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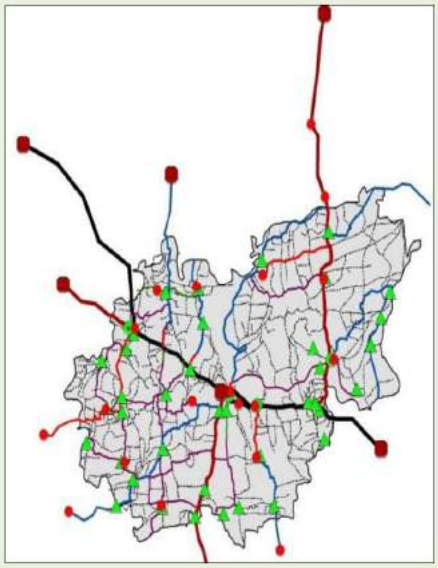
Planning and Prioritisation of Rural Roads in Bangladesh

Report on
Dynamic Illustration of GIS Application



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The analyses presented and views expressed in this report are those of the authors and they do not necessarily reflect the views of the Government of Bangladesh, Local Government Engineering Department or Research for Community Access Partnership (ReCAP).

Cover Photo:

Mr. Md. Mashrur Rahman using
LGED's GIS Database

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We are grateful to the LGED officials of Mirzapur for helping us to collect data required for this study from the field. We sincerely acknowledge the GIS Unit of LGED for allowing us to upload the software in their online GIS portal.

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Acronyms, units and currencies

AADT	Average Annual Daily Traffic
BC	Bituminous Concrete
BUET	Bangladesh University of Engineering and Technology
CBA	Cost Benefit Analysis
CC	Community Clinic
CVD	Commercial vehicles per Day
DURP	Department of Urban and Regional Planning
EIRR	Economic Internal Rate of Return
FWC	Family Welfare Centre
GC	Growth Centre
GIS	Geographical Information System
GPS	Government Primary School
HQ	Head Quarters
LGED	Local Government Engineering Department
MCA	Multi Criteria Analysis
PO	Post Office
RDBMS	Road Database Management System
ReCAP	Research for Community Access Partnership
RHD	Roads and Highways Department

Contents

Executive summary

A web-based application tool, Rural Road Planning and Prioritisation Model (RPPM), has been developed for planning and prioritisation of rural roads in Bangladesh. RPPM has some limitations in its mapping feature. Using the required information from the GIS database it can show a prioritised road on a map but cannot show the spatial features or socio-economic facilities along the road on the map. As a result, the map outputs are not very interactive.

The main purpose of this prototype illustration study is to customise RPPM to illustrate that the information in the road and GIS databases can be effectively used to show the spatial features or socio-economic facilities along a road. This feature of RPPM will make its map outputs more useful and interesting to decision makers for rural road development as well as use it as a potential tool to undertake useful interactive analyses for other development purposes.

This study has produced a tool as part of RPPM for the prototype mapping illustration of selected roads with spatial socio-economic features. For this purpose, as a test case, information were collected on 14 socio-economic features (schools, clinic, post office, market etc.) for 33 roads in Mirzapur upazila of Tangail district.

The prototype illustration model has been successfully run to show the spatial features of a road on a map. However, the model could not be run successfully for all the roads for which data were collected from the field. This was due to mismatch of information collected from the field and the corresponding information in the GIS database. This problem may need further investigation. The report outlines some recommendations before the prototype illustration model is considered for its application in other districts.

1 Introduction

1.1. Background

The Local Government Engineering Department (LGED) in collaboration with Local Government Institutions (LGIs) manage all rural roads in Bangladesh. LGED spends a considerable amount of resources for the development of rural road network comprised of about 353,000 km roads. There is a need to develop a planning and prioritisation methodology for further development and maintenance of rural roads on a sustainable basis.

A research study was undertaken to develop a planning and prioritisation methodology to identify rural roads that should be prioritised for development and maintenance. One of the main objectives of the research study was to develop an application tool to implement the methodology. The application tool was also expected to enhance the planning and decision-making capacity in LGED.

Accordingly, a web-based application tool, Rural Road Planning and Prioritisation Model (RPPM), has been developed and implemented on the Geographical Information System (GIS) portal of LGED. Its integration with the GIS portal facilitates mapping and generating road priority outputs from the web platform. RPPM can generate core road networks at the upazila and union levels, and appraise the priority of rural roads for their development including their ranking based on the outcomes of Cost Benefit Analysis (CBA) and/or Multi Criteria Analysis (MCA).

RPPM can produce the following outputs:

- core networks for the upazila;
- eight separate priority lists (output tables) by type of road development and type of road surface;
- priority score table with basic information, details of priority scores, and CBA and MCA results of a road; and
- maps showing prioritised roads on an upazila map.

The priority score table for a road has the following information:

- road code and road name;
- road surface condition, AADT and CVD values;
- total road length, road type, surface type, connectivity;
- MCA scores for facilities;
- evaluation score including EIRR and MCA scores;
- priority ranking considering EIRR or MCA as may be applicable.

RPPM uses data mainly from the databases of LGED. LGED maintains two databases namely the road database and the GIS database. There is a wealth of information in these two databases which has the potential to be used in undertaking many useful interactive analyses relevant to rural road development and other development purposes. However, currently these two databases are not fully integrated and such interactive analyses cannot be undertaken.

The road database does not have spatial information on socio-economic or other spatial features. While the GIS database has the socio-economic features but they are not integrated with the road database. As a result, RPPM has some limitations in its mapping feature. Using the required information from the GIS database it can show a prioritised road on a map but cannot show the spatial features or socio-economic facilities along the road on the map. As a result, the map outputs are not very informative or interesting.

If overlays of the geographical features (for example, schools) are made over a map, the proximity of the features with respect to a road would be rather indicative than actual and could be also misleading, especially where roads are close to each other. Therefore, it was not possible for RPPM to show on a map the socio-economic features that were located along a road and contributed to priority score for the road. Once this integration problem can be resolved, RPPM has the potential to produce interesting and interactive outputs of interest to policy-makers.

It was realised that it would be much easier for decision makers to understand the priority of development of a road if RPPM could make interactive display of the location of facilities along a selected road on a map. By this it would also be possible to illustrate the spatial distribution of socio-economic features that contributