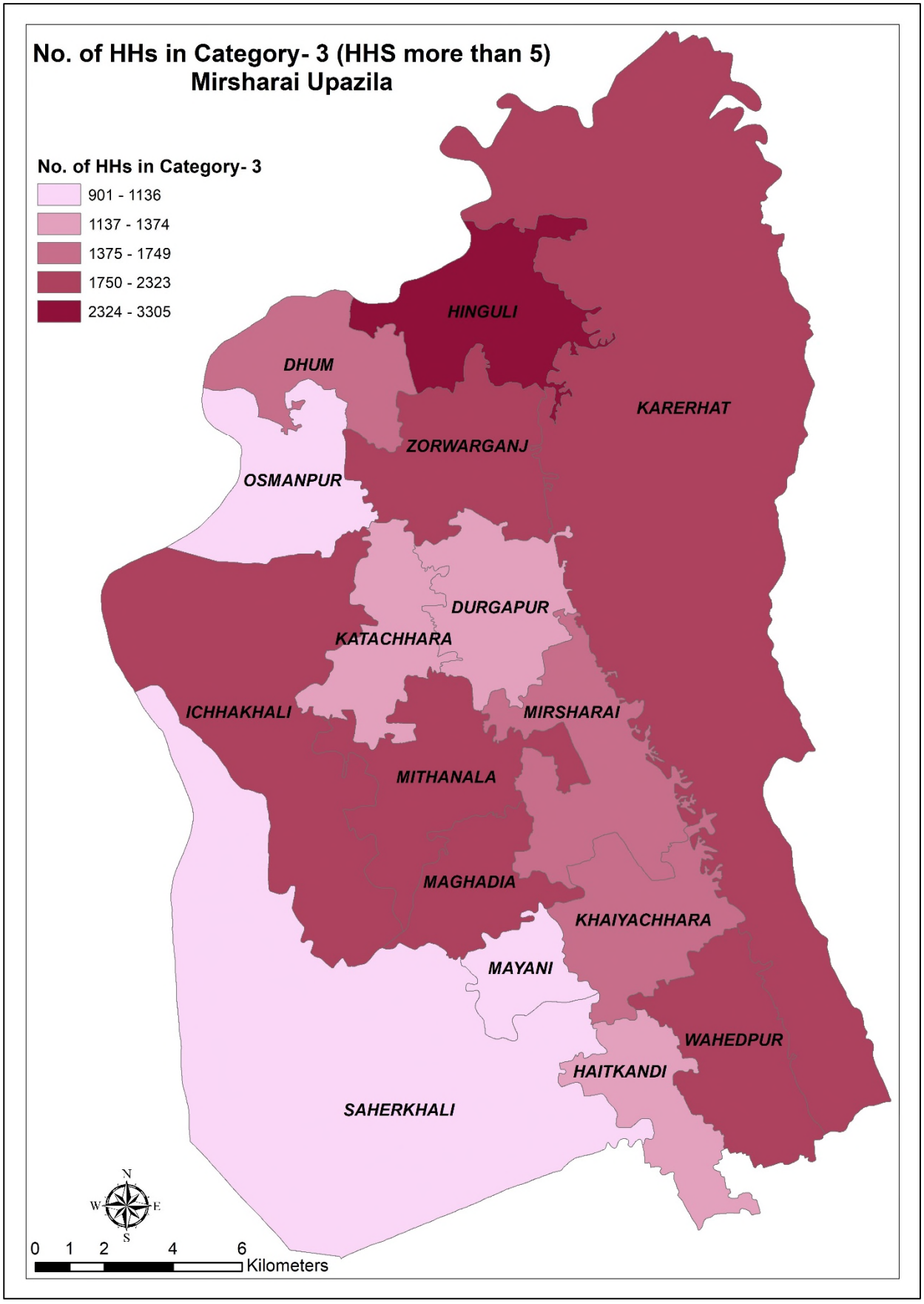


Figure 5: No. of HHs in Category -3 (HHS more than 5), Mirsharai Upazila

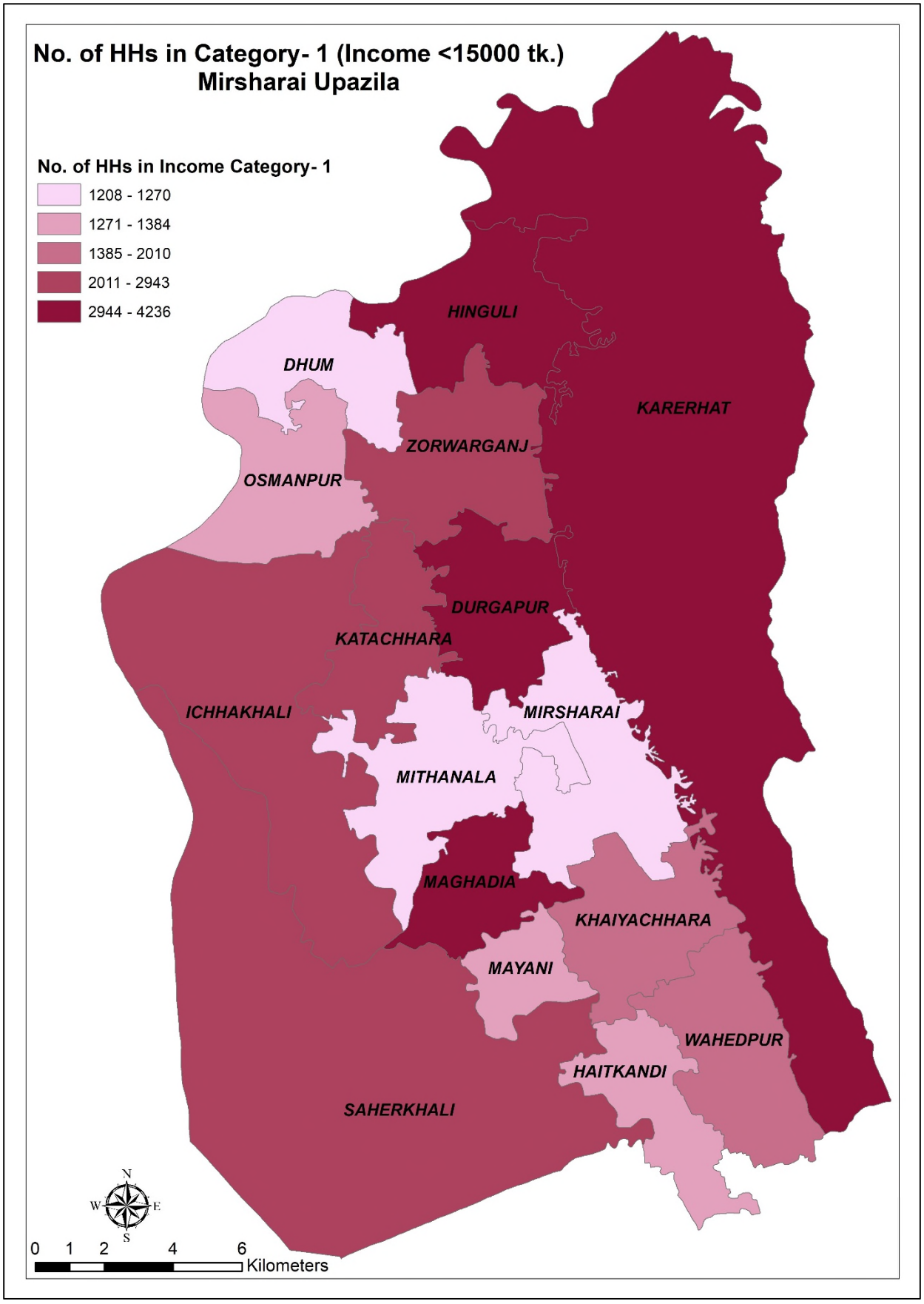


Figure 6:No. of HHs in Category -1 (Income<15000 tk.), Mirsharai Upazila

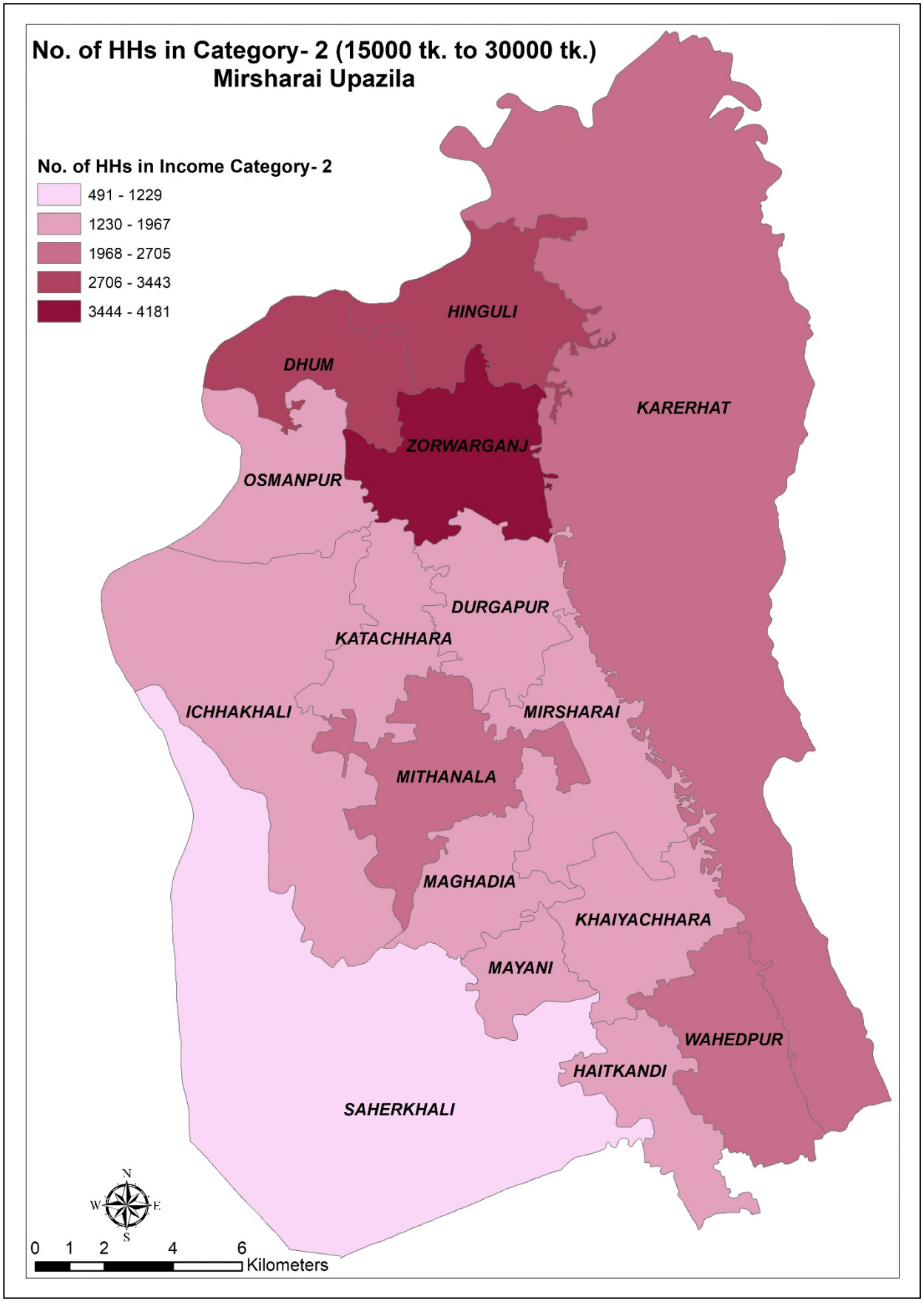


Figure 7:No. of HHs in Category -2 (15000 tk. to 30000 tk.), Mirsharai Upazila

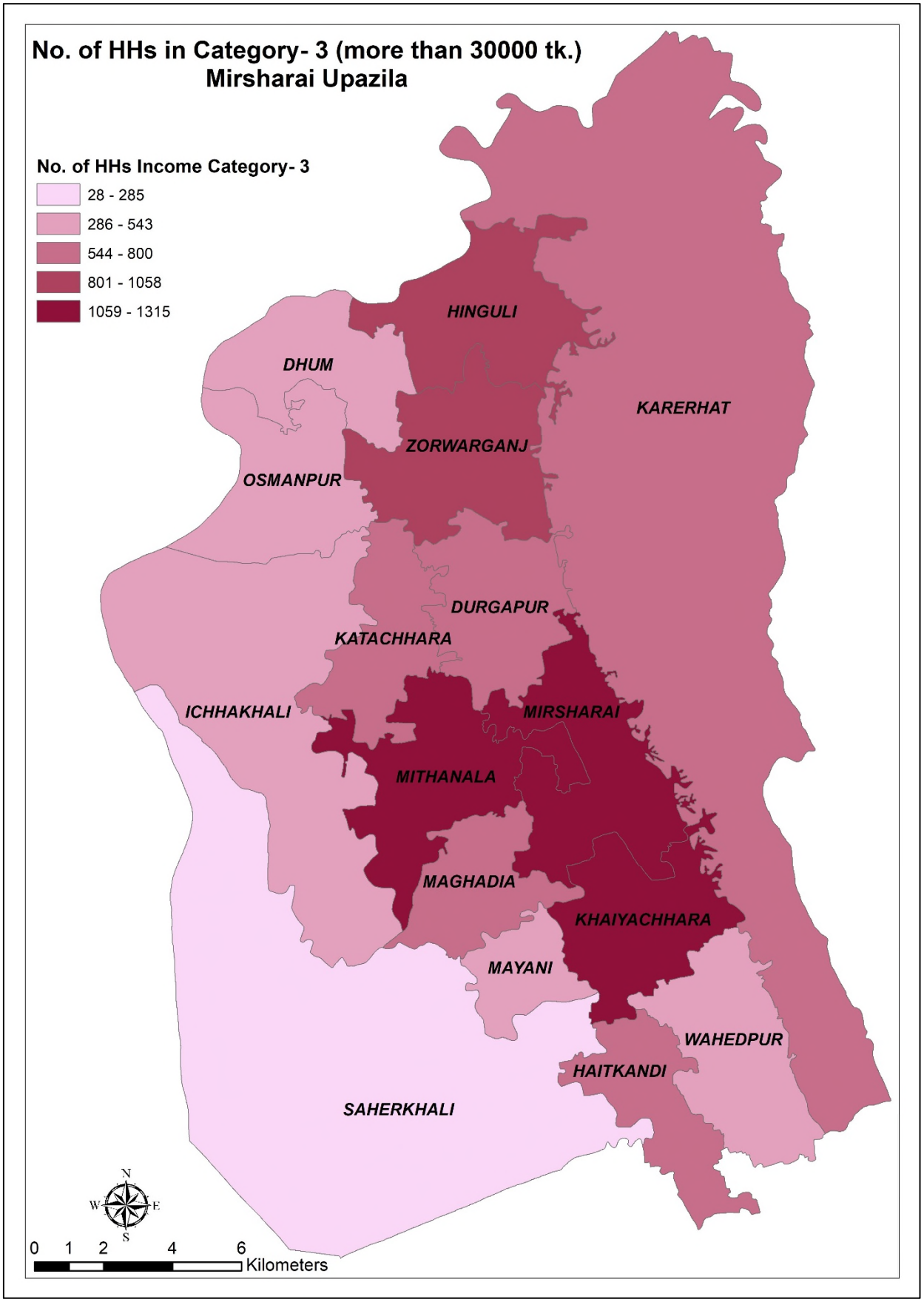


Figure 8:No. of HHs in Category -3 (more than 30000 tk.), Mirsharai Upazila

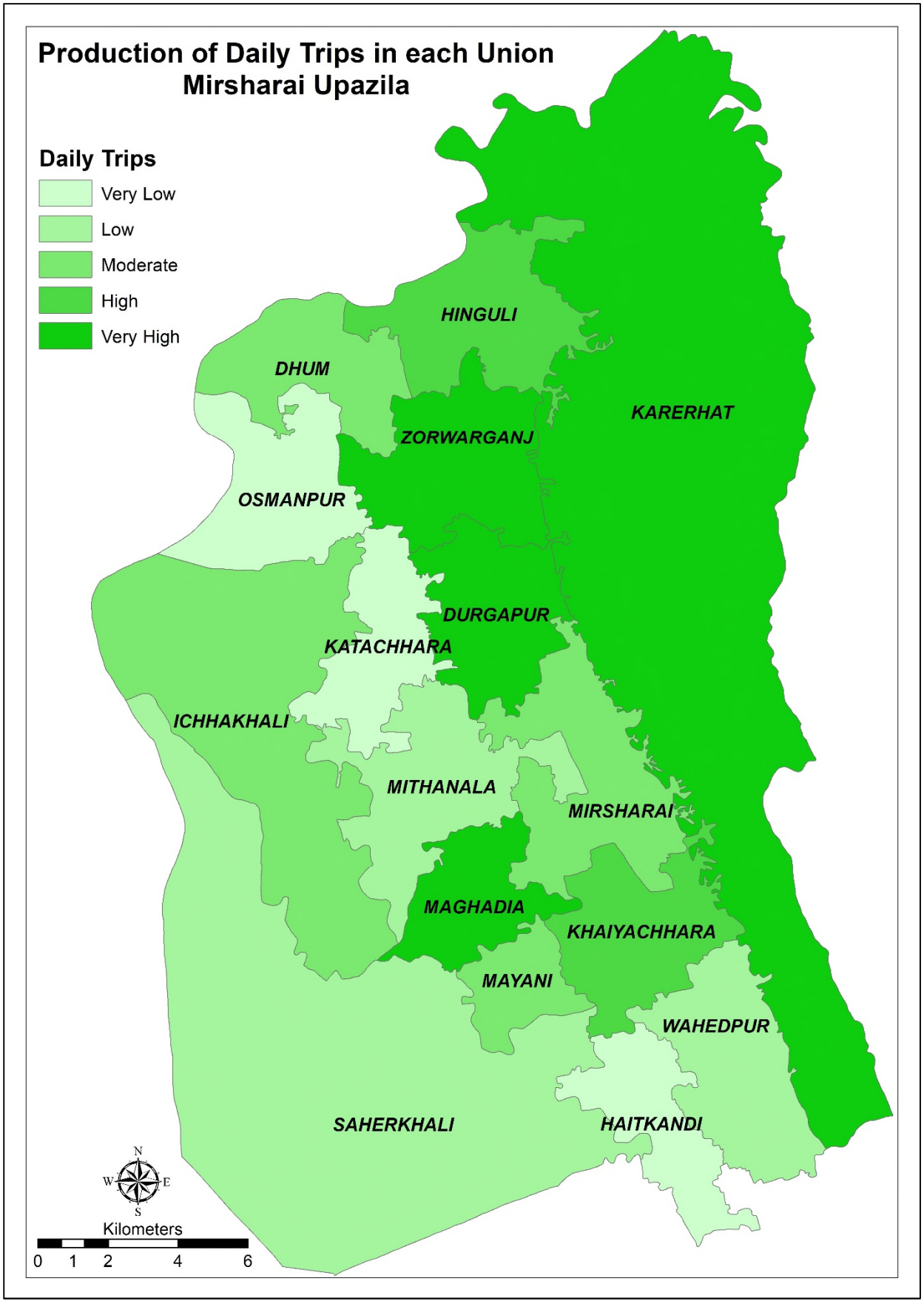


Figure 9: Production of Daily Trips in each Union, Mirsharai Upazila

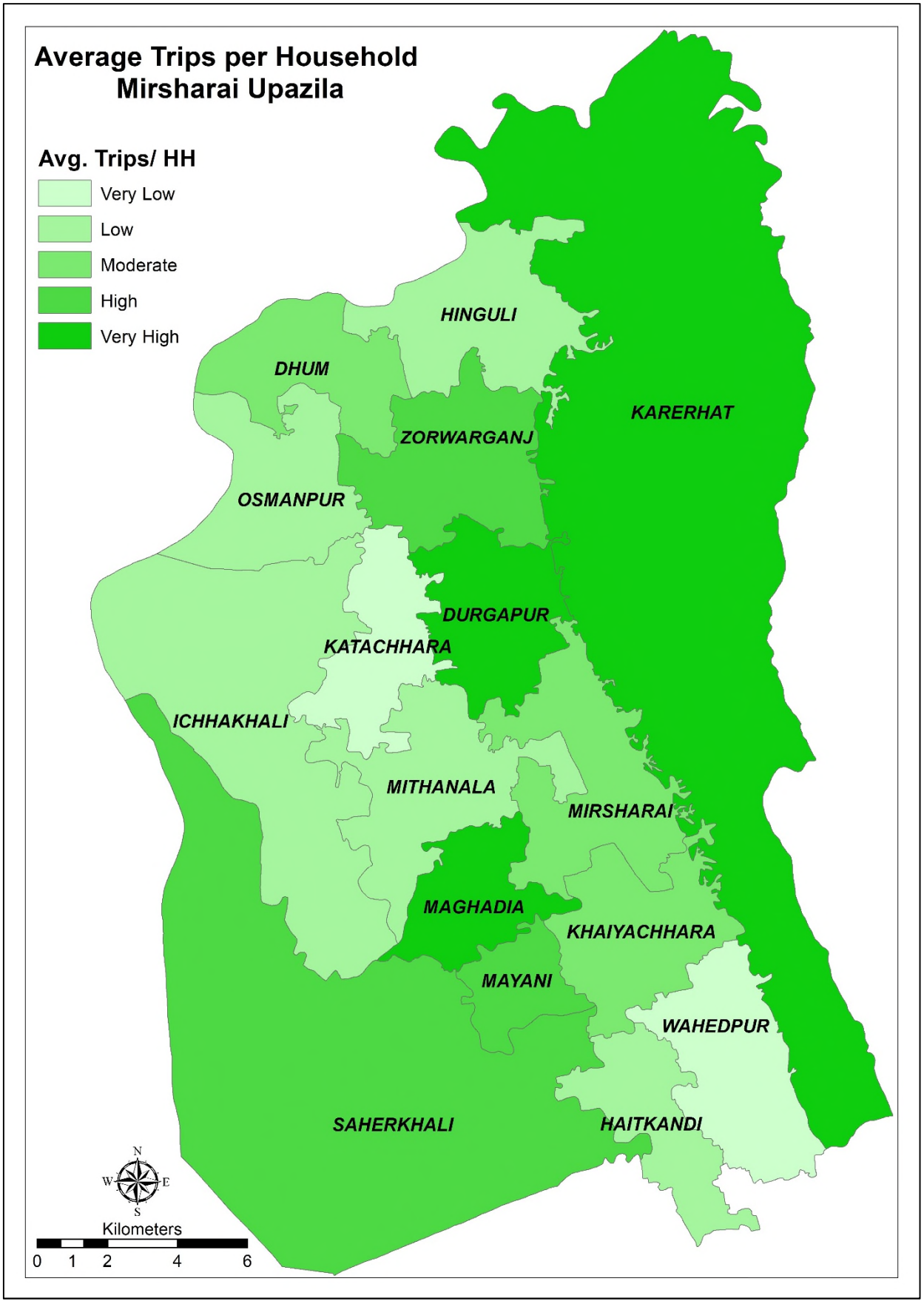


Figure 10: Average Trips per Household in Mirsharai Upazila

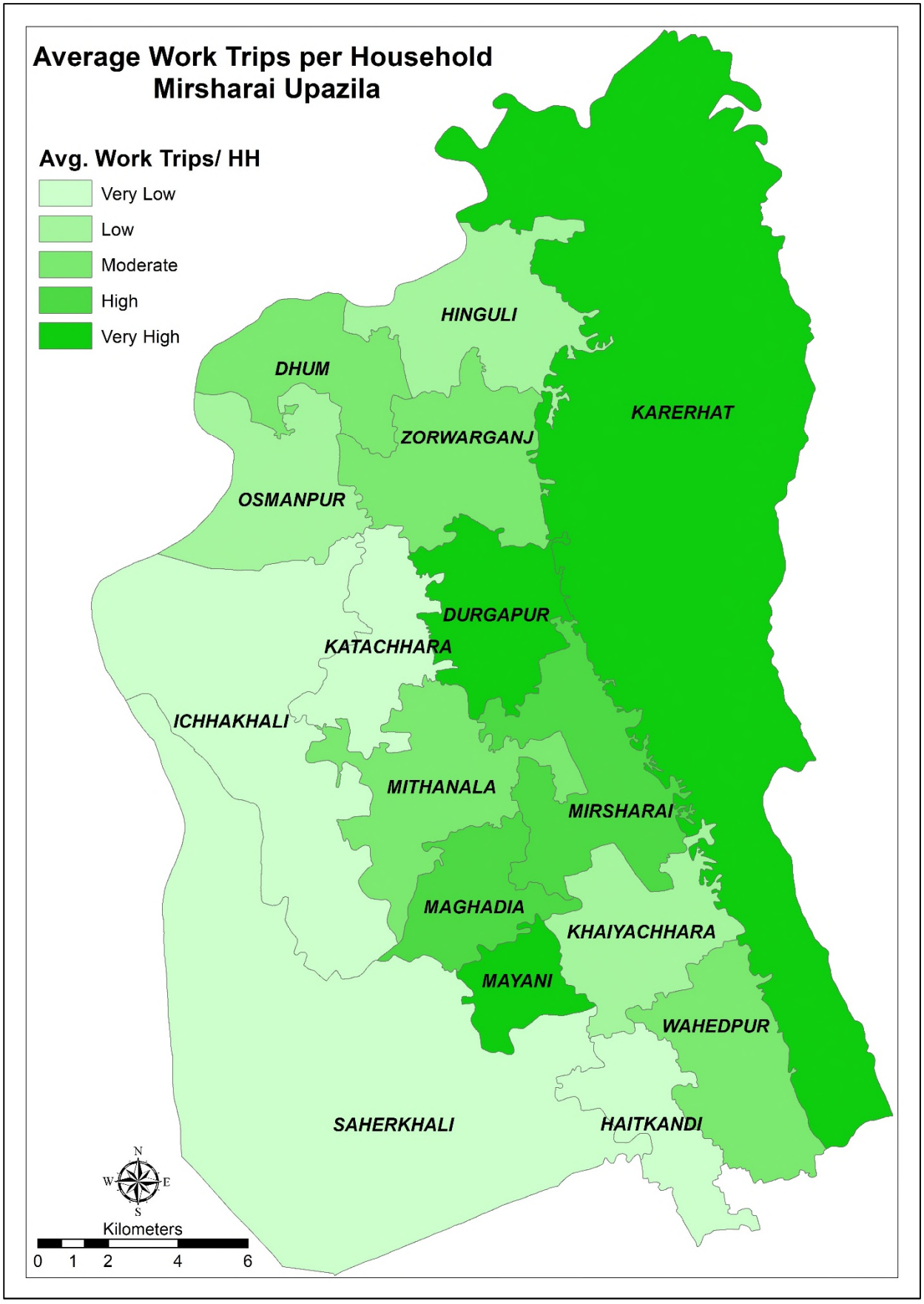


Figure 11: Average Work Trip per Household, Mirsharai Upazila

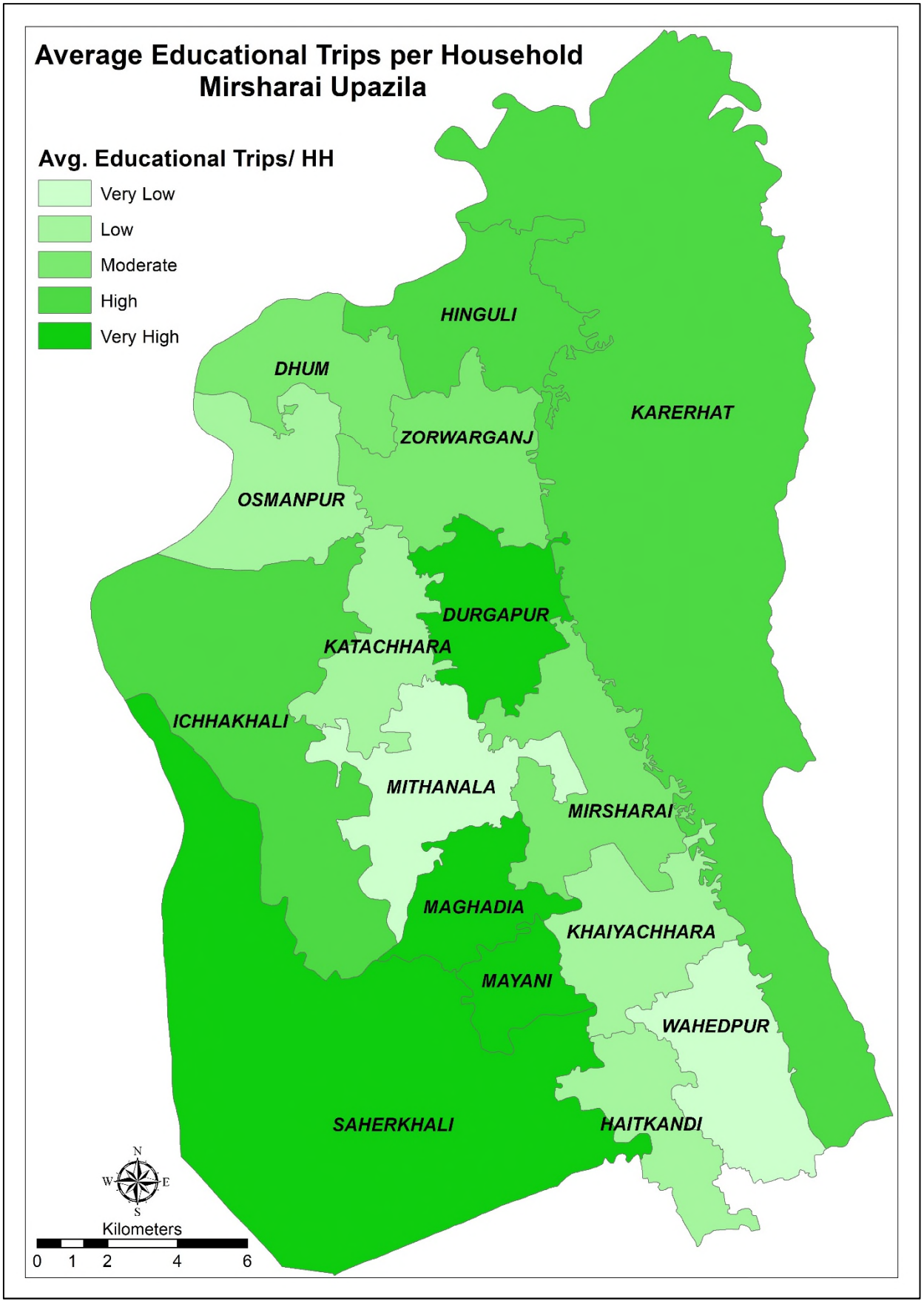


Figure 12: Average Educational Trips per Household, Mirsharai Upazila

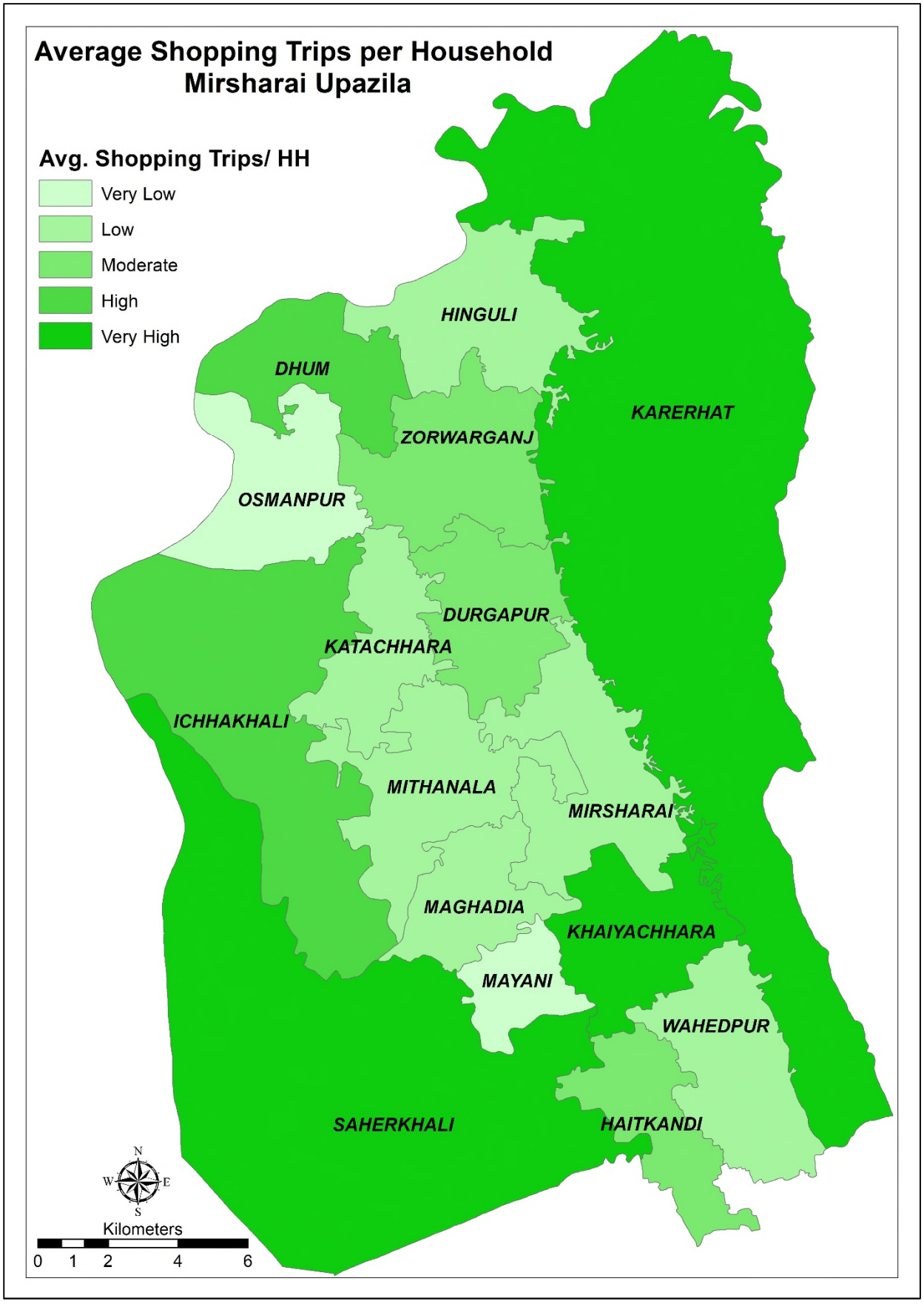


Figure 13: Average Shopping Trips per Household, Mirsharai Upazila

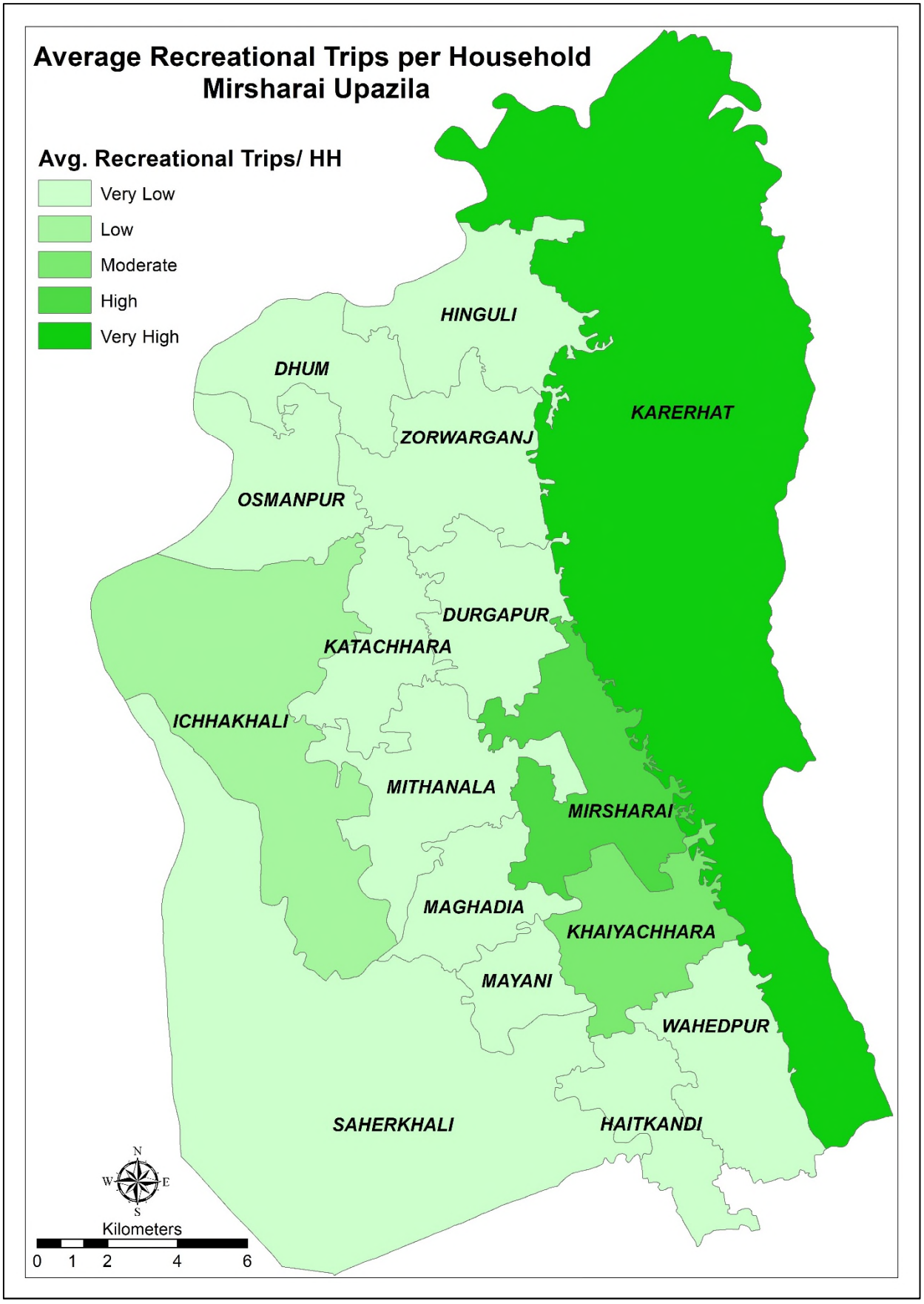


Figure 14: Average Recreational Trips per Household, Mirsharai Upazila

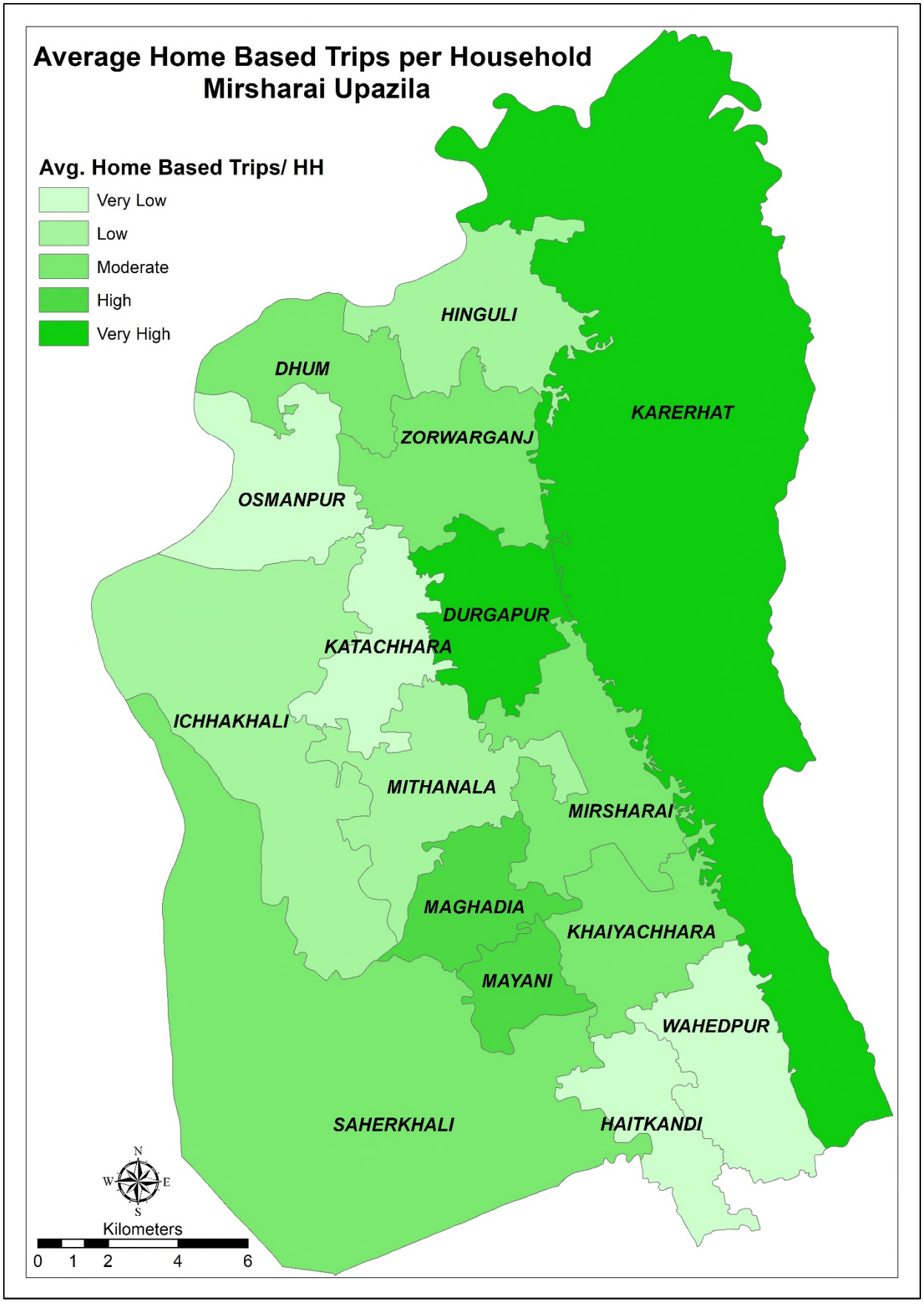


Figure 15: Average Home Based Trips per Household, Mirsharai Upazila

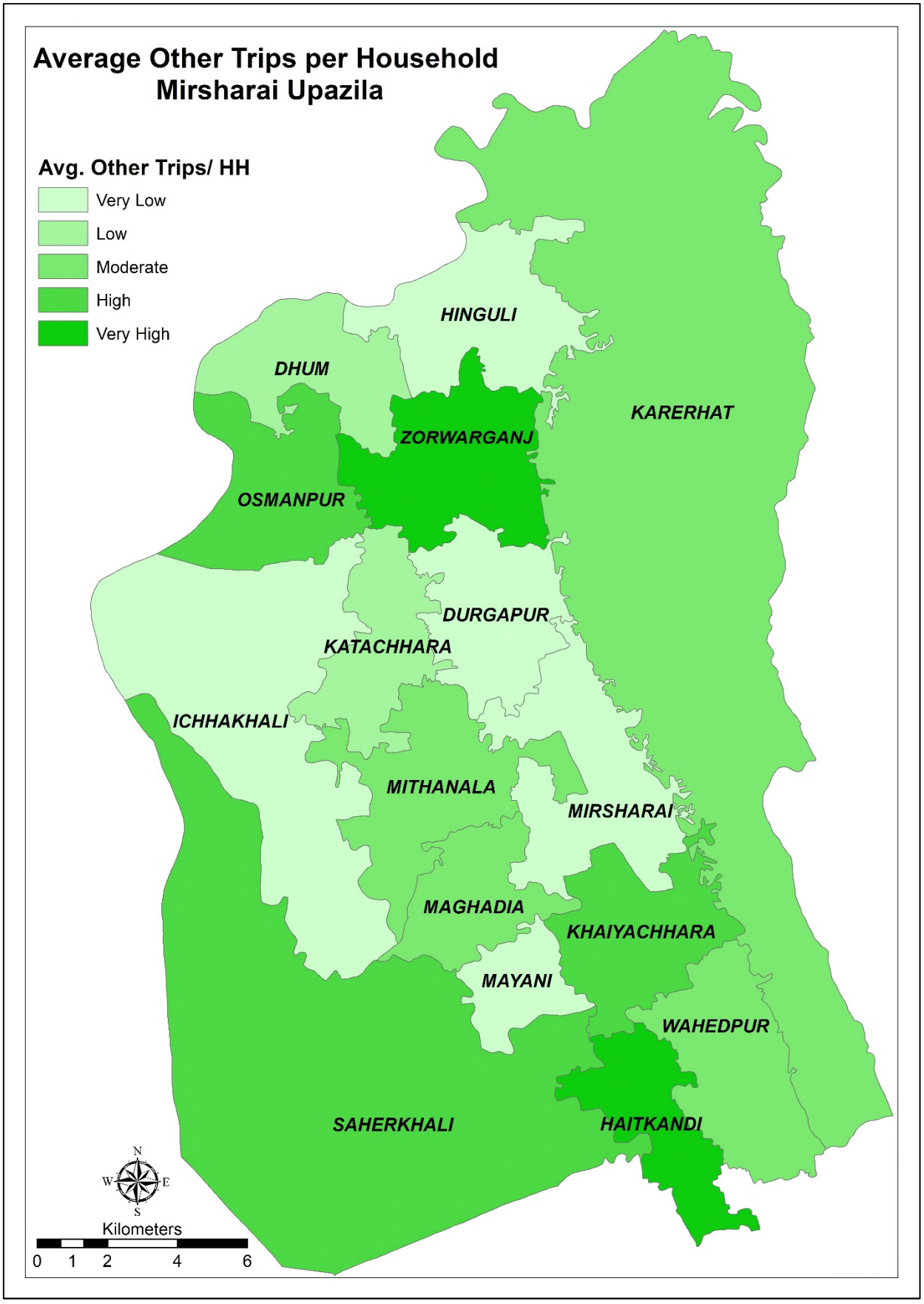


Figure 16: Average Other Trips per Household, Mirsharai Upazila

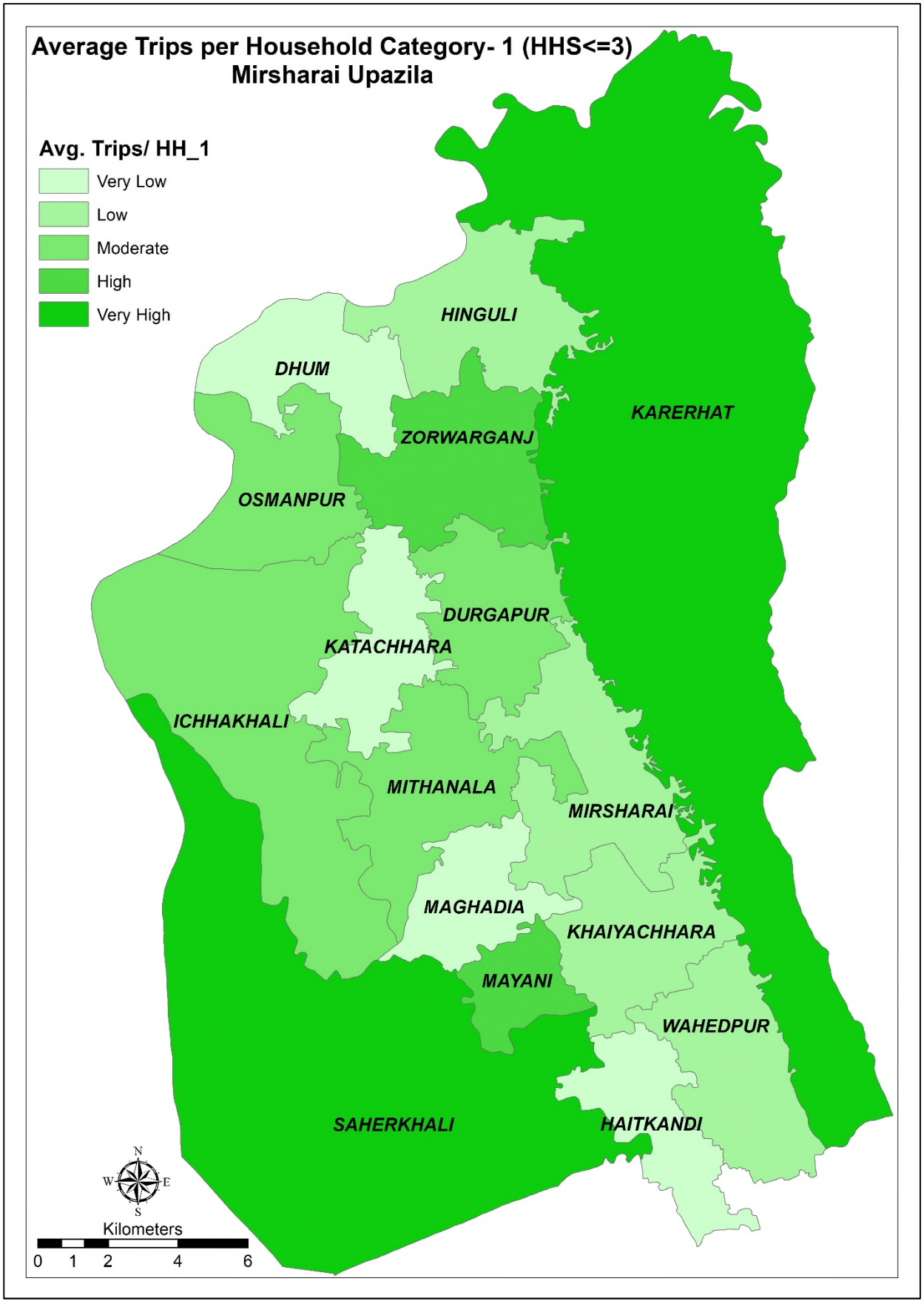


Figure 17: Average Trips per Household Category- 1 (HHS<= 3), Mirsharai Upazila

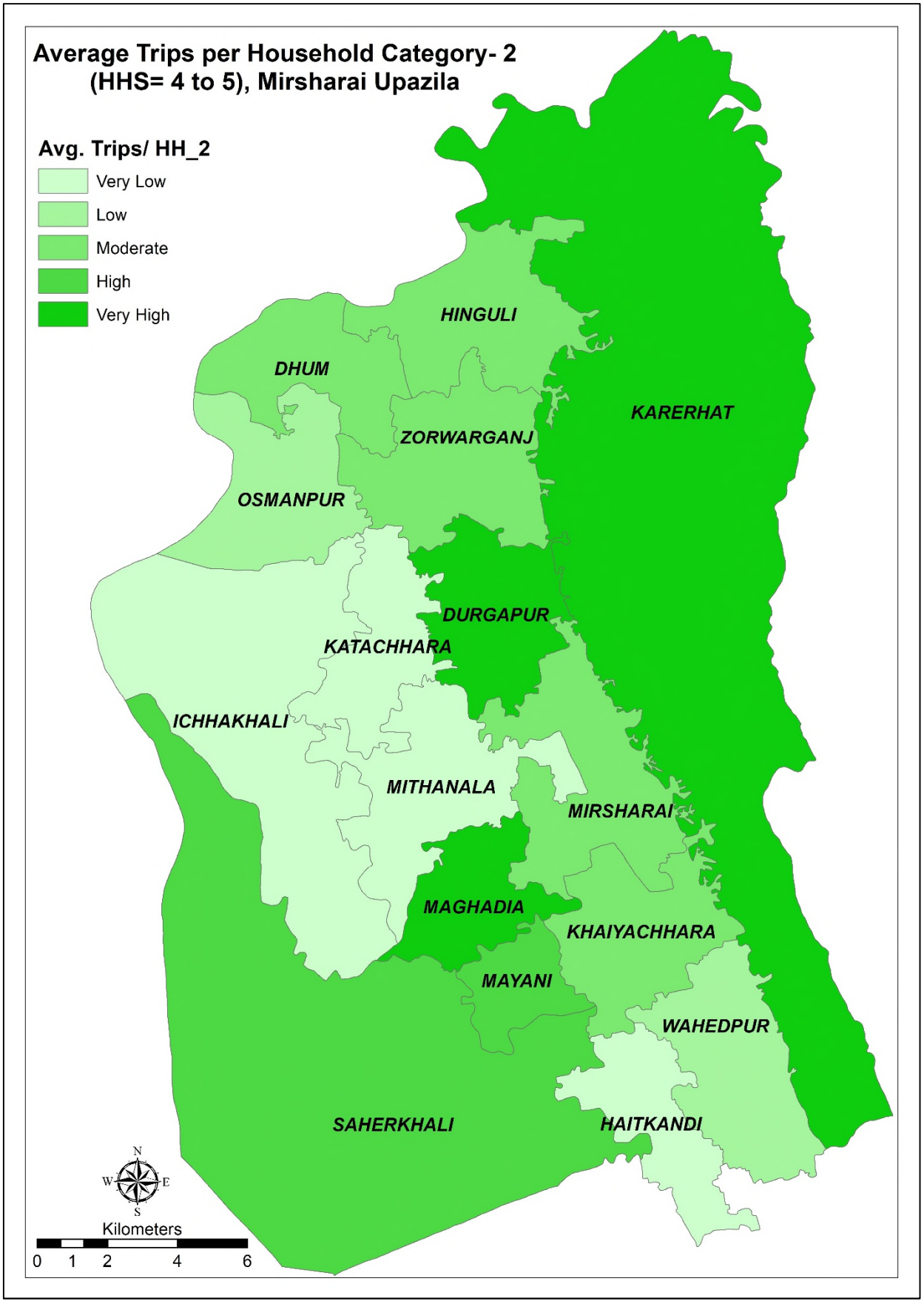


Figure 18: Average Trips per Household Category- 2 (HHS= 4 to 5), Mirsharai Upazila

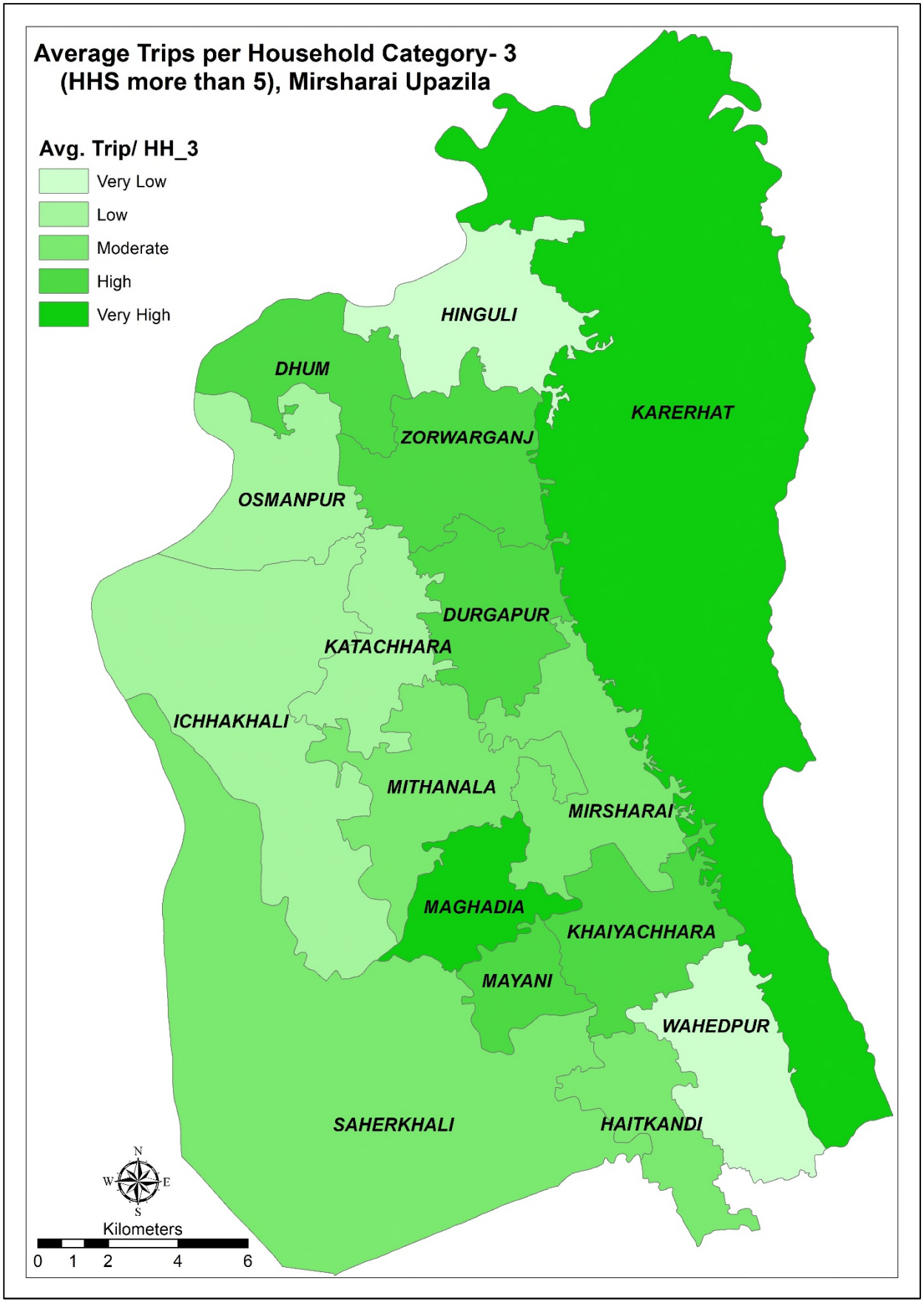


Figure 19: Average Trips per Household Category- 3 (HHS> 5), Mirsharai Upazila

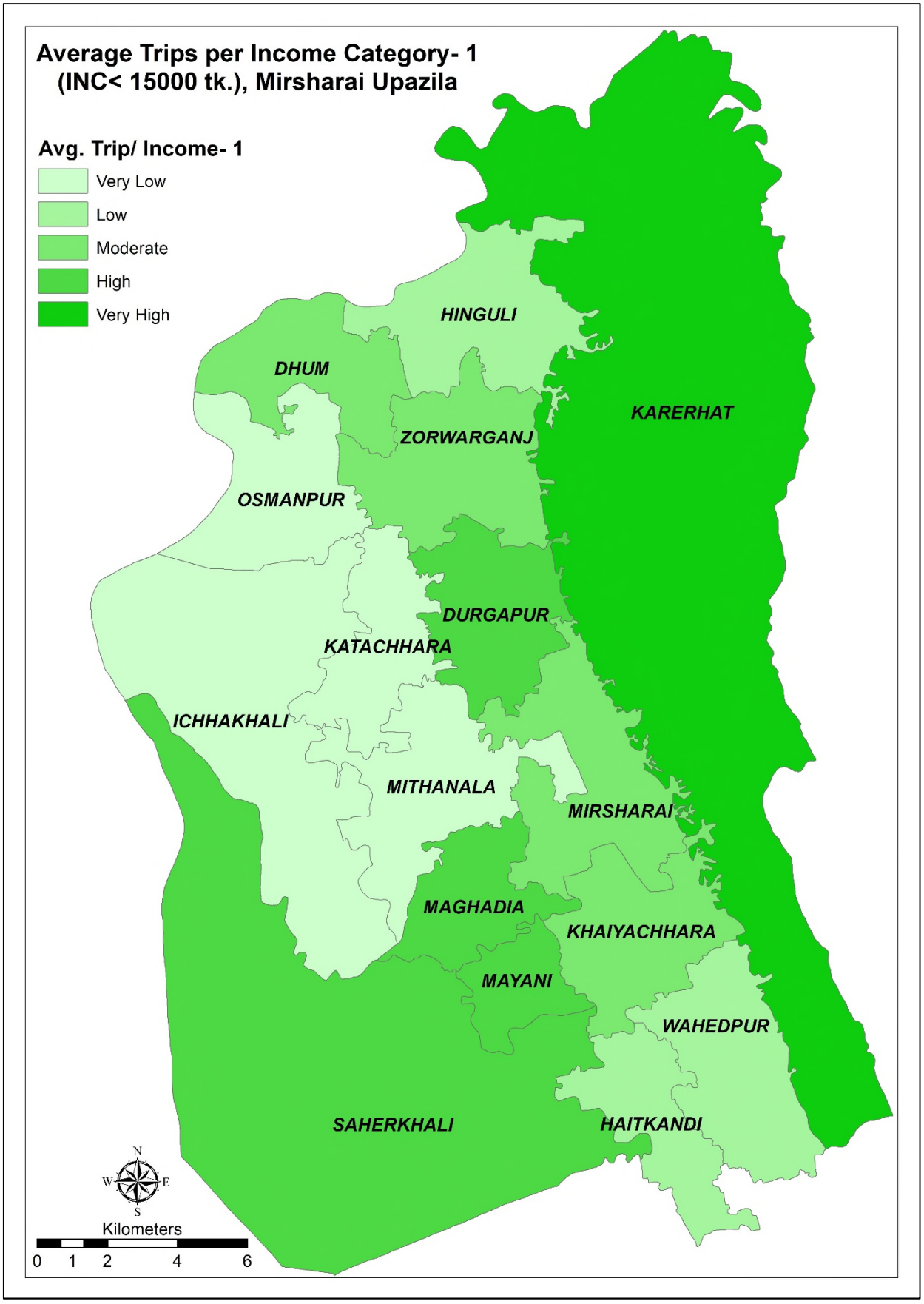


Figure 20: Average Trips per Income Category - 1 (INC< 15000 tk.), Mirsharai Upazila

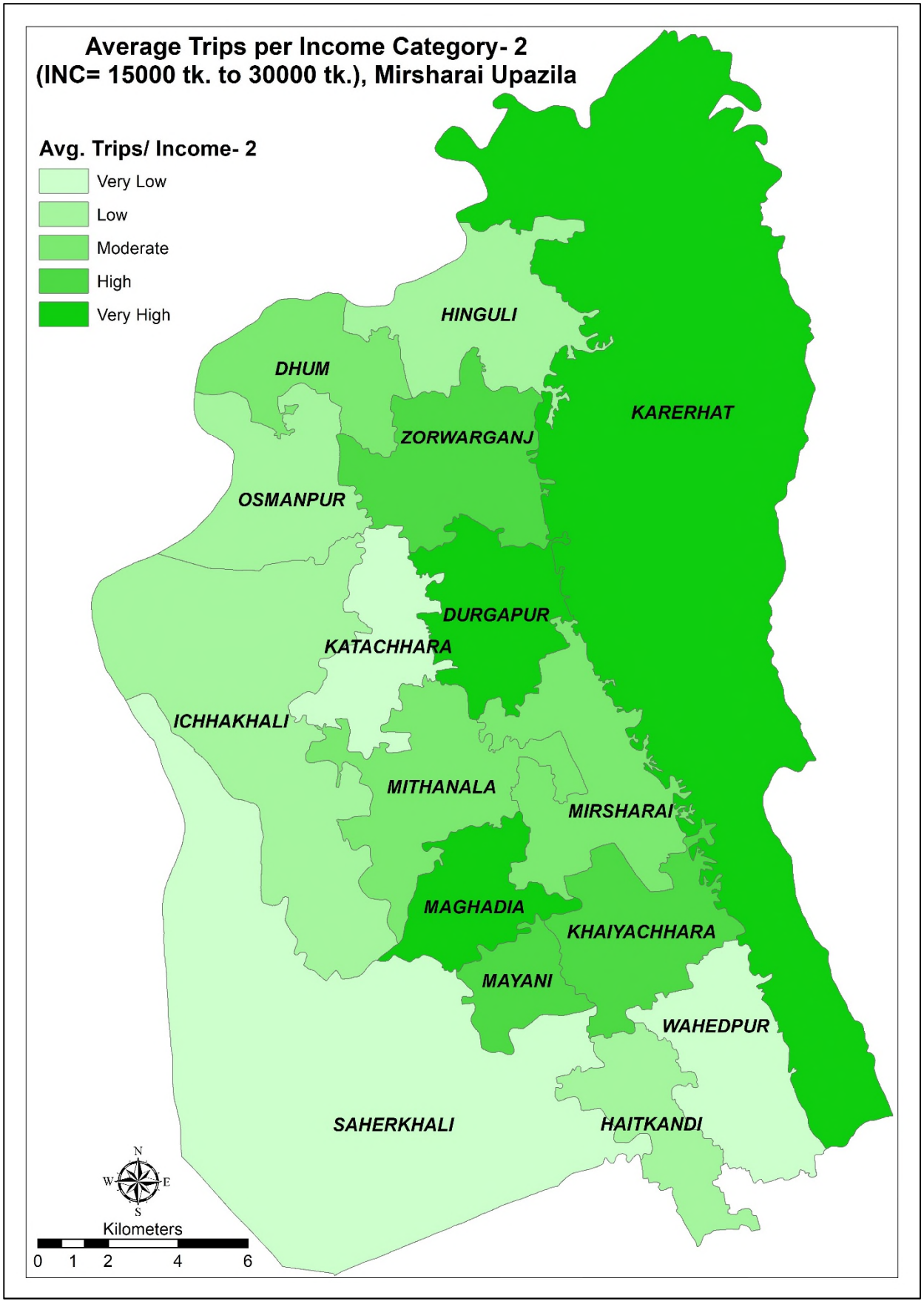


Figure 21: Average Trips per Income Category - 2 (INC= 15000 tk. to 30000 tk.), Mirsharai Upazila

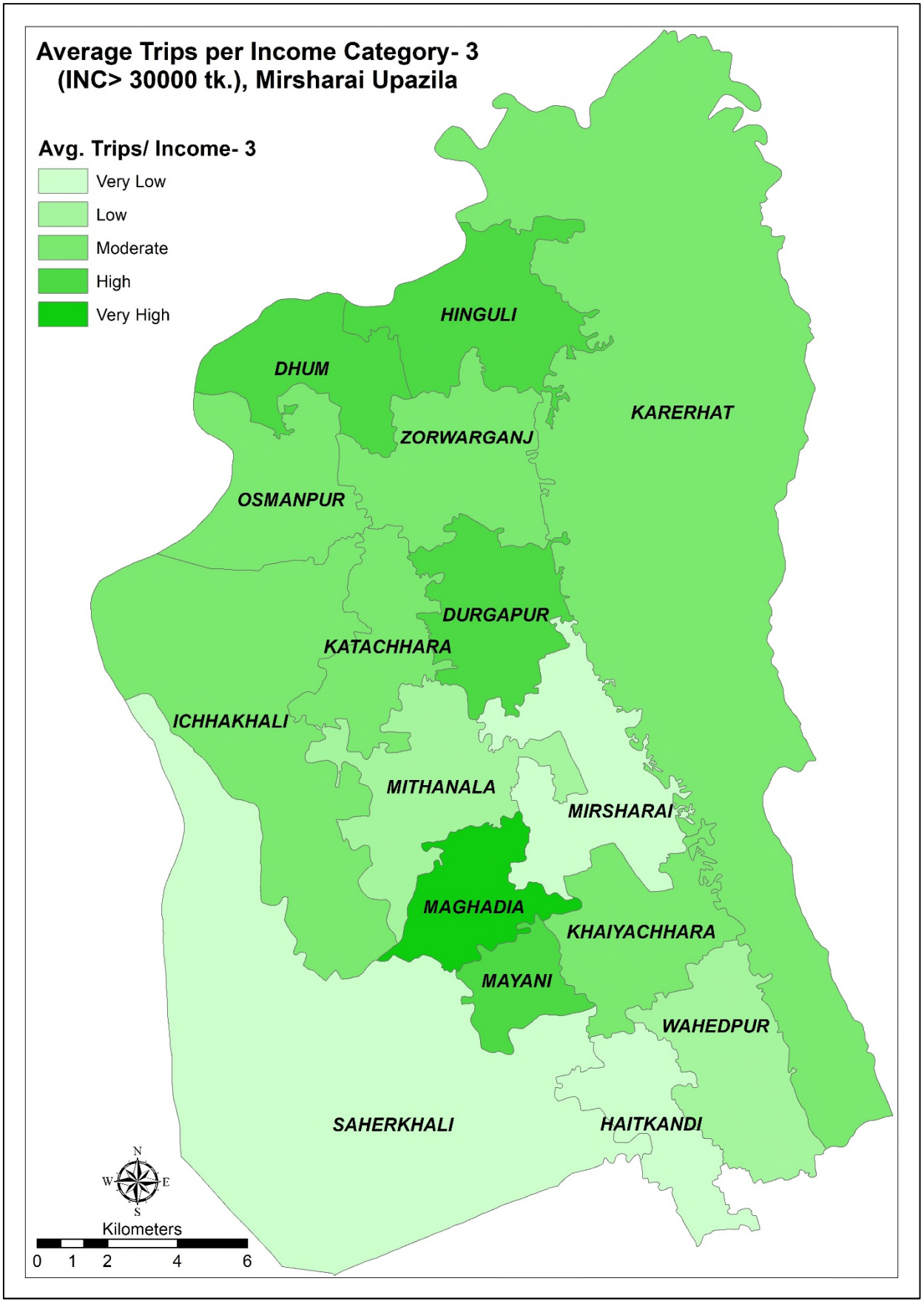


Figure 22: Average Trips per Income Category -3 (INC> 30000 tk.), Mirsharai Upazila

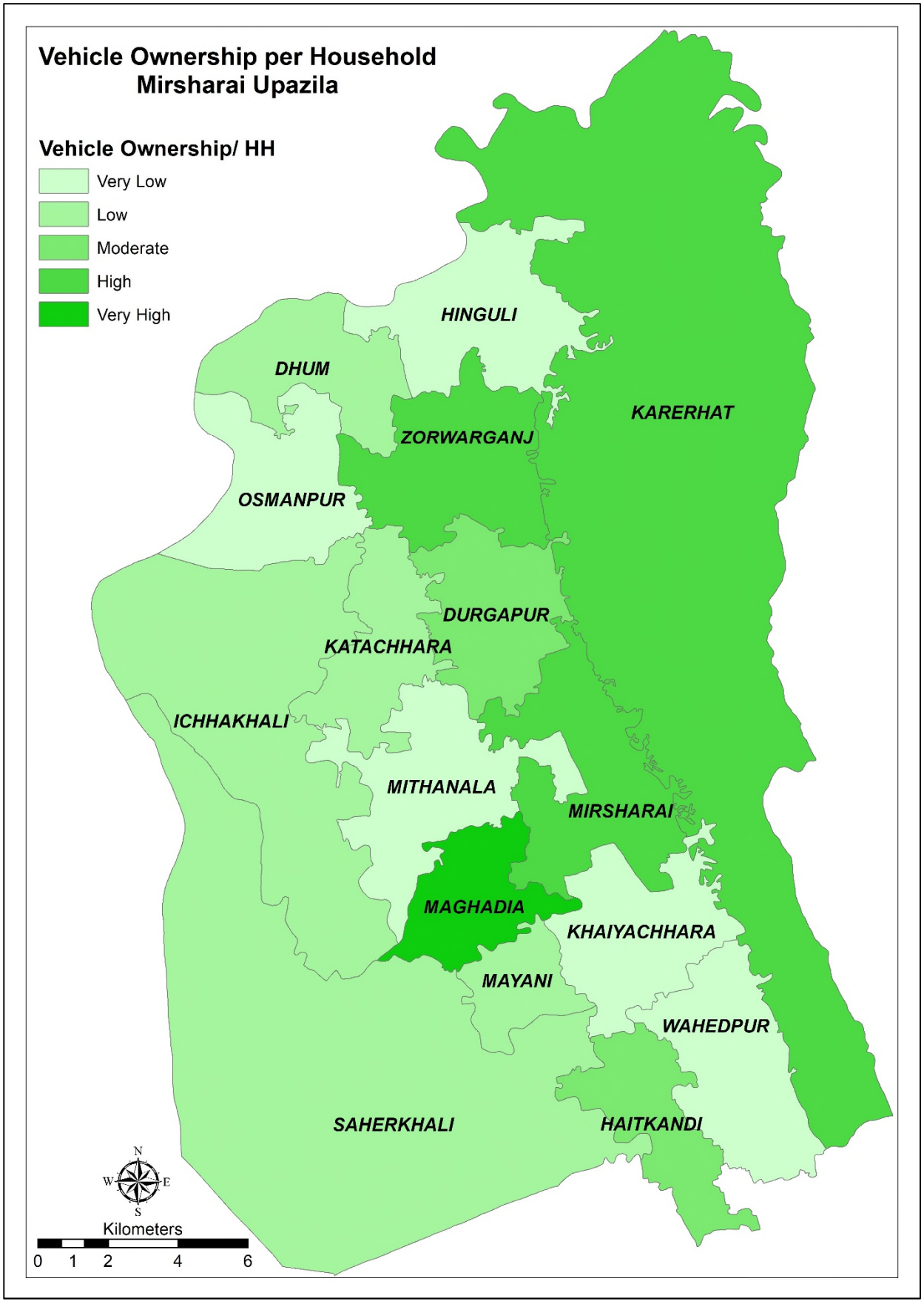


Figure 23: Vehicle Ownership per Household, Mirsharai Upazila

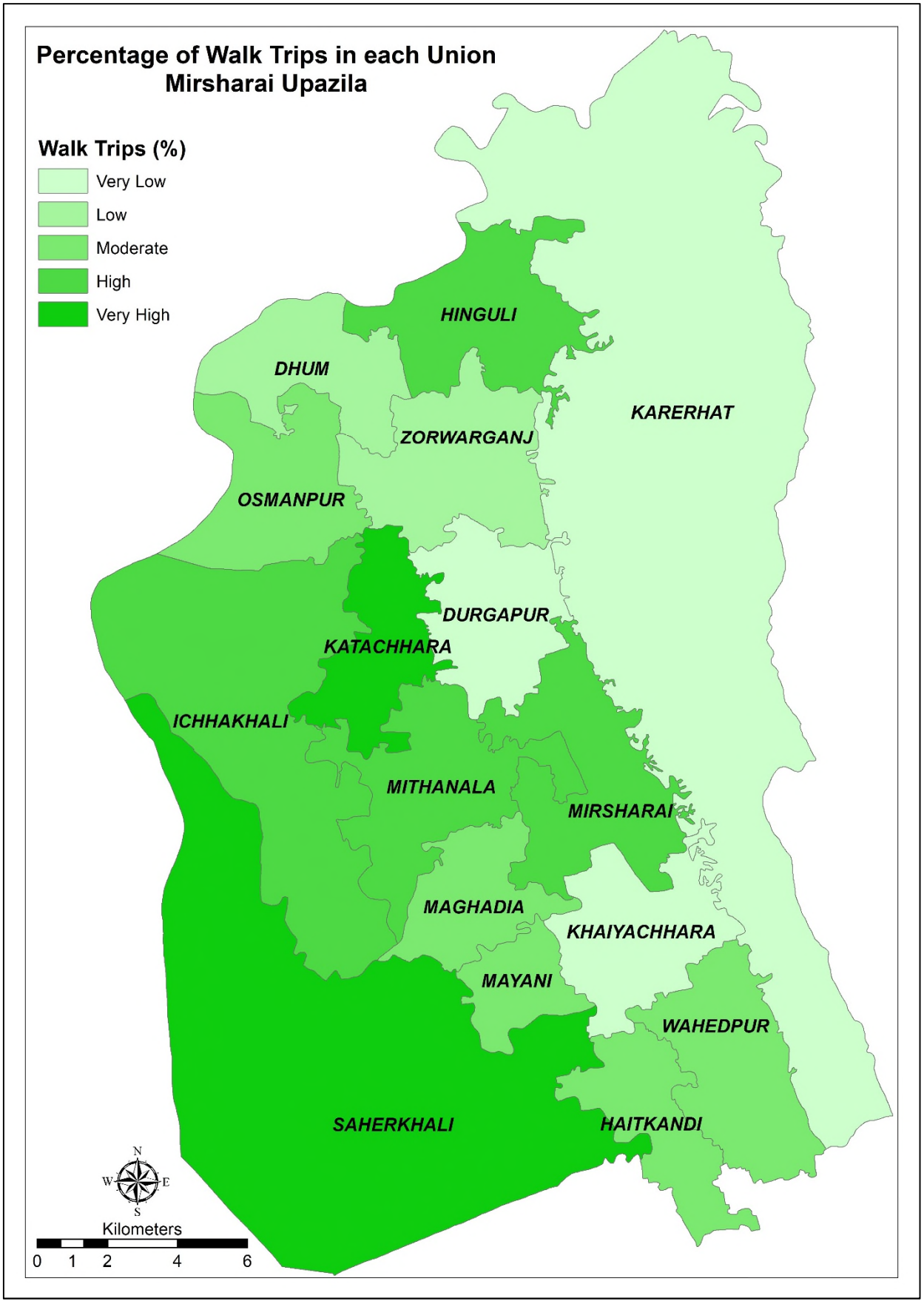


Figure 24: Percentage of Walk Trips in each Union, Mirsharai Upazila

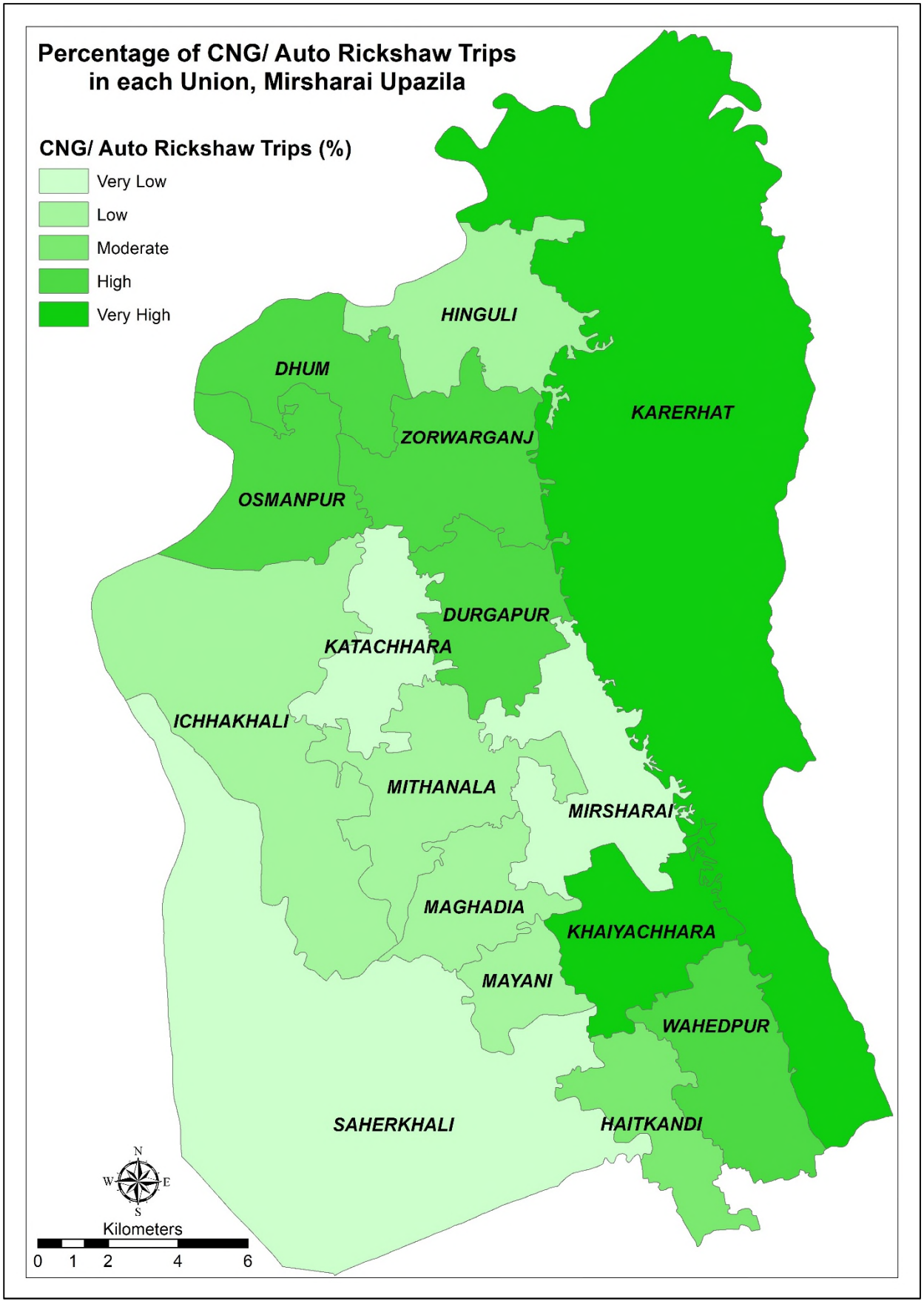


Figure 25: Percentage of CNG/ Auto Rickshaw Trips in each Union, Mirsharai Upazila

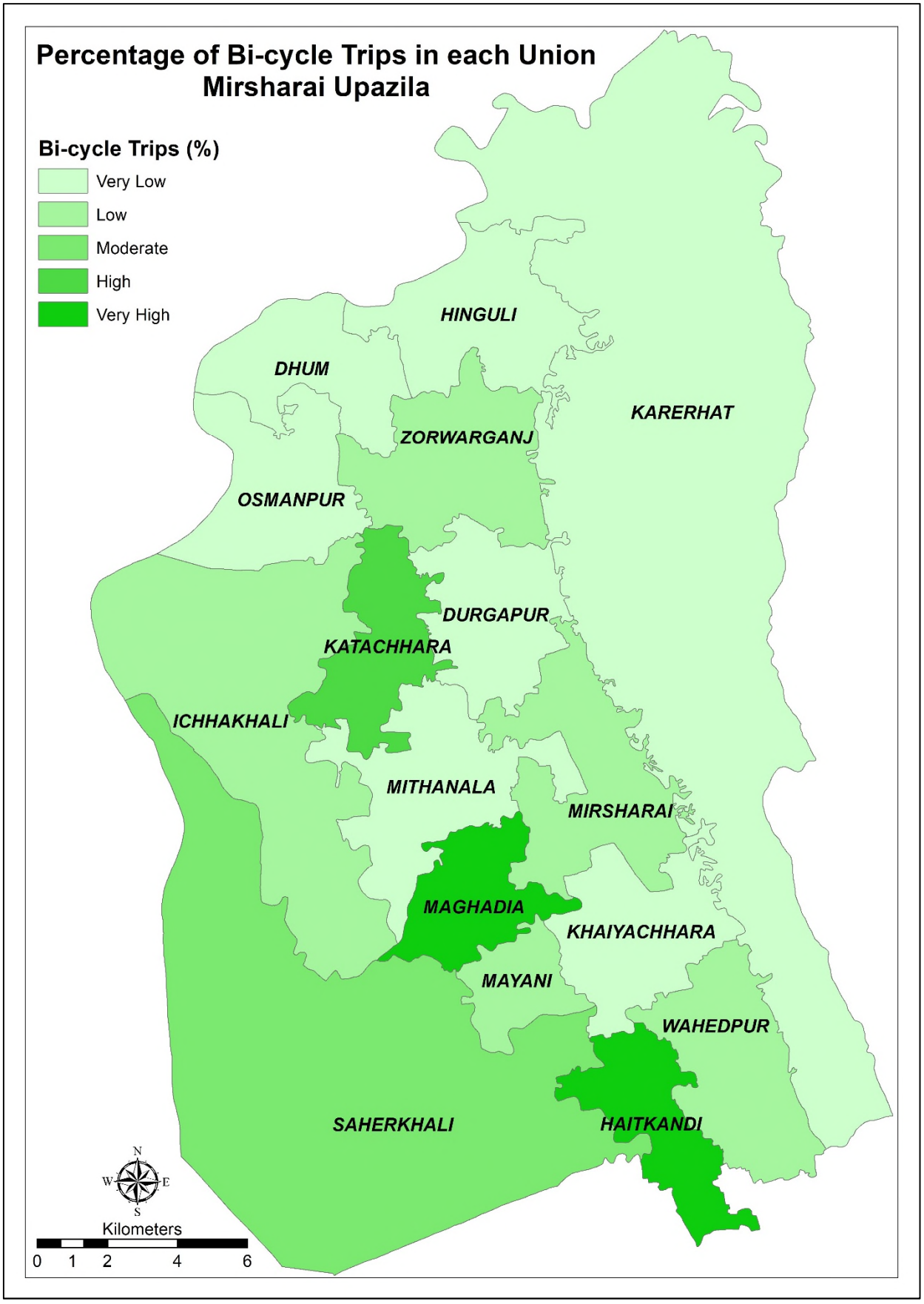


Figure 26: Percentage of Bi-cycle Trips in each Union, Mirsharai Upazila

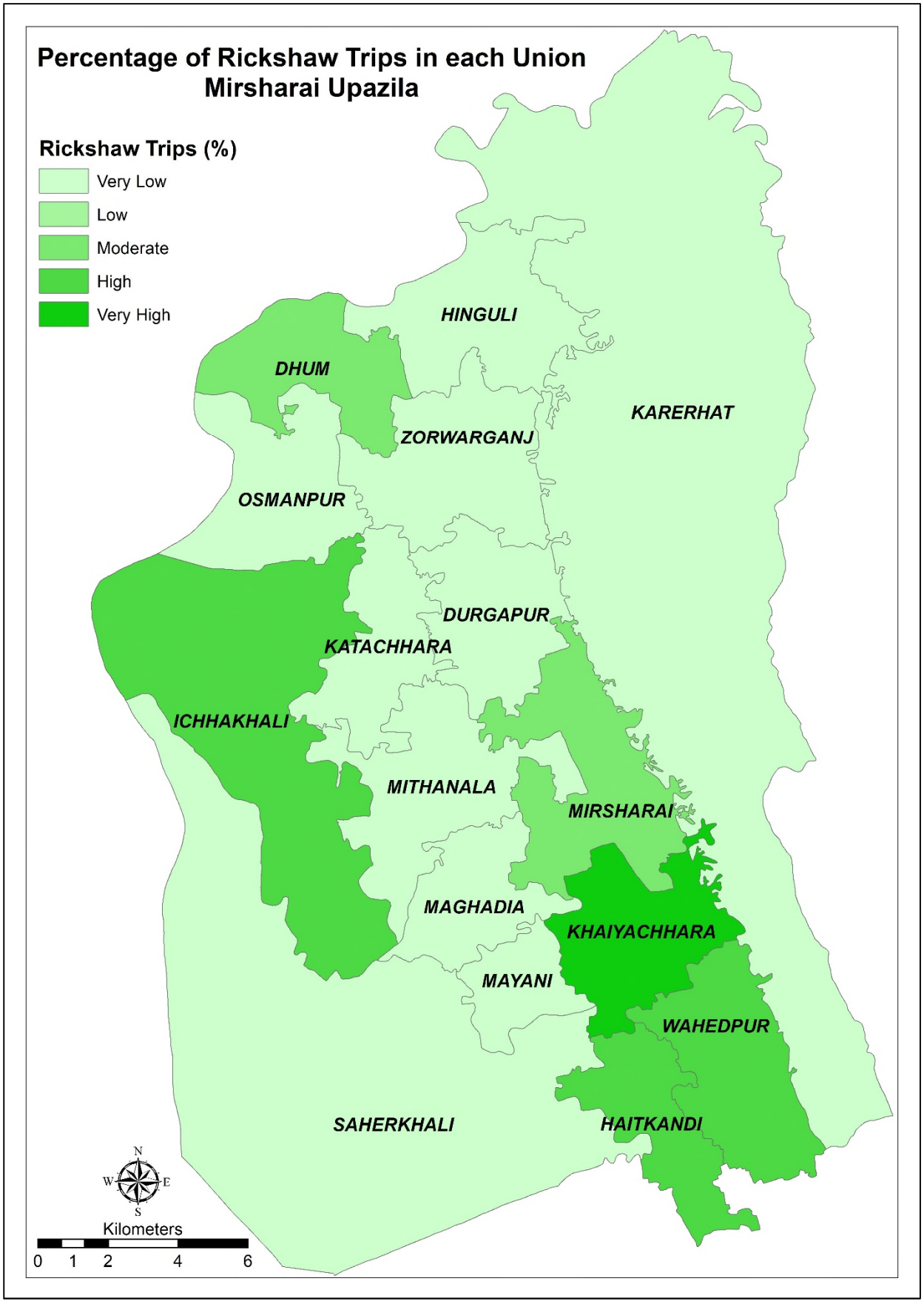


Figure 27: Percentage of Rickshaw Trips in each Union, Mirsharai Upazila

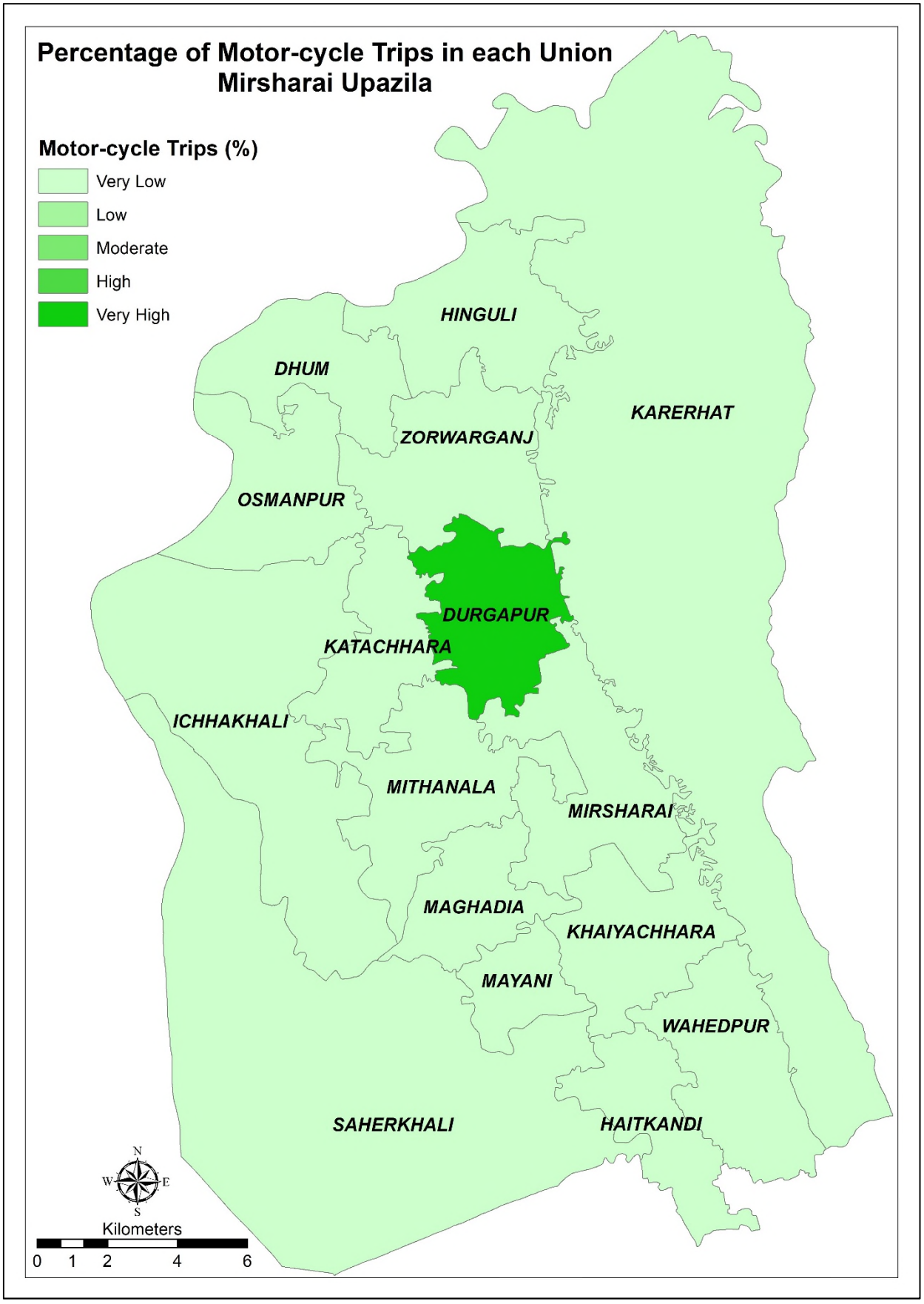


Figure 28: Percentage of Motor-cycle Trips in each Union, Mirsharai Upazila

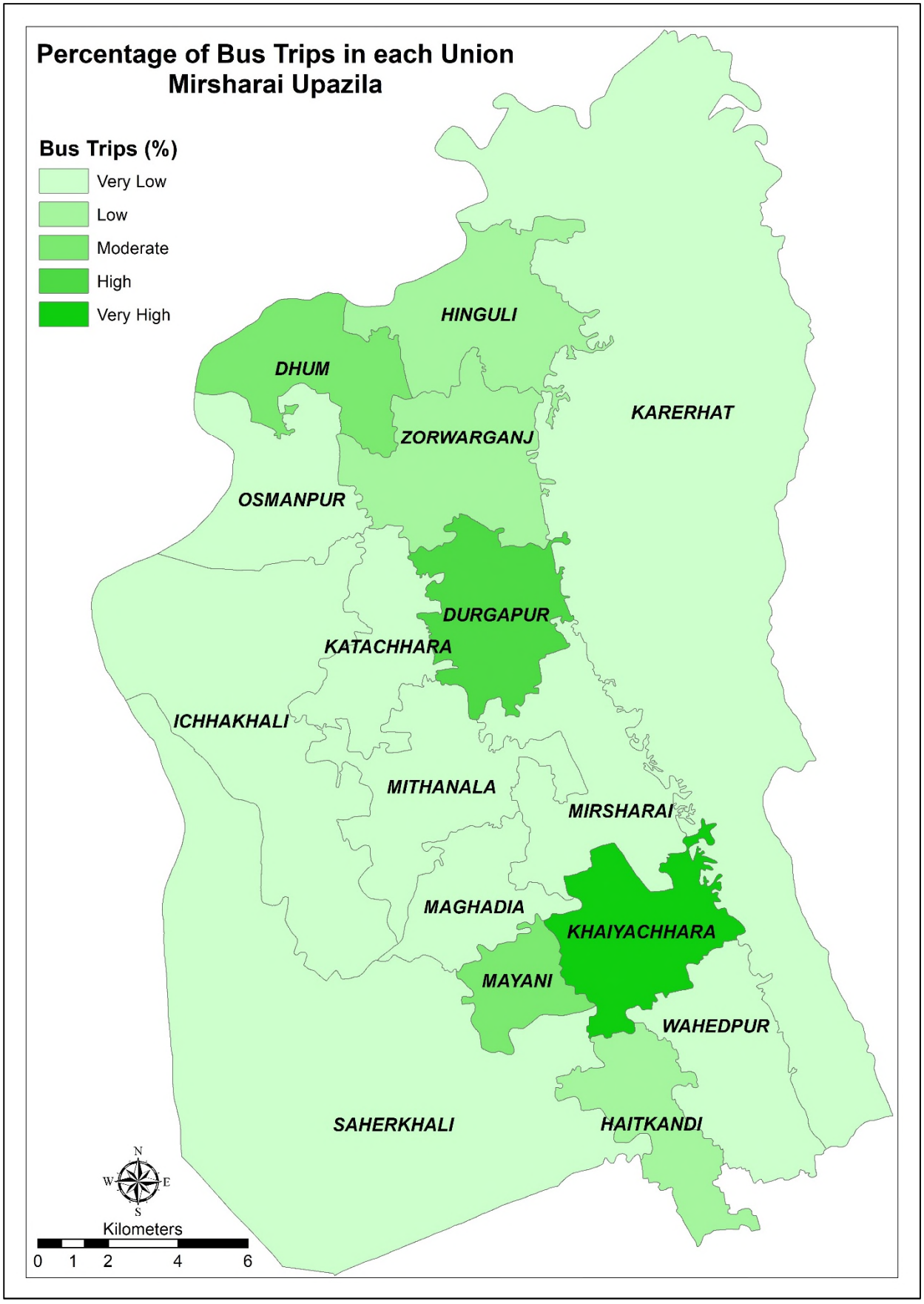


Figure 29: Percentage of Bus Trips in each Union, Mirsharai Upazila

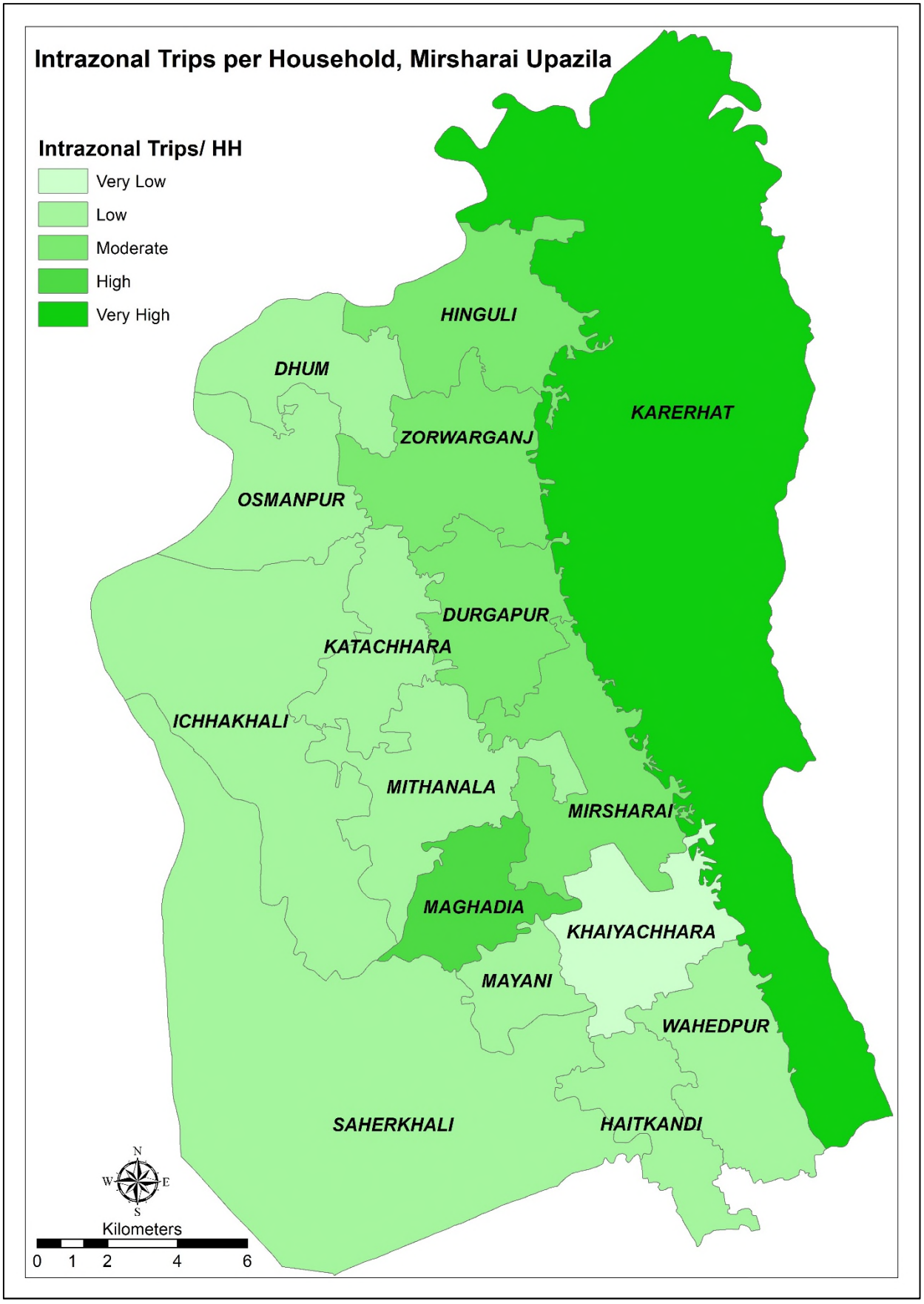


Figure 30: Intrazonal Trips per Household, Mirsharai Upazila

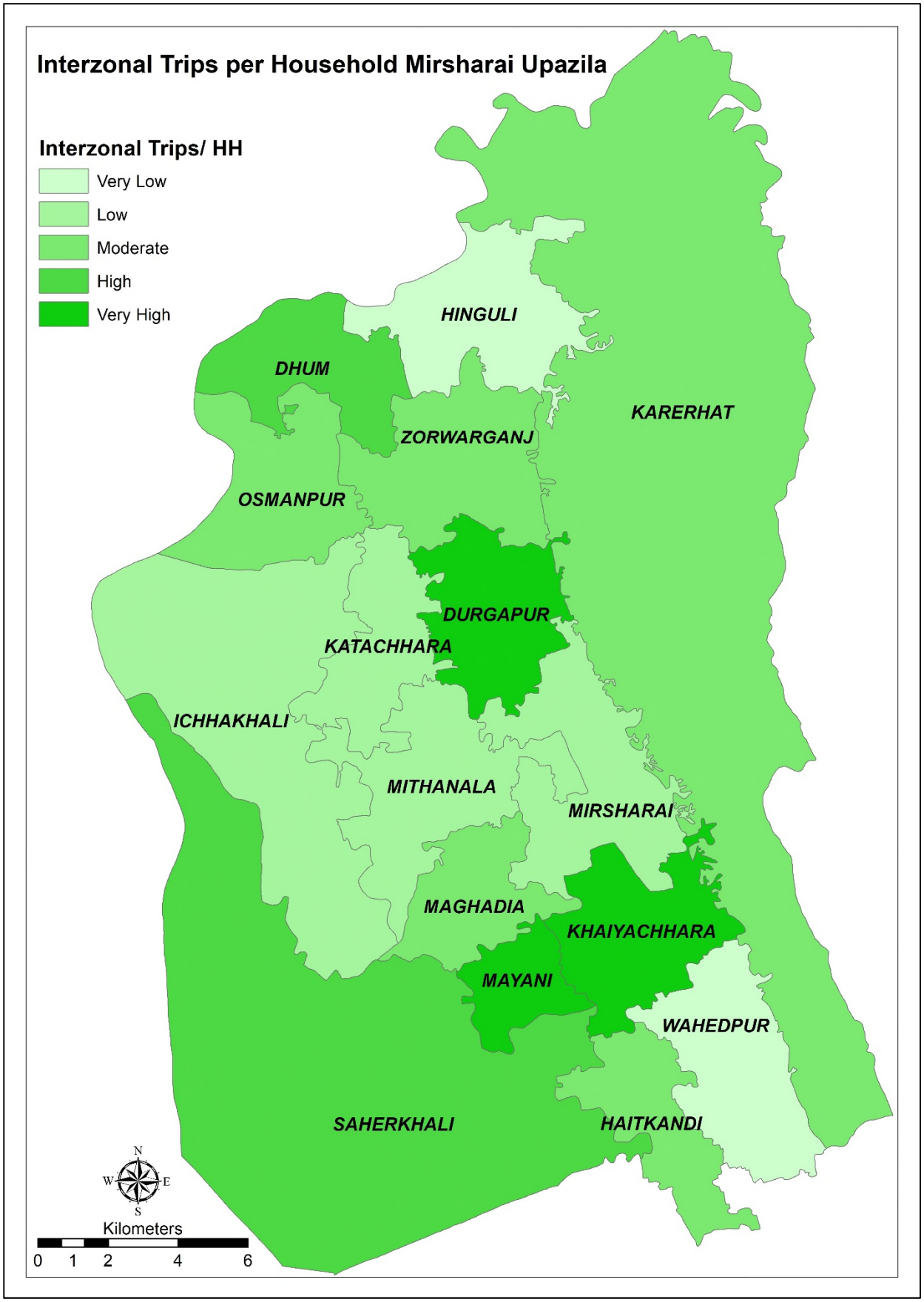


Figure 31: Interzonal Trips per Household, Mirsharai Upazila

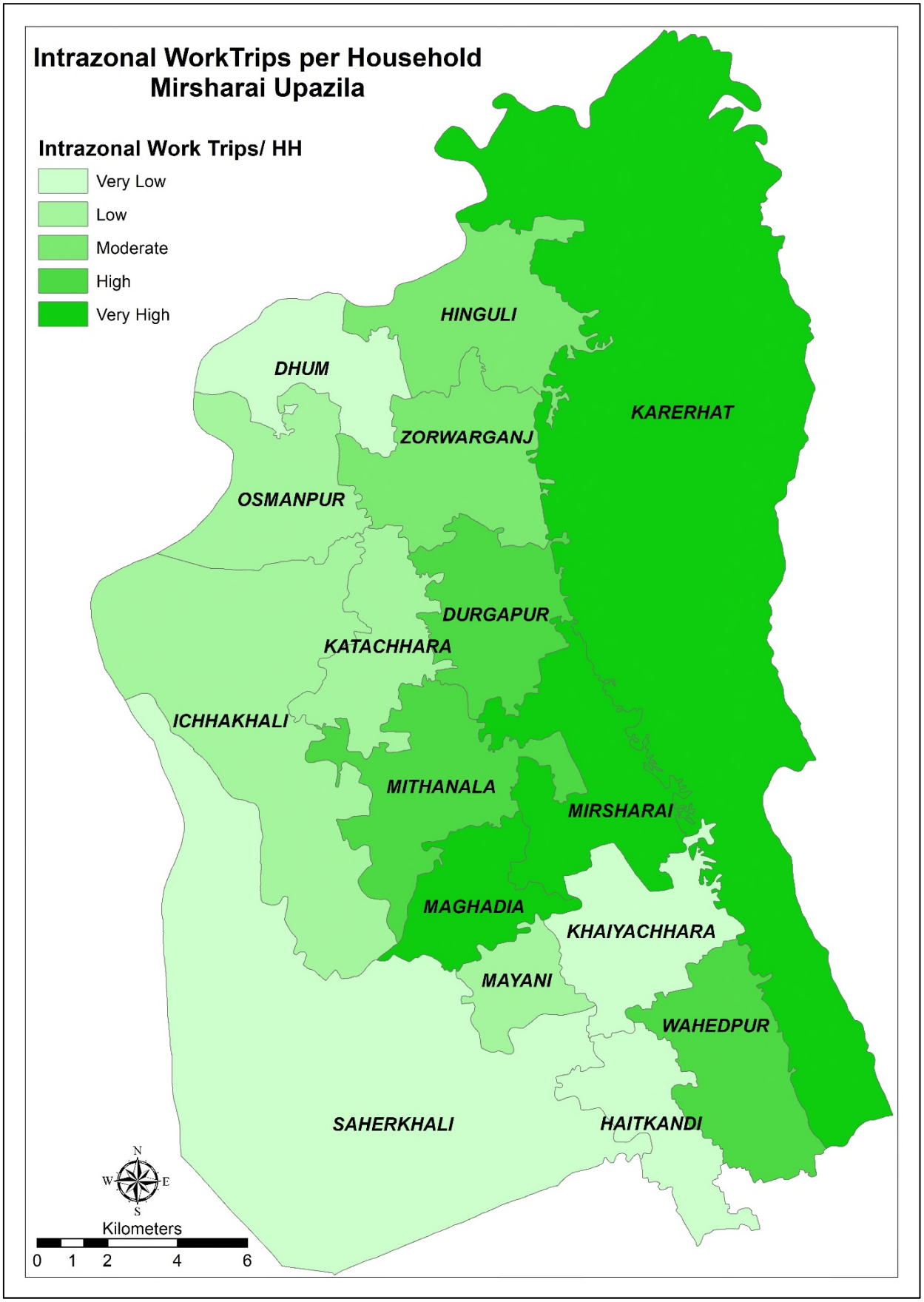


Figure 32: Intrazonal Work Trips per Household, Mirsharai Upazila

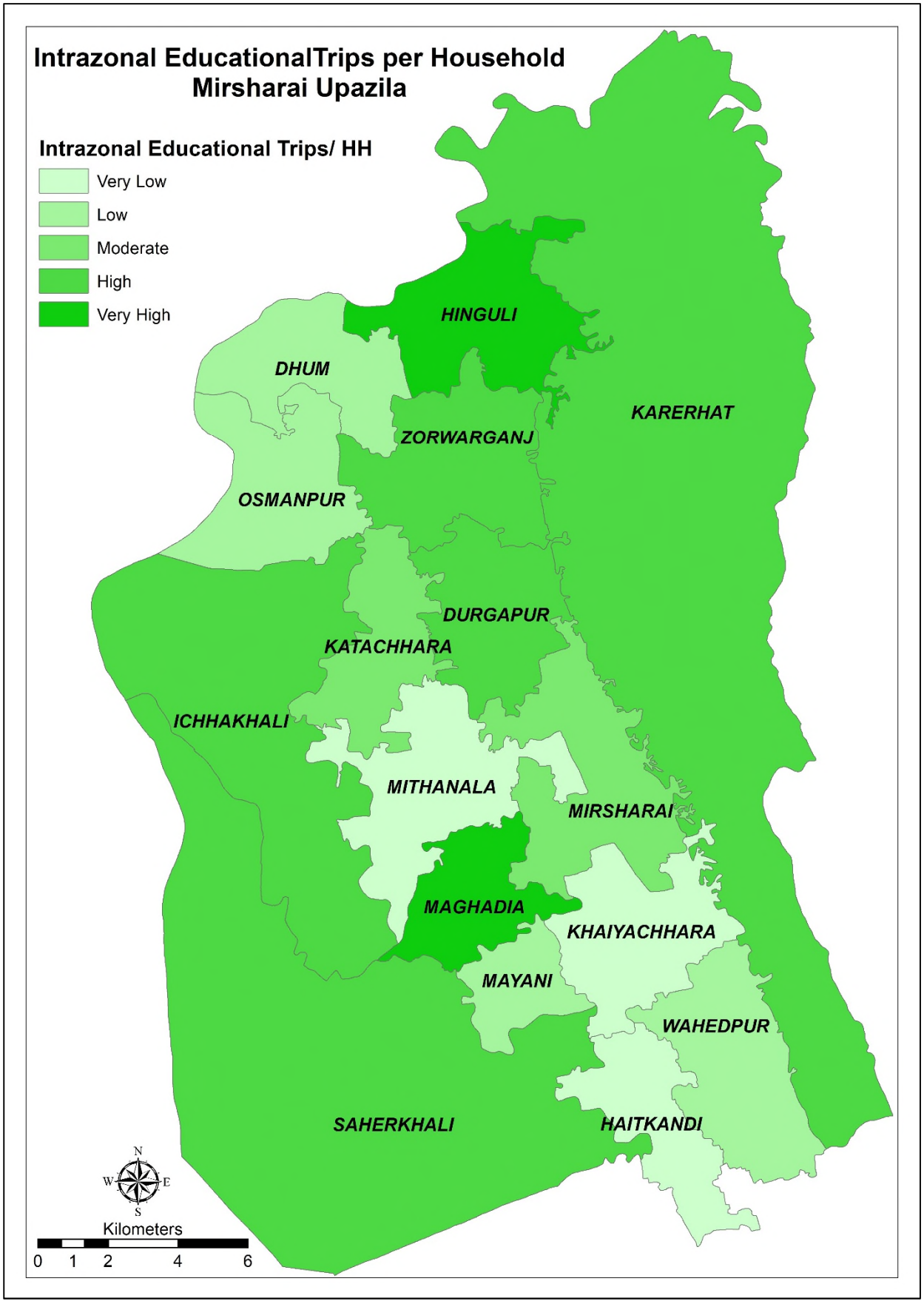


Figure 33: Intrazonal Educational Trips per Household, Mirsharai Upazila

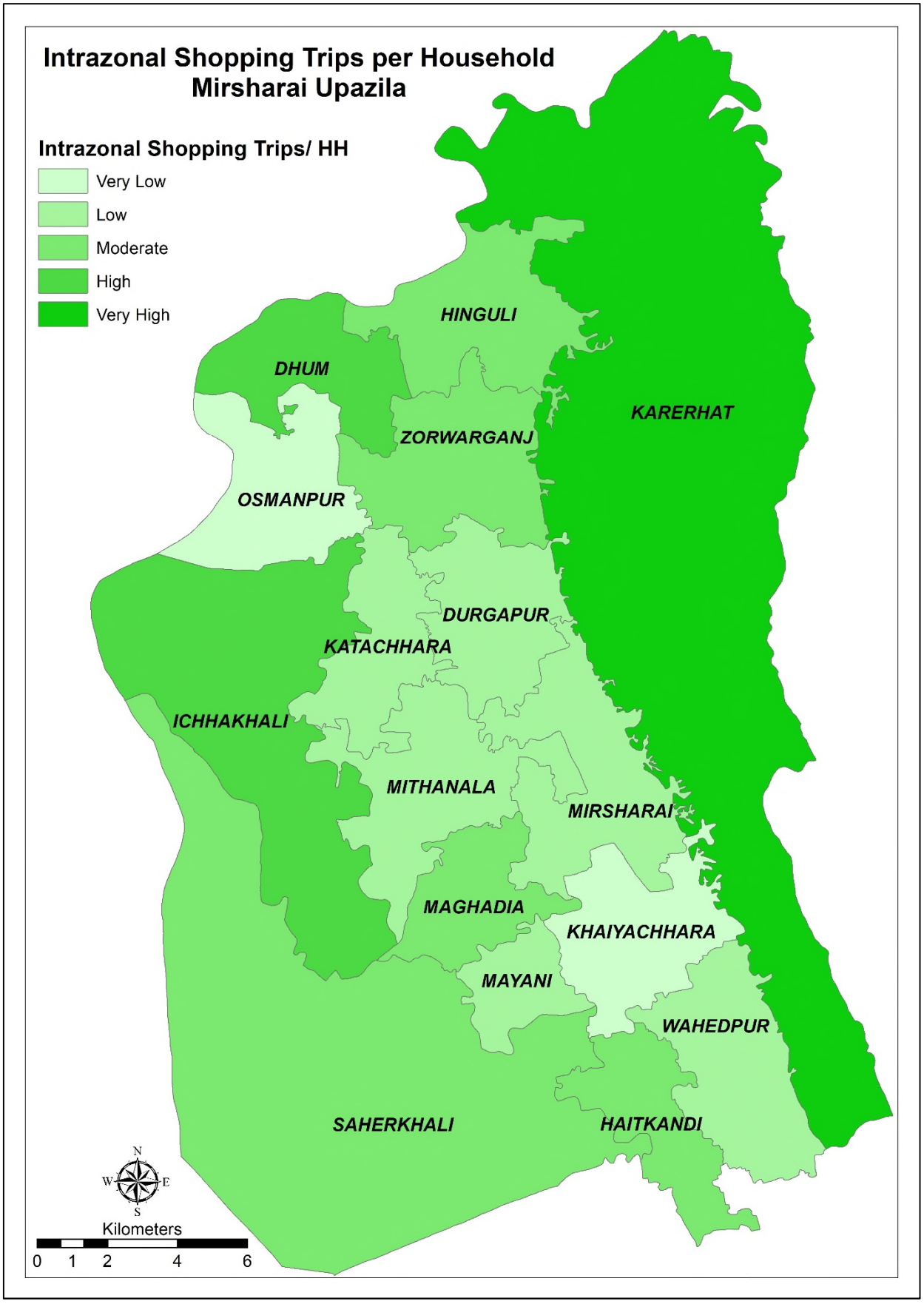


Figure 34: Intrazonal Shopping Trips per Household, Mirsharai Upazila

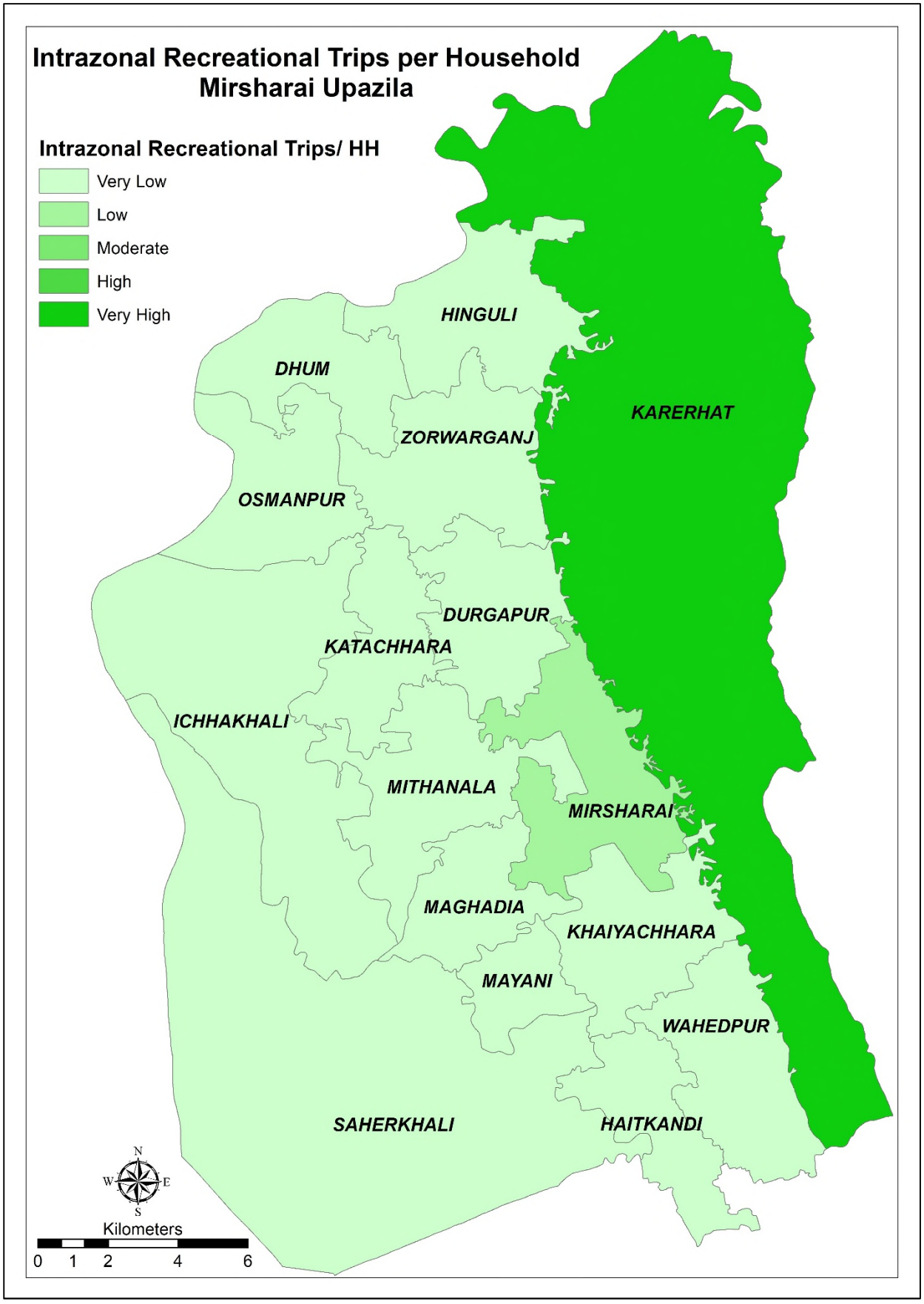


Figure 35: Intrazonal Recreational Trips per Household, Mirsharai Upazila

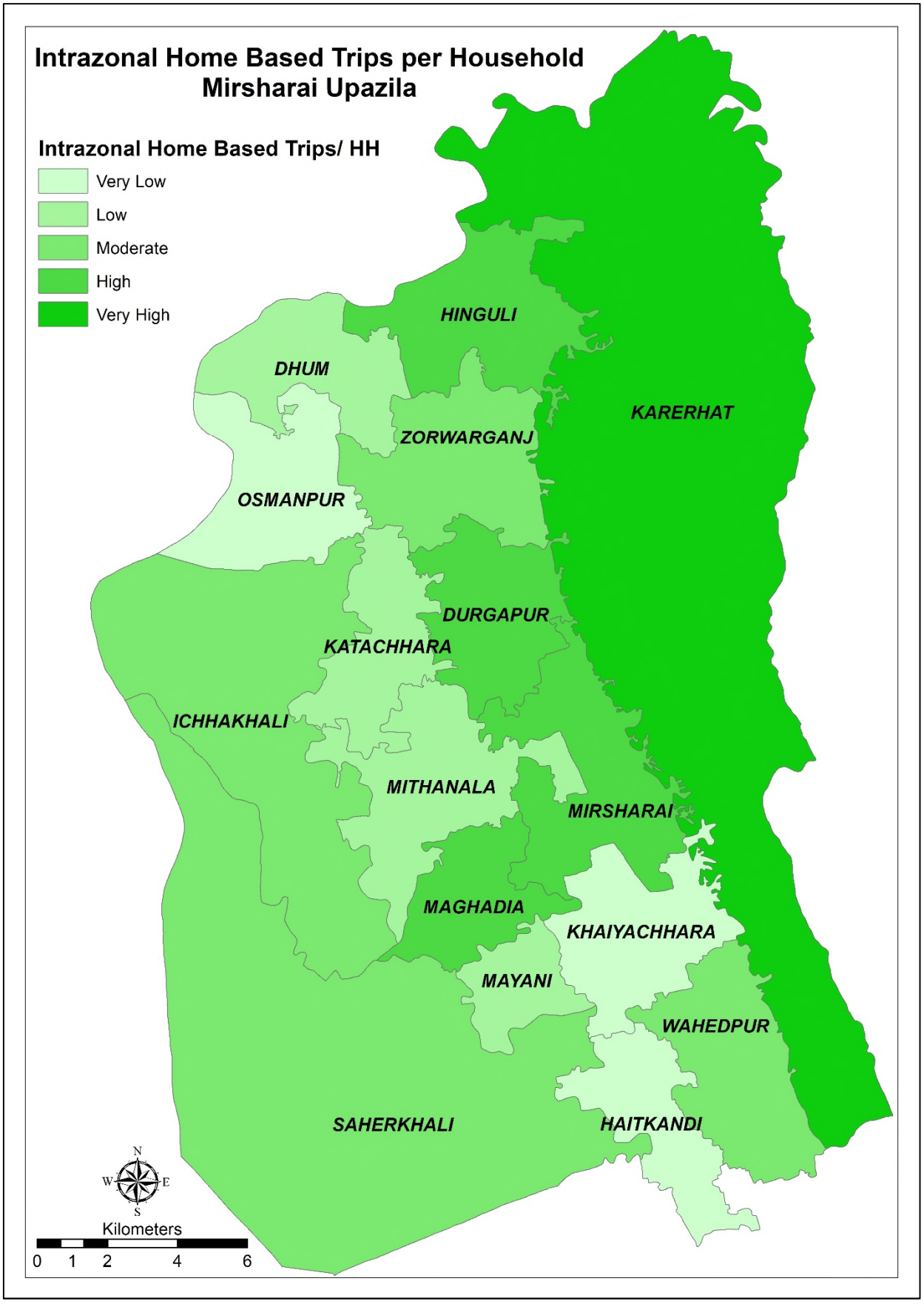


Figure 36: Intrazonal Home Based Trips per Household, Mirsharai Upazila

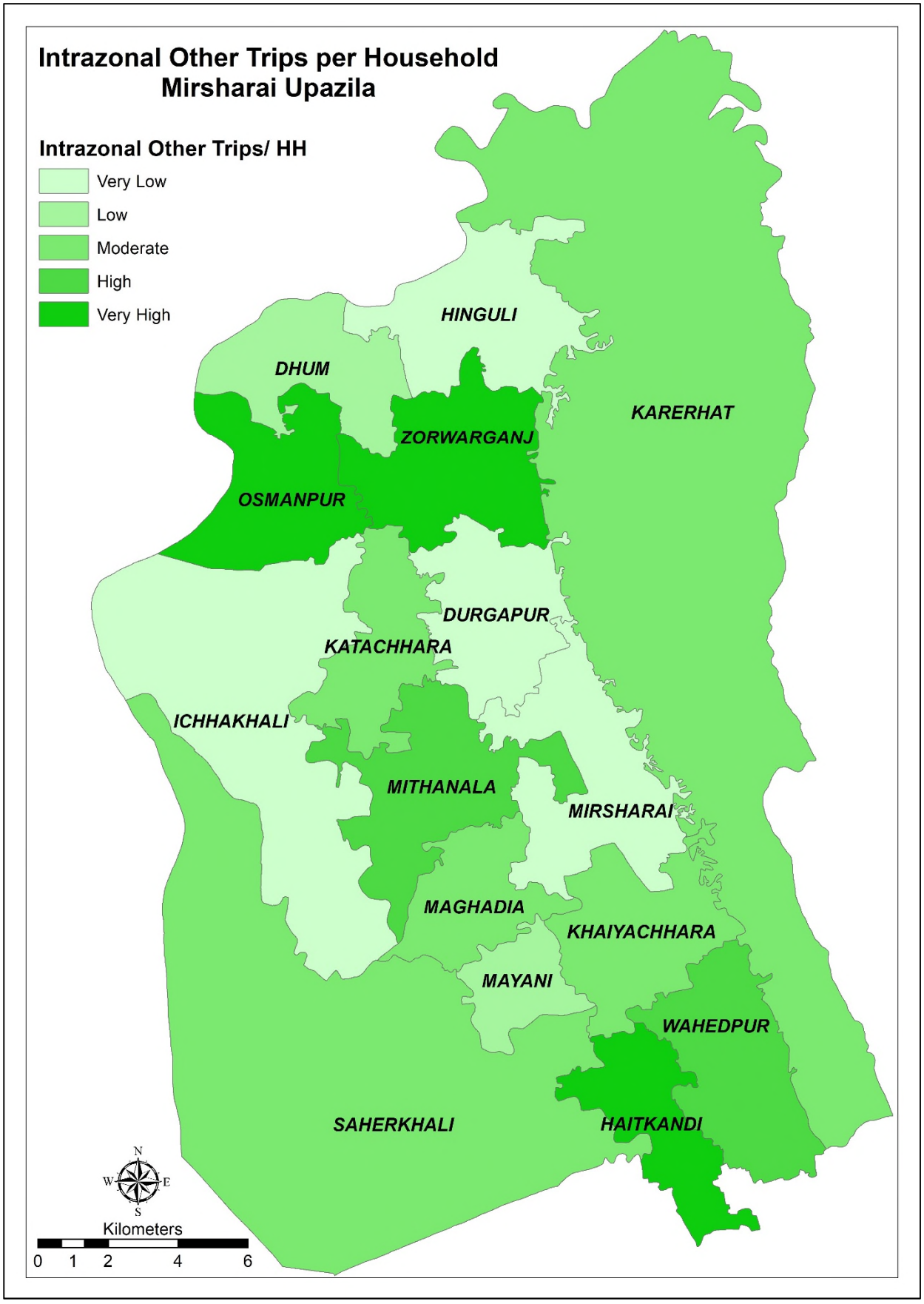


Figure 37: Intrazonal Other Trips per Household, Mirsharai Upazila

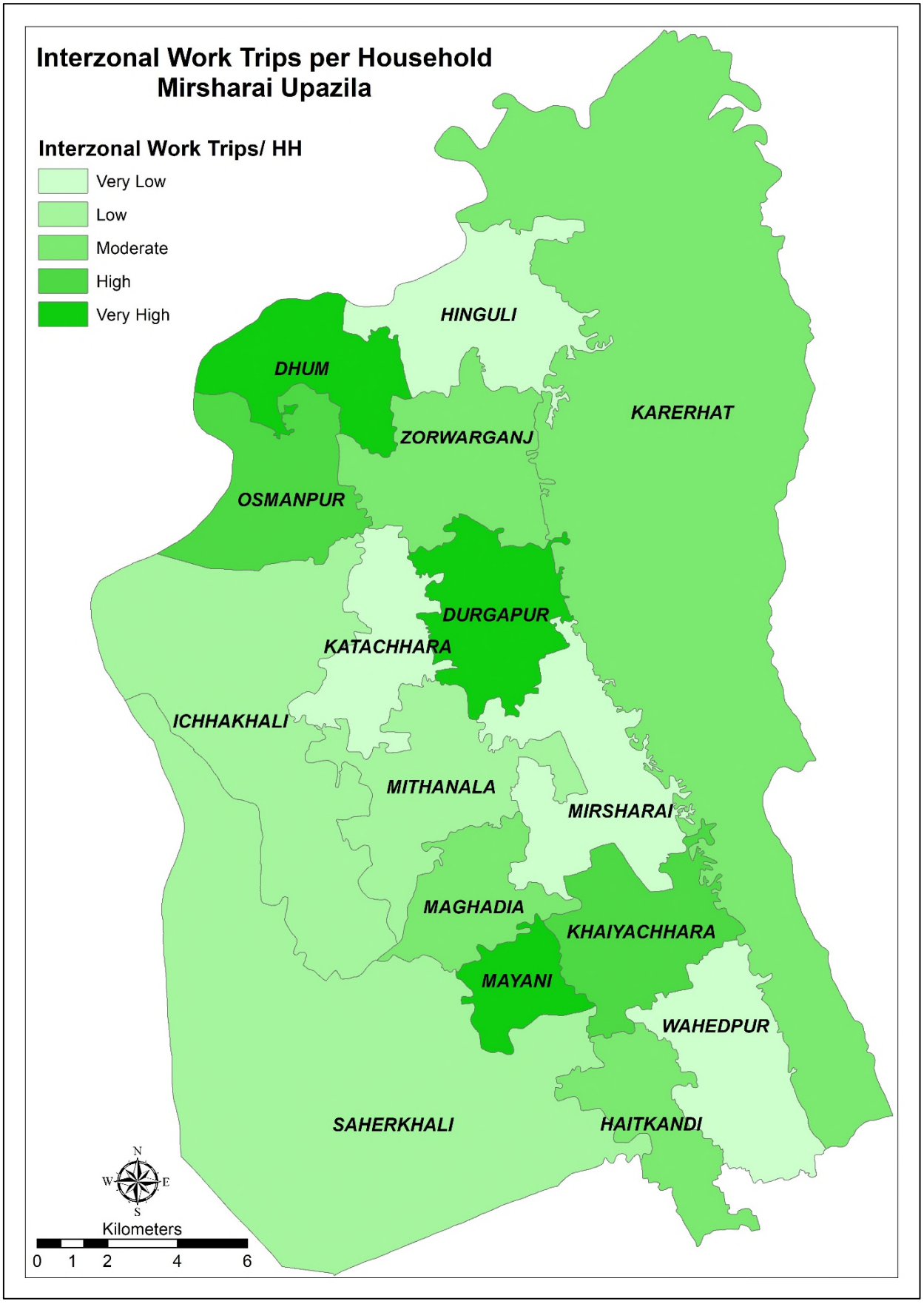


Figure 38: Interzonal Work Trips per Household, Mirsharai Upazila

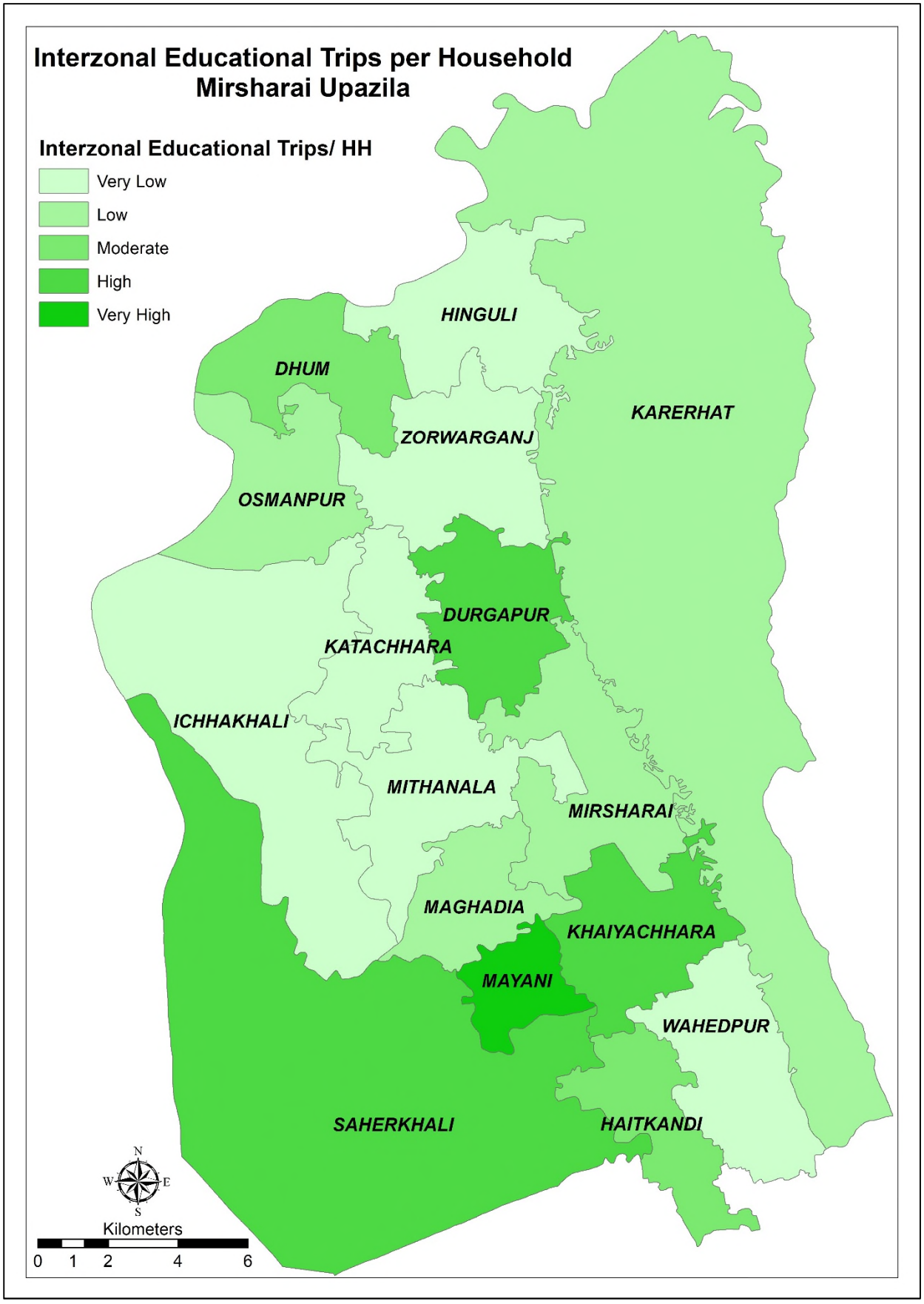


Figure 39: Interzonal Educational Trips per Household, Mirsharai Upazila

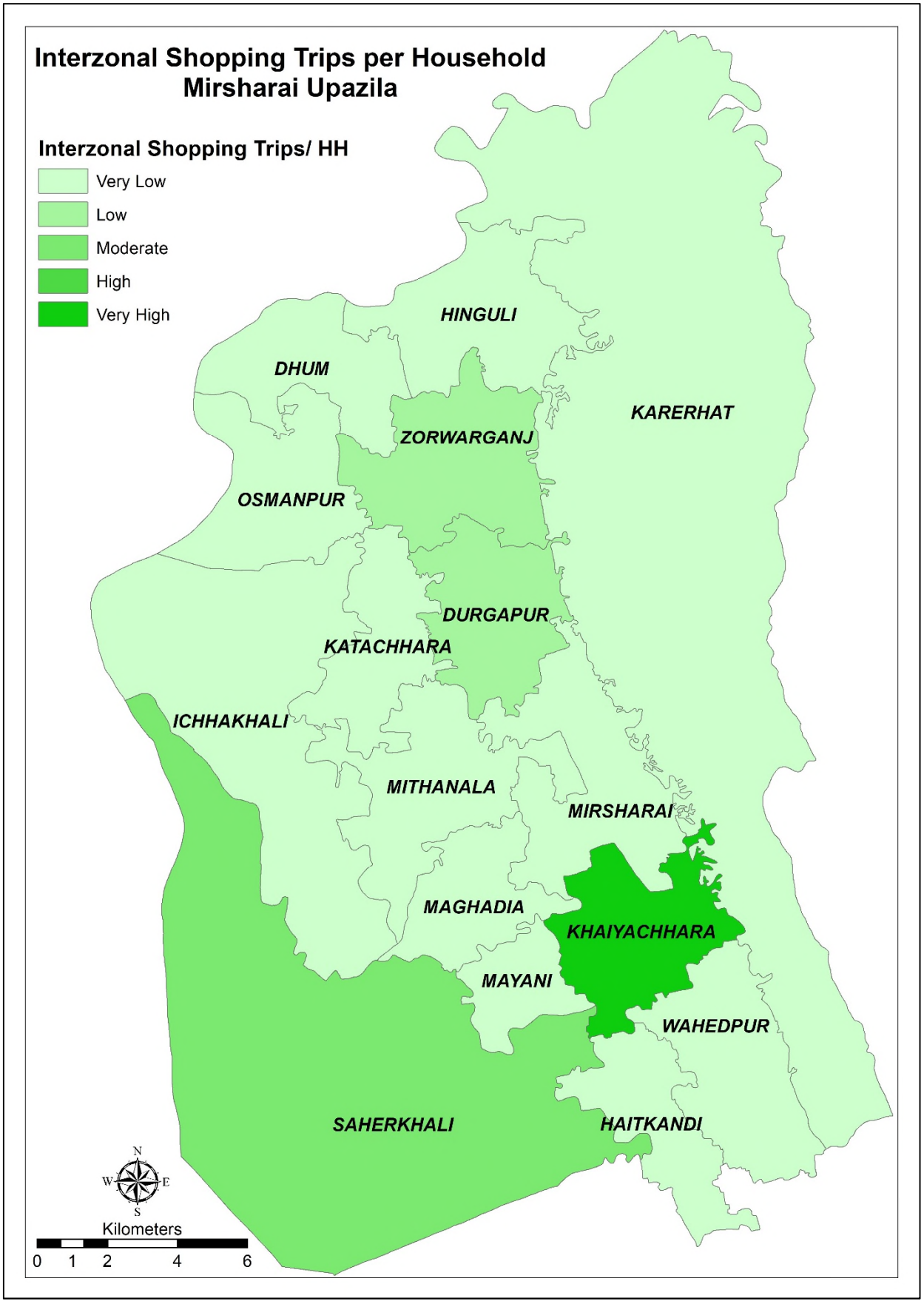


Figure 40: Interzonal Shopping Trips per Household, Mirsharai Upazila

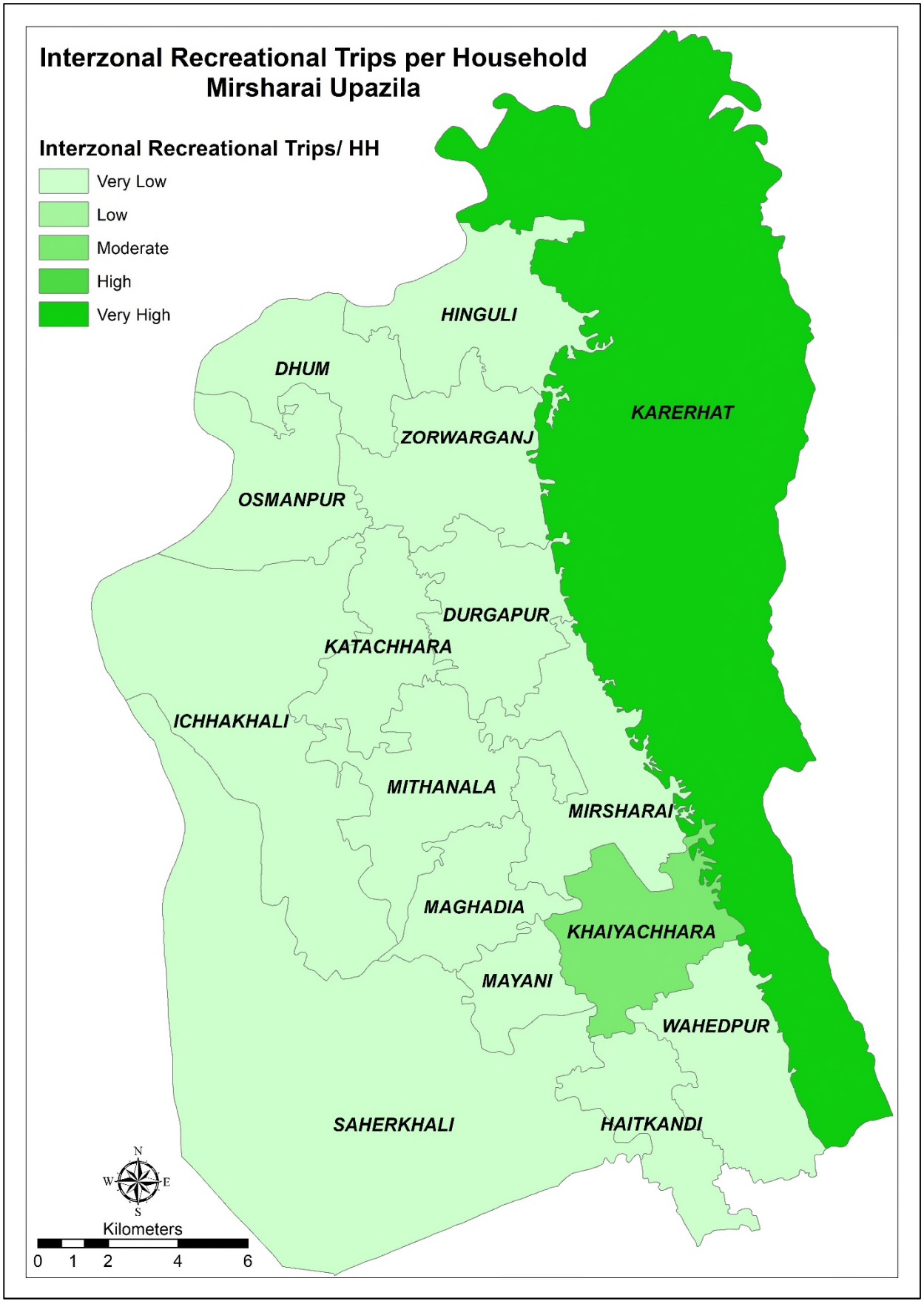


Figure 41: Interzonal Recreational Trips per Household, Mirsharai Upazila

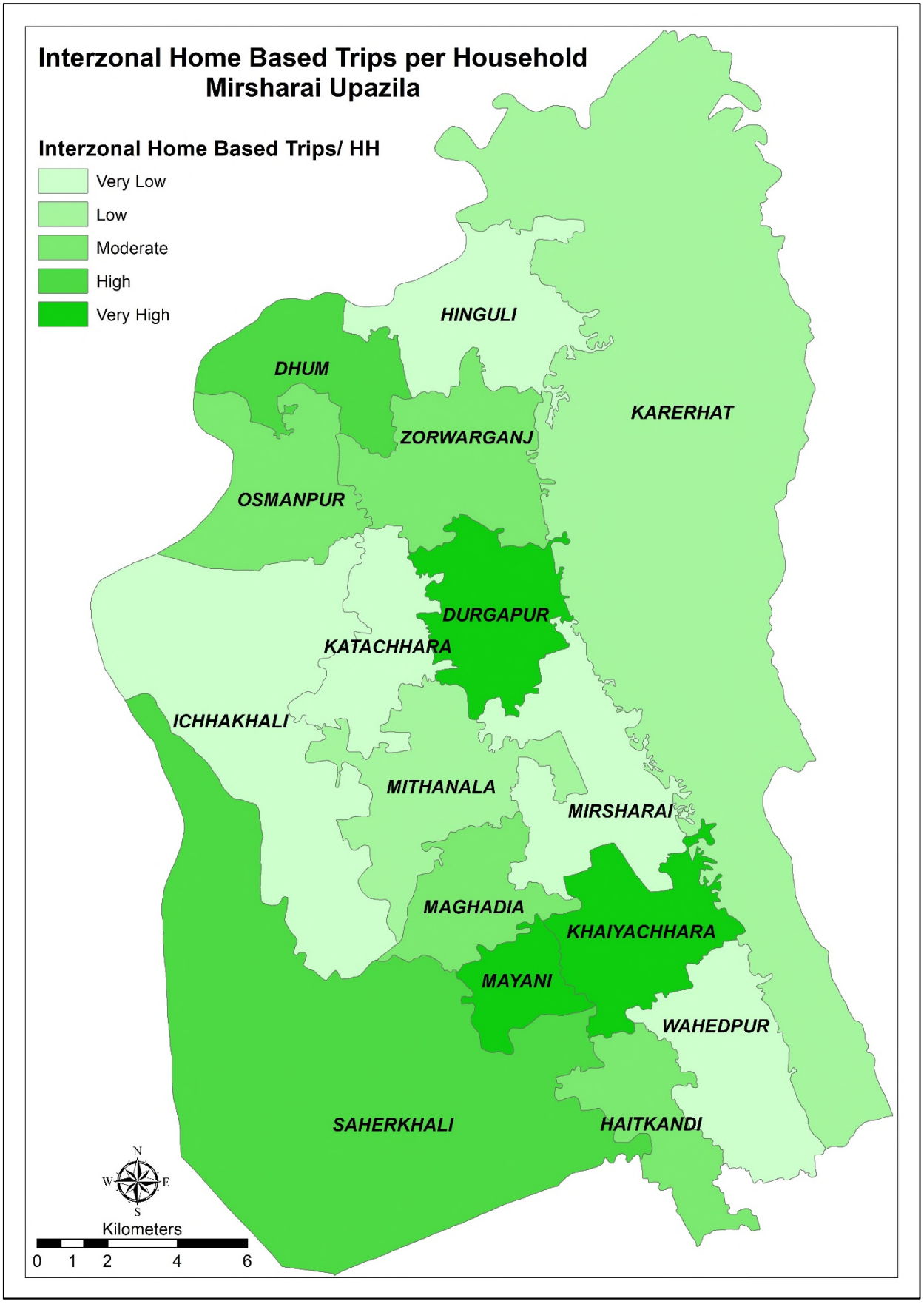


Figure 42: Interzonal Home Based Trips per Household, Mirsharai Upazila

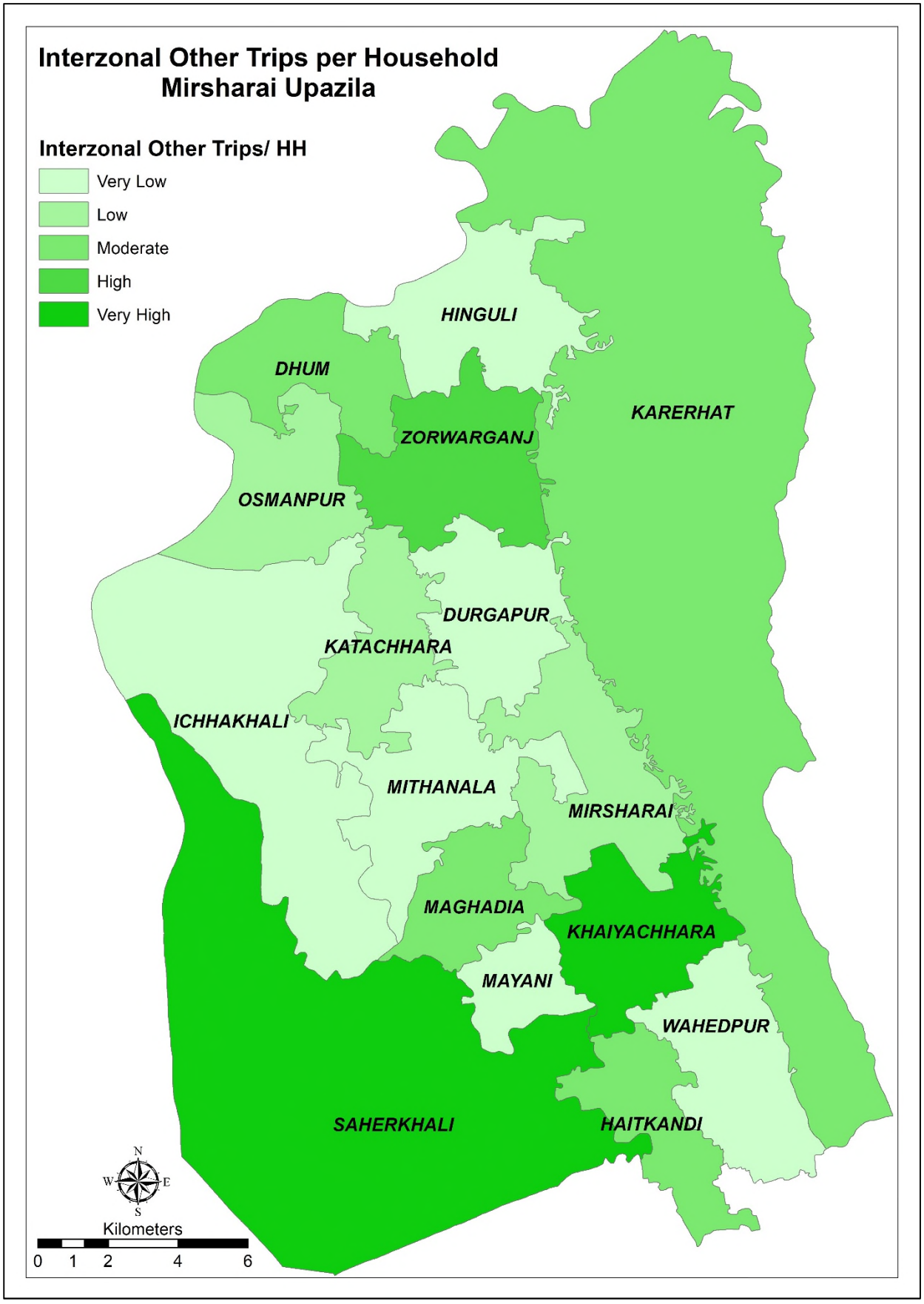


Figure 43: Interzonal Other Trips per Household, Mirsharai Upazila

Table 17: Origin-Destination Matrix of Zone- 2

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2		98%	1%																			
3		1%																				
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						
21																						
22																						

Table 18: Origin-Destination Matrix of Zone- 3

Origin	Destination																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2			15%																			
3		15%	51%	2%	1%			1%	2%					1%	1%							1%
4			2%																			
5			1%																			
6																						
7																						
8			1%																			
9			2%																			
10																						
11																						
12																						
13																						
14			1%																			
15			1%																			
16																						
17																						
18																						
19																						
20																						
21																						
22			1%																			

Table 19: Origin-Destination Matrix of Zone- 4

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2				9%																		
3																						
4		11%		70%		1%			2%													3%
5																						
6				1%																		
7																						
8																						
9				2%																		
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						
21																						
22				3%																		

Table 20: Origin-Destination Matrix of Zone- 5

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2					4%																	
3																						
4					14%																	
5		4%		14%	58%		1%								1%			1%				
6																						
7					1%																	
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15					1%																	
16																						
17																						
18					1%																	
19																						
20																						
21																						
22																						

Table 21: Origin-Destination Matrix of Zone- 6

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2						2%																
3																						
4						4%																
5																						
6		2%		4%		53%	1%	1%	13%						1%							2%
7						1%																
8						1%																
9						13%																
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						
21																						
22						2%																

Table 22: Origin-Destination Matrix of Zone- 7

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4																						
5																						
6							6%															
7						6%	80%	4%														
8							4%															
9																						
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						
21																						
22																						

Table 23: Origin-Destination Matrix of Zone- 8

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2								3%														
3																						
4																						
5								3%														
6																						
7																						
8		3%			3%			88%	1%													
9								1%														
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						
21																						
22																						

Table 24: Origin-Destination Matrix of Zone- 9

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9									89%	3%					1%		2%					1%
10									3%													
11																						
12																						
13																						
14																						
15									1%													
16																						
17																						
18																						
19																						
20																						
21																						
22									1%													

Table 25: Origin-Destination Matrix of Zone- 10

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4																						
5																						
6																						
7										1%												
8																						
9										10%												
10							1%		10%	78%												
11																						
12																						
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						
21																						
22																						

Table 26: Origin-Destination Matrix of Zone- 11

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4											1%											
5																						
6																						
7																						
8																						
9																						
10											1%											
11										1%	52%		2%	8%	4%	10%						
12																						
13											2%											
14											6%											
15											4%											
16											10%											
17																						
18																						
19																						
20																						
21																						
22																						

Table 27: Origin-Destination Matrix of Zone- 12

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2												1%										
3																						
4																						
5																						
6																						
7																						
8																						
9												7%										
10												1%										
11																						
12									7%	1%		79%		1%				1%				
13																						
14												1%										
15																						
16																						
17																						
18												1%										
19																						
20																						
21																						
22																						

Table 28: Origin-Destination Matrix of Zone- 13

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2													1%									
3																						
4																						
5																						
6													1%									
7																						
8																						
9													28%									
10																						
11																						
12																						
13		1%				1%			29%				17%		4%							7%
14																						
15													4%									
16																						
17																						
18																						
19																						
20																						
21																						
22													7%									

Table 29: Origin-Destination Matrix of Zone- 14

Origin	Destination																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2														4%								
3																						
4														1%								
5																						
6														1%								
7																						
8																						
9						1%								5%								
10																						
11																						
12														10%	1%							
13														1%								
14		4%				1%			6%			10%	1%	39%	7%	1%						
15														7%								
16														1%								
17																						
18																						
19																						
20																						
21																						
22																						

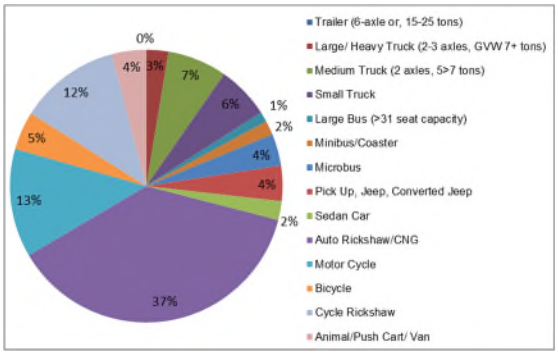
Table 30: Origin-Destination Matrix of Zone- 15

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						
13															2.6%							
14																						
15													2.6%		94.9%							
16																						
17																						
18																						
19																						
20																						
21																						
22																						

Table 31: Origin-Destination Matrix of Zone- 16

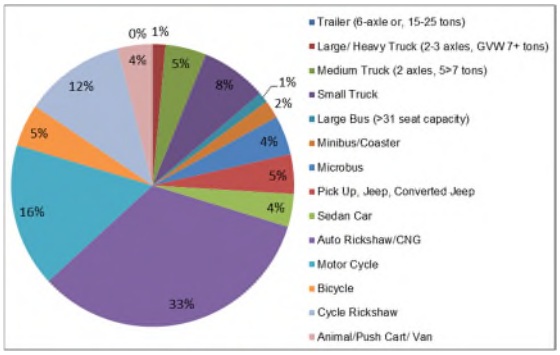
Origin	Destination																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																3%						
10																						
11																4%						
12																						
13																						
14																						
15																12%						
16									3%		4%				12%	59%						3%
17																						
18																						
19																						
20																						
21																						
22																1%						

B.2 Results of Traffic Count Survey:



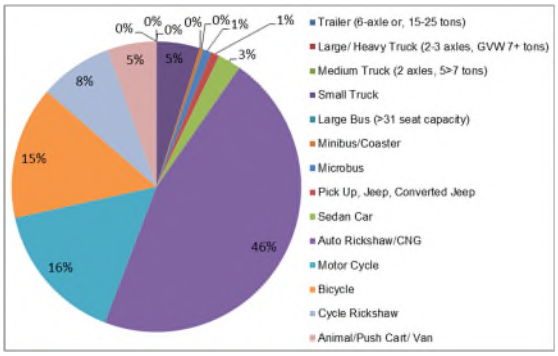
Up- Direction

Figure 44: Modal share of vehicles on Site 02



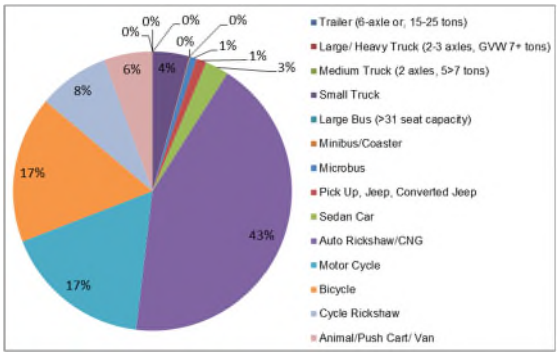
Down- Direction

Figure 45: Modal share of vehicles on Site 02



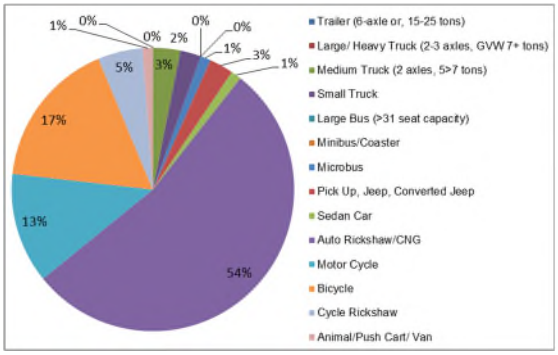
Up- Direction

Figure 46: Modal share of vehicles on Site 04



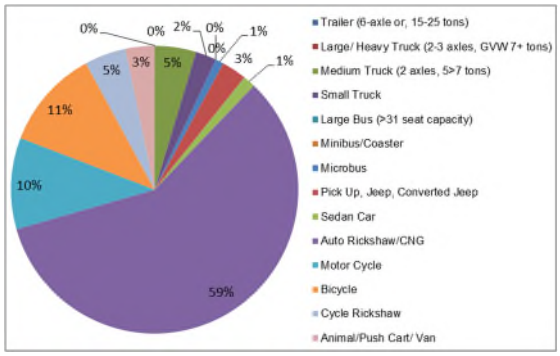
Down- Direction

Figure 47: Modal share of vehicles on Site 04



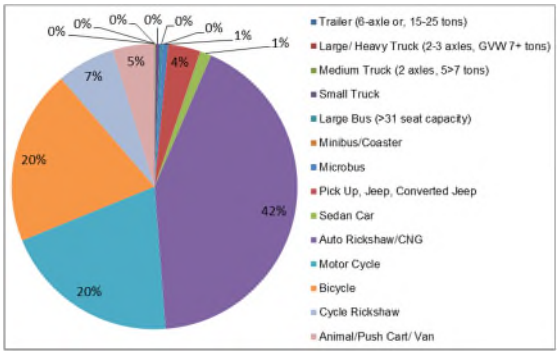
Up- Direction

Figure 48: Modal share of vehicles on Site 05



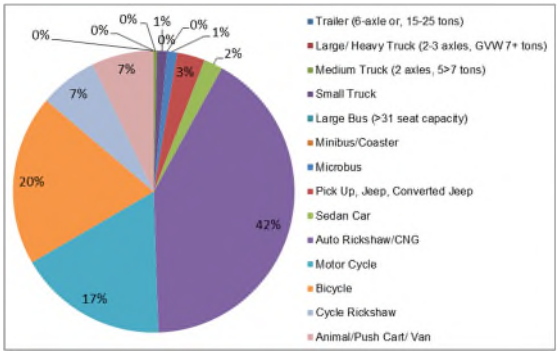
Down- Direction

Figure 49: Modal share of vehicles on Site 05



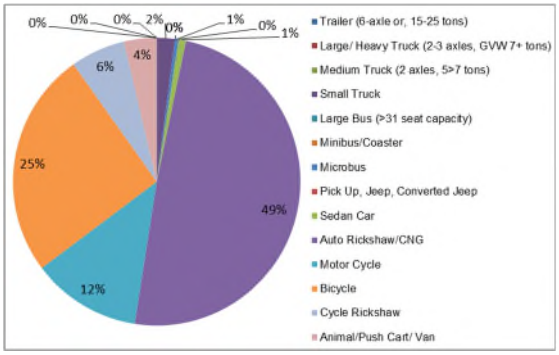
Up- Direction

Figure 50: Modal share of vehicles on Site 06



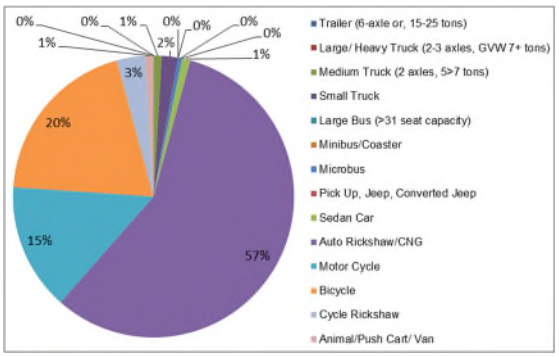
Down- Direction

Figure 51: Modal share of vehicles on Site 06



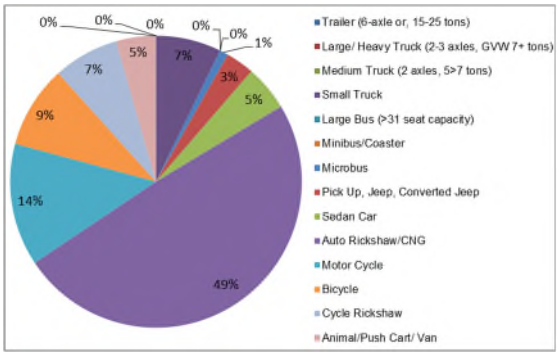
Up- Direction

Figure 52: Modal share of vehicles on Site 07



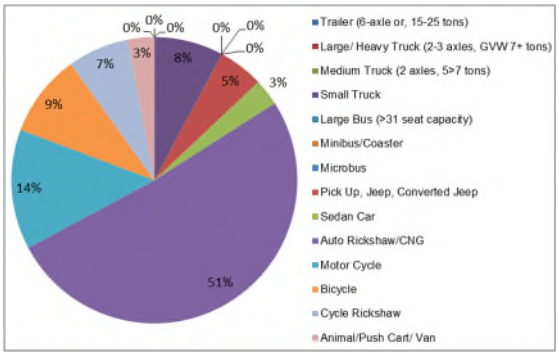
Down- Direction

Figure 53: Modal share of vehicles on Site 07



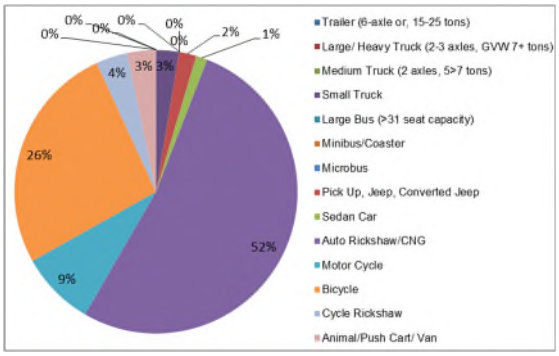
Up- Direction

Figure 54: Modal share of vehicles on Site 08



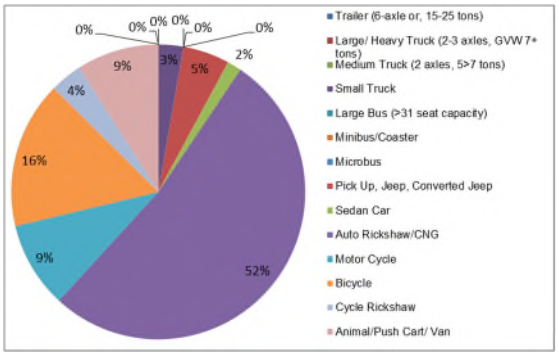
Down- Direction

Figure 55: Modal share of vehicles on Site 08



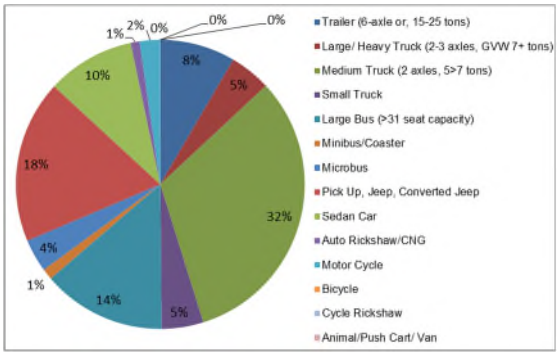
Up- Direction

Figure 56: Modal share of vehicles on Site 09



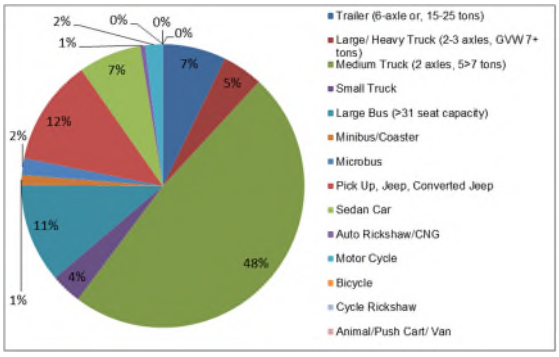
Down- Direction

Figure 57: Modal share of vehicles on Site 09



Up- Direction

Figure 58: Modal share of vehicles on Site 10



Down- Direction

Figure 59: Modal share of vehicles on Site 10

B.3 Results of Road Side OD Survey:

Table 32: Origin-Destination matrix: Location- Baraiyarhat Rail-Crossing (Peak Hour)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		105	6	13		3		6	29				3				3	54	3			26	
2		123		11				3	29		3		3			3	3	54				16	
3																							
4		3																					
5																							
6																							
7																							
8		21		3	3				6									3				3	
9																							
10																							
11																							
12																							
13		3																					
14																							
15																							
16																							
17				3					3									3					
18		3						3	3													8	
19		3																3					
20		16																44	34			3	
21		6							8									8				6	
22		18																				3	
23																							

Table 33: Origin-Destination matrix: Location- Baraiyarhat Rail-Crossing (Off-Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		16	1	2		1		1	5				1				1	8	1			4	
2		18		2				1	5		1		1			1	1	8				3	
3																							
4		1																					
5																							
6																							
7																							
8		3		1	1				1									1				1	
9																							
10																							
11																							
12																							
13		1																					
14																							
15																							
16																							
17				1					1									1					
18		1						1	1													2	
19		1																1					
20		3																7	5			1	
21		1							2									2				1	
22		3																				1	
23																							

Table 34: Origin-Destination matrix: Location- Mirsharai Stadium (Peak Hour)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									7	2		1											
2									8			1											
3																							
4									2														
5																							
6																							
7																							
8									4														
9	1	3							126			7	1			2		1	1			5	
10																							
11																							
12	1																						
13									1														
14																							
15																							
16																							
17									1														
18																							
19									1														
20																							
21						1			13														
22																							
23																							

Table 35: Origin-Destination matrix: Location- Mirsharai Stadium (Off-Peak Hour)

Origin	Destination																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									2	1		1											
2									2			1											
3																							
4									1														
5																							
6																							
7																							
8									1														
9	1	1							25			2	1			1		1	1			1	
10																							
11																							
12	1																						
13									1														
14																							
15																							
16																							
17									1														
18																							
19									1														
20																							
21						1			3														
22																							
23																							

Table 36: Origin-Destination matrix: Location- Boro Darogarhat (Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2																						5	
3																							
4																							
5																							
6																							
7																							
8																							
9															5								
10																							
11																							
12																							
13																							
14																							
15		10																					
16																		5	10				
17																							
18																							
19																							
20																							
21																							
22		137							74		5		15		133		59	142	446			5	
23																							

Table 37: Origin-Destination matrix: Location- Boro Darogarhat (Off-Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2																						4	
3																							
4																							
5																							
6																							
7																							
8																							
9															4								
10																							
11																							
12																							
13																							
14																							
15		8																					
16																		4	8				
17																							
18																							
19																							
20																							
21																							
22		100							54		4		11		96		43	103	323			4	
23																							

Table 38: Origin-Destination matrix: Location- Shantir Hat (Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		5																					
2	5	155		5					5									9				5	
3		155		5	5	5												5				5	
4		61							9						5							5	
5	5	9																					
6		5																					
7		9																					
8		9																					
9																							
10																							
11																							
12																							
13																							
14																							
15																							
16																							
17																							
18																							
19																							
20																							
21																							
22																							
23																							

Table 39: Origin-Destination matrix: Location- Shantir Hat (Off-Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		1																					
2	1	35		1					1									2				1	
3		35		1	1	1												1				1	
4		14							2						1							1	
5	1	2																					
6		1																					
7		2																					
8		2																					
9																							
10																							
11																							
12																							
13																							
14																							
15																							
16																							
17																							
18																							
19																							
20																							
21																							
22																							
23																							

Table 40: Origin-Destination matrix: Location- Thakur Dighi Bazar (Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1					3																		
2																							
3																							
4																							
5				3																			
6		7		17		58			38				3					3					
7		12				40			5													3	
8		5				49			14				3										
9																							
10																							
11																							
12																							
13																							
14																							
15																							
16																							
17																							
18																							
19																							
20																							
21																							
22																							
23																							

Table 41: Origin-Destination matrix: Location- Mirsharai Upazila Road (Adjacent to Paurashava) (Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2																							
3									4														
4																							
5																							
6																							
7									2														
8									2														
9						2			91			2											
10									54			2											
11									2														
12									28				2										
13																							
14									2														
15																							
16									6														
17																							
18																							
19									2														
20																							
21																							
22		2							23			2											
23									17														

Table 42: Origin-Destination matrix: Location- Bara Takiya Bazar (Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2																							
3																							
4																							
5																							
6																							
7																							
8	4												4										
9																							
10																						4	
11																							
12		32		4		7			41				188		7		4	4	4			13	
13																							
14																							
15															4								
16																							
17																							
18																							
19																							
20																							
21																							
22																							
23				4					7				13									13	

Table 43: Origin-Destination matrix: Location- Sarkar Hat (Peak Hour)

Origin	Destination																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2															2								
3																							
4															15								
5																							
6																							
7																							
8																							
9																							
10																							
11													4		111							4	
12											2				8								
13																							
14															12								
15															17								
16									2						83								
17																							
18															8								
19															2								
20																							
21																							
22															2								
23																							

APPENDIX C: NOTES OF THE CONSULTATION MEETINGS

Notes of Start-up Meeting with Project Director (MUDP), UDD

Location: Urban Development Directorate (UDD) HQ, 82, Segunbagicha, Dhaka- 1000.
Date & Time: Wednesday, November 22, 2017; 11:00 am

Present:

Ahmed Akhtaruzzaman, Project Director (MUDP), UDD
Ahsan Habib, Asst. Planner & PM (MUDP), UDD
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) This was the first meeting that took place between the UDD officials and the team members of DevCon, thus the participants of the meeting introduced themselves.

2) The Project Director, Mr. Akhtaruzzaman briefly described the nature of the project, its goal and UDD's approach towards the MUDP. He also pointed out the development opportunities of Mirsharai Upazila considering the two important aspects of (i) Economic Zones and EPZ those are being constructed by BEZA and BEPZA; and (ii) Tourist Spots on the South-Eastern part of Mirsharai.

3) With the help of a printed GIS map of Mirsharai and the road network map LGED, PD identified the access road to the EZ sites that is already under construction by RHD along the Abu Torab Bazar road previously owned by LGED. He also added that this alignment has some drawbacks such as:

- The has a number of sharp bents since the road is being constructed on the same alignment as that of the previous, it will reduce driving comfort, increase chances of accidents and limit the average speed of vehicles
- An important canal is being filled up for the construction of the road, which will in turns cause drainage problem in the surrounding area,
- The alignment passes through an important marketplace (Abu Torab Bazar) and thus there will be traffic congestion on the access road near the built up area; this will result in a long travel time.

Considering the above, Mr. Akhtaruzzaman emphasized on proposing alternative access routes to the Economic Zones

4) The PD asked the consultants to exploit all possible options and propose a multi-modal transport network for the study area with both improved local and regional connectivity; taking into account the rail connectivity, waterways and even MRT. He also mentioned a direct connectivity from the EZ sites to Shonagazi, Feni can be established.

5) The consultants were asked to visit the tourist spots and propose better access to the spots and direct connectivity in between different ones, and innovative but practical ideas for introduction of modern facilities for tourists such as safety for hiking, ropeway etc.

6) The PD also sought solution for keeping road transport operational within the Mirsharai city area during the recurring seasonal flush floods.

7) The consultant team members shared the reconnaissance tour program with UDD counterparts when Mr. Ahsan Habib discussed the consultants about the important checkpoints (of Mirsharai) to visit during reconnaissance, make arrangement for logistic support (including issuance of letter) and initiated communication with one of the Mayors and the local representatives of UDD in Mirsharai who would assist the survey team in field.

8) At last, the PD requested the consultant team members to arrange a demonstration of the Transport Modelling Software that will be used in this project.

Notes of 1st Meeting with UDD Officials in Mirsharai Office

Location: MUDP Project Office (UDD), Mirsharai.
Date & Time: Saturday, November 25, 2017; 11:00 am

Present:

Md. Saifur Rahman, Planner, UDD
Md. Monir Hossain, Nokshakar
S M Saidul Islam, Nokshakar
Md. Shahinur Rahman, Nokshakar
Md. Nazrul Islam, Nokshakar
Renu Miah, Rekhakar
Dr. Moinul Hossain, Team Leader, DevCon
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) The Team Leader (TL) introduced the team with the UDD local representatives and started the meeting,

2) Using the maps already prepared in consultant's Dhaka office, the TL discussed purpose of the reconnaissance field visit and places to visit to obtain the remarks and suggestions from the local staff,

3) The UDD officials shared their views regarding the field visit and recommended important locations to visit and helped fine tune the tour program. They also assigned two persons- Mr. Monir and a local volunteer to be with the team and provide all necessary logistic support and guidance throughout the tour.

4) It was also assured that the traffic survey team during the thorough field surveys would get local community support as much as needed, and introduced the team with the Co-founder of the 300-member strong local student association, USAM.

5) On request of the TL and as per earlier instruction of the PM (UDD), Mr. Ahsan Habib; Mr. Saidul Islam arranged an appointment with the Honourable Mayor (Mirsharai Pourashava) Mr. Gias Uddin at the day's end.

Notes of Meeting with USAM (University Students Association of Mirsarai)

Location: MUDP Project Office (UDD), Mirsharai.
Date & Time: Saturday, November 25, 2017; 11:30 am

Present:

Md. Nahid Mahamood, Co-founder, USAM
Dr. Moinul Hossain, Team Leader, DevCon
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) Mr. Nahid, the Co-founder of University Students Association of Mirsharai introduced himself with the transportation consultants and briefly described the visions & activities of their group.

2) Upon sharing the purpose of the reconnaissance, Mr. Nahid confirmed that as a local resident of Mirsharai, he can take the team to all the sites to visit within the available time and suggested the best route plan for the visit.

3) The TL briefed about the nature and extent of the traffic surveys to be carried out under the Package-4 assignment and asked how the local community could assist in that. In response, Mr. Nahid mentioned their association has 300 active members ready to provide any voluntary field support during the surveys and being students of various universities and colleges, they could also take part in the survey activities as well.

Notes of Meeting with Mayor, Mirsharai Pourashava

Location: Mirsharai Pourashava Office, Mirsharai.
Date & Time: Saturday, November 25, 2017; 4:00 pm

Present:

Md. Gias Uddin, Hon. Mayor, Mirsharai Pourashava
Ward Councillors of 2 wards
Sub-inspector, Mirsharai Thana
Md. Monir Hossain, Nokshakar (UDD)
S M Saidul Islam, Nokshakar (UDD)
Md. Nahid Mahamood, Co-founder, USAM
Dr. Moinul Hossain, Team Leader, DevCon
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) The Mayor in spite of his other activities managed time for the meeting with the consultant team and a number of other important city persons were present in the discussion. The formal introduction was done by the UDD representatives present in the Mayor's office.

2) The Team Leader shared his observations after visiting various places of significance within the Mayor's jurisdiction and most importantly the EZ sites. After that, he sought suggestions from the Mayor for possible road network improvement and his visions regarding Mirsharai.

3) In response, the Mayor had the following remarks:

- The proposed access road from Bar Takiya towards Mirsharai EZ may create huge traffic congestion in the area. Also, there are 4 large/ small markets/ GCs which will understandably be affected due to widening of the road. Again, the zigzag geometry of the road creates difficulties. Moreover, the existing canal, which contains the floodwater, is being filled up. Instead of the extension of this road Mayor proposed to extend road Mithachara to EZ via Baman Sundar Hat GC. He also added that the surrounding area of that alignment is mostly vacant- devoid of any notable development and will not require much resettlement work and land acquisition is very much possible to widen the road up to 100 feet.
- The Fatikchhari road (Z1021) from Mirsharai is too narrow and encroached by bazars, shops and residential buildings. These developments are mostly in unplanned, which makes the situation worse. Moreover, this is the only road toward the Fatikchhari. Mayor has the interest to widen this existing road and improve the connectivity between two Upazilas.
- It is very significant to widen and straighten the RHD regional road R151 (Hinguli-Kararhat-Ramgarh Rd.) which connects the Ramgarh Land Port and there are about 42 nos. of bridges that need to be rehabilitated or reconstructed.
- There is a proposal of construction of a new canal from Mohamaya lake towards the EZ that is waiting for the ECNEC approval
- The area under his jurisdiction especially Ward nos. 11, 12 and 13 suffer from flooding and waterlogging; the Mayor required solutions to solve the problem and stated that the roads within this area need to be raised.
- In reply, of the TL's query, the Mayor mentioned about an available space for possible terminal of the public transports.

4) The Team Leader noted all the comments from the Mayor and promised to evaluate these options while planning the road network for Mirsharai.

5) The meeting ended with a nice arrangement of Lunch by the Mayor and followed by photo session and tea.

Notes of Discussion at Mohamaya Eco Park, Mirsharai

Location: Mohamaya Eco Park, Mirsharai.
Date & Time: Sunday, November 26, 2017; 10:00 am

Present:

Md. Gholam Kabir, Forest Beat Officer, Forest Department
Tour Operator, Mohamaya Eco Park
Representatives of BWDB
Person in-charge, Parking Area, Mohamaya Eco Park
Dr. Moinul Hossain, Team Leader, DevCon
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) Mr. Kabir, representative of the Forest Department took the team to points of interest within the Eco Park and briefed about different facilities like food, accommodation, connectivity, recreational activities etc. for the tourists.

2) It was noted that the recreational activities such as boating, kayaking, fishing, kayaking etc. including the parking area; are leased to private parties on yearly basis. The leasing is done and managed by the Department of Forest. However, the rates for the tourists vary from season to season and are different for the local indigenous people living nearby.

3) The local representatives of the BWDB stated that the lake's discharge is controlled by a sluice gate built and operated by BWDB, and there are boats reserved for the department which the survey team could use if required.

4) The FBO also mentioned that there is a proposal for development of the Mohamaya Eco Park submitted to ECNEC for budget allocation which will comprise various touristic facilities improvement such as Ropeway, Cable car, Cottage etc.

5) The parking area in-charge told the team that the Eco Park has insufficient parking facility. During the off season the tourist cars are limited but during the season, it is multiplied many times and they cannot accommodate all the vehicles coming to the spot. The surplus vehicles then take place in the access road which is also very narrow and create congestion.

Notes of Wrap up Meeting at UDD Field Office, Mirsharai

Location: UDD Field Office, Mirsharai
Date & Time: Sunday, November 26, 2017; 12:30 pm

Present:

Md. Saifur Rahman, Planner, UDD
Md. Monir Hossain, Nokshakar, UDD
S M Saidul Islam, Nokshakar, UDD
Md. Shahinur Rahman, Nokshakar, UDD
Md. Nazrul Islam, Nokshakar, UDD
Renu Miah, Rekhakar, UDD
Dr. Moinul Hossain, Team Leader, DevCon
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) The reconnaissance survey team was invited for lunch to the MUDP Project Office at Mirsharai, and a short discussion took place following lunch.

2) The Team Leader shared his observations from the reconnaissance up until then and briefed the UDD officials about the next actions and preliminary planning for the traffic survey. He also sought their assistance when the team visits Mirsharai next for detailed planning and surveys. In addition, he expressed the need for an office and housing space for the survey supervisors and enumerators to visit Mirsharai for survey purpose.

3) Mr. Saidul and Mr. Monir confirmed that they will assist in finding a rental accommodation for office and housing in the earliest and that they will arrange for any local support and logistics, which might be required during execution of the traffic surveys.

4) Mr. Monir then arranged an appointment with the Mr. Foyz Ahmed, Secretary to the Mayor of Baroiyar Hat Pourashava with the Mayor not being at the station.

5) The discussion ended with tea and handshakes.

Notes of Meeting with Baroiyar Hat Pourashava

Location: Baroiyar Hat Pourashava Office, Mirsharai
Date & Time: Sunday, November 26, 2017; 3:00 pm

Present:

Mr. Foyz Ahmed, Secretary to Mayor
3 nos. of other staff of the office
Dr. Moinul Hossain, Team Leader, DevCon
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) The meeting was brief and started with a formal introduction among participants. Mr. Foyz greeted the team with snacks and tea and started the discussion.

2) As the Team Leader described the nature and objectives of the assignment, the Secretary shared his following remarks in accordance with the vision of his Mayor:

- The regional road (R151) is desired and proposed to be widened up to 4 lanes to accommodate higher volume of traffic when the land port and the EZ are fully operational
- A Flyover is envisioned across the Hinguli intersection carrying the traffic from the EZ towards the land port in Ramgarh
- Two options could be there for accessing the EZ sites; which are (i) Hinguli-Santir Hat-Dhum-Azampur Hat-Muhurighat Bazar-EZ Embankment; and (ii) Zorwarganj-Bishu Miar Hat- Azampur Hat-Muhurighat Bazar-EZ Embankment
- A 247 crore worth project is already in place for establishing direct connectivity with Noakhali over the sluice gate through Shonapur Road which will reduce 50km of distance to that if the highway is taken
- Widening is required for the municipal (LGED) roads to eradicate traffic congestion
- The Zorwarganj-Borburia Ghat Road can be reconstructed and made operational with a bridge across the river Feni to connect with the national highway bypassing the Hinguli intersection, Santir Hat and Baraiyar Hat GCs.

3) The Team Leader took notes of the comments from the secretary and promised to consider all these options while planning.

Notes of Tea Stall Meetings

Location: Various locations, Mirsharai
Date & Time: November 25-26, 2017; 10:00 am-3:00 pm (intermittently)

Present:

Local people at different locations, Mirsharai
Md. Monir Hossain, Nokshakar, UDD
Md. Nahid Mahamood, Co-founder, USAM
3 nos. of other staff of the office
Dr. Moinul Hossain, Team Leader, DevCon
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) The UDD officials took active part in setting up the discussions and briefed the locals about the MUDP Project after introducing the consultant team.

2) These meetings held at various locations of the existing road network with local people as available.

3) The output of such discussions were mainly key information regarding nearby growth centres, markets, available modes of transport and other important places for the road network.

4) The local people shared the facilities they already enjoy and the problems encountered in road communication.

5) The Team Leader welcomed the demands of the public regarding the improvement of the transport facilities.

Notes of Follow-up Meeting with Project Director (MUDP), UDD

Location: Urban Development Directorate (UDD) HQ, 82, Segunbagicha, Dhaka- 1000.
Date & Time: Wednesday, December 13, 2017; 12:00 pm

Present:

Ahmed Akhtaruzzaman, Project Director (MUDP), UDD
Ahsan Habib, Asst. Planner & PM (MUDP), UDD
Yarun Nesa Khanam, Asst. Planner (MUDP), UDD
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) The Project Director, Mr. Akhtaruzzaman shared his remarks on the submitted '*Mobilization Report*'.

2) In case of road design standard, the PD said that the study area has both jurisdictions (roads) of both LGED and RHD. The tentative road network outlined in the report is mostly under the jurisdiction of LGED. So he suggested the consultant team to consider the LGED road standard as well for network design. If it is necessary to follow the RHD standard then the consultant team must discuss with LGED and later propose a logical road design standard for Mirsharai.

3) The PD discussed with the team about the future land use provisions alongside the future road network and improved land use of the contained (pocket) areas in between old and new alignments.

4) In Chinki Astana railway station more passengers and goods are loaded and unloaded than Mirsharai. So, PD asked the team to exploit all possible road connectivity to the tourist spots from the station. He also inquired about how the tourist spots can be accessible for aged persons and what facilities can be provided for them.

5) BEZA proposed a railway connectivity to EZ through the Bara Takiya. PD asked the consultant to study the feasibility of the connection. He also told the team to consult with BEZA and BR about their future plans for Mirsharai.

6) As Mirsharai is close to the Bay of Bengal, it should be ensured through the plan that people can easily access the sea beach at the toe end of the EZ Site and necessary road connectivity should be provided during the planning.

7) PD also suggested that the linkage between BISIC and EZ must be ensured in future road network plan.

8) Honourable Prime Minister of Bangladesh, Sheikh Hasina, promised that a Tourism City will be developed by centring the Mohamaya Lake in Mirsharai. PD asked consultant team to design future road network for tourist spots considering this vision for tourism development.

9) Mr. Akhtaruzzaman, PD, said that major regional connectivity should be shown in a map.

10) PD also asked the consultant team to find out, after reviewing all policies and proposals of different government plans and projects, all the gaps of existing road network and those estimated in different sectoral development plans. He also told to review the study report on *"The Bay of Bengal Industrial Growth-Belt (BIG-B) Initiative, JICA"* for better understanding of the regional and national connectivity with the Mirsharai.

Notes of Meeting with Mayor, Baraiyarhat Pourashava

Location: Baraiyarhat Pourashava Office, Mirsharai.
Date & Time: Wednesday, January 10, 2018; 11:45 am

Present:

Md. Nizam Uddin, Hon. Mayor, Baraiyarhat Pourashava
Mr. Foyz Ahmed, Secretary to Mayor
Md. Monir Hossain, Nokshakar, UDD
Sultana Razia, Transport Survey Supervisor, DevCon
Hamim Ahmed, Project Coordinator, DevCon

1) Honourable Mayor, Baraiyarhat Paurashava, mentioned many transport related problems in his Paurashava. Among the problems, he mentioned that transport facilities are not good in Mirsharai Upazila, no designated parking for unconventional motorized vehicles (CNG, Auto-rickshaw), no terminal for bus and trucks. For illegal and unplanned parking, congestion is high in Mirsharai.

2) Mayor also shared that he has taken steps by developing some designated parking areas/ terminals for CNG, microbus and pickup and he monitors these areas by himself. The terminals for Microbus and CNG are located in the North and South side of Baraiyarhat at Shantir hat road. Pickup stands has been constructed in Zorawargonj Thana.

3) Honourable Mayor has also discussed with the consultant team that proper parking facility is needed at the entrance of Shantir hat road and beside the Dhaka-Chittagong Highway. He mentioned that proper parking and terminal is needed for public transport. In addition to that He mentioned his interest in constructing terminal for Bus and Truck and there is enough land for that in Zorawargonj Thana. But the land is under RHD jurisdiction so there are some acquisition issues standing on the way of development.

4) He stated that roads must be widened in double to remove congestion and for bettering livelihood of the people of Mirsharai.

5) Dhaka-Chittagong highway divided Mirsharai into two parts and there is no direct access for people to move from one side to another. For this reason, people face some accessibility problems and sometimes they cross the highway directly by foot without using foot overbridge which causes accidents especially among the children and aged persons. Moreover, local vehicles are not allowed to pass from one side to other and they do not have access to the highway. Vehicles that have access to the highway, have to take U-turn by travelling a long distance. So, Hon. Mayor suggests Consultant team to consider the construction of *"Circular road, Underpass or Flyover"* in Baraiyarhat Intersection for connection between two sides and for easy movement of people and goods which will remove congestion as well.

6) In response of the Consultant's request to mention some alternative routes to Economic Zones, Hon. Mayor had the following suggestions:

- Route 1: From Bara Takiya Bazar to EZ embankment road via Abu Torab Bazar.
- Route 2: Mirsharai Paurashava HQ road (newly construction is needed).
- Route 3: From Mithachhara Bazar to EZ embankment via Baman Sundardarogar Hat and Takerhat.
- Route 4: Thakur Dighi Bazar to EZ embankment through Chowdury Hat and Julanpur Bazar (Ichhakhali)
- Route 5: Zorawargonj bazar-Bishu Miar Hat-Azampur Hat to EZ embankment via Muhurighat Bazar.
- Route 6: Dhumghat bridge-Golakar Hat-Azampur Hat to EZ via Muhurighat Bazar.

7) He mentioned drainage problem of Mirsharai and said that he has taken steps by himself to excavate some drains to less the drainage problem in Baraiyarhat Paurashava.

8) The meeting ended with a photo session and tea.

Notes of Meeting with Local People at Different Locations

Location: Different Locations, Mirsharai Upazila.
Date & Time: Jan 06, 2018 to Jan 12, 2018; Different time

Present:
Consultants' Team and Local People

1) During fixation of survey stations local people stated that about 300 local CNGs move through the Fatikchhari road from Mirsharai. If government take necessary steps to widen the road then it will be better for people who travel Fatikchhari from Mirsharai.

2) From local people it had been known that mainly Tuesday, Thursday and Friday in the week congestion at bazars are high.

3) To fix the survey duration it was necessary for consultant team to know the peak time for the roads. From people of Mirsharai the team confirmed that congestion is to be high during 9 am to 12 pm and 4 pm to 7 pm/ 8 pm in local roads.

4) Some people mentioned that people cross the highway in a very unsafe manner even there is foot overbridge available. The use of bridges is at the very least. So accidents happen frequently. They demand some facilities to stop unsafe road crossing.

Notes of Meeting with BEPZA

Location: BEPZA HQ, Dhanmondi, Dhaka
Date & Time: March 11, 2018; 10:00 am

Present:

Md. Hafizur Rahman, G.M (MIS) and Project Director (NARI)
Dr. Moinul Hossain, Team Leader
Hamim Ahmed, Project Coordinator
Sultana Rajia, Transport Survey Supervisor

1) During the meeting, information about the Mirsharai EPZ was sought by the team leader. Mr. Rahman told that at present, the masterplan is still ongoing and it is expected that around 5 lacs of people will be employed within the EPZ area (Zone- 14).

2) Mr. Rahman did let the Team Leader know the following facts about the Mirsharai EPZ:

- The area of Dhaka EPZ is 320 acres and that of Mirsharai will be 3 times the Dhaka EPZ.
- The investment for this particular area will be near about USD 4-4.5 billion and 300 to 350 nos. of factories will be established in the next 5-7 years within the EPZ compound and will start operation in 2020. Although the EPZ will be fully functional from 2025. No traffic management plan has been adopted for the construction period.
- The **induced employment by the operation of EPZ is estimated as 20%**, but this is only direct effect of the EPZ. 5% of the population within the area will be foreigners and they will have separate residential quarter in the premises. No public transport facility is planned for the workers from BEPZA.
- All the traffic will be using roadways and the cargos have trips from different ports mainly from Chittagong Port.
- The main access from the Dhaka-Chittagong Highway is Sheikh Hasina Avenue through Abu Torab Bazar and is currently under construction by RHD. However, there will be two other access from this main access road towards the EPZ. He suggests there should be more East-West access roads from the highway which should be connected with North-South link roads. In addition, there should be good drainage facility along the roads to address the present flooding problem of the urban area of Mirsharai.
- No rail connectivity has yet been planned to connect with the EPZ. He suggests a railway route should be there passing through the EZ area ultimately joining the Dhaka-Chittagong route. An option can be Fazilpur- Mirsharai Economic Zone- Sitakundu alignment.

3) Lastly, he expressed his understanding of the necessity of a proper transportation plan before starting an EPZ and he promised to share all the information required for the planning purpose.

Notes of Meeting with BEZA

Location: BEZA HQ, Karwan Bazar
Date & Time: March 21, 2018; 4:45 pm

Present:
Doyanondo Debnath, Manager (Planning), BEZA
Md. Abdul Quader Khan, Consultant (BEZA)
Hamim Ahmed, Project Coordinator
Sultana Rajia, Transport Survey Supervisor

1) During the meeting, information about the Mirsharai EZ was sought by the consultants;

2) Questions mostly related to the transportation of the proposed EZ was asked and explained;

3) BEZA representatives acknowledged that the induced employment by the operation of EZ would be as much as 20%, but this is only direct induction. However, there is no traffic forecast available at this moment but it can be envisaged that the EZ will produce 10 times the traffic of Dhaka EPZ in next 20 years.

4) Mr. Quader requested the Project Director (MUDP) to arrange a meeting among all the EZ concerned parties such as UDD, UDD's transportation consultants, BEZA and BEZA's consultant team for the masterplan of Mirsharai EZ.

5) He emphasized that the two masterplans have to be integrated for a fruitful and effective implementation of the transportation planning from both ends in the long run.

Notes of Meeting with Mayor, Mirsharai Paurashava

Location: Mirsharai Paurashava, Mirsharai
Date & Time: July 08, 2018; 2:00 PM

Present:
Md. Gias Uddin, Hon. Mayor, Mirsharai Pourashava
Hamim Ahmed, Project Coordinator

1) During the meeting, Mr. Gias shared the idea that there are other alternatives to access the tourist spots of Mirsharai. These access roads directly connects the waterfall locations with the main roads and it will be convenient for the local and foreign tourists to access the spots if these routes are opened.

2) The team of consultants were informed that the existing Mirsharai-Narayanhat Road (Z1021) connects two of such major waterfalls; Khaiyachhara and Boalia. Also the proposed tourist spot beside the Gobania Canal can be connected through the road. He also mentioned that this will minimize the efforts of the tourists to see the beauty of nature and at the same time will increase emergency support in any accidents by police, firemen from the HQ.

3) The Mayor emphasized on widening the Mirsharai Upazila road to establish smooth and fast communication with the Economic Zone area. Since this road connects EZ with the Mirsharai HQ, it can be used by the EZ Authorities and the visiting foreigners for administrative purposes.

4) The proposed public transport network was discussed with the Mayor and he had no objection with it. He suggested a few available places that could be used to construct the public transport hub.

5) Lastly, he requested the concerned officials to investigate the options of waterway connectivity across Mirsharai using and improving the largest canal that connects EZ (West) with the Dhaka-Chittagong Highway on the East. He said this will also **help eradicate the flush flooding and waterlogging problem in Mirsharai**.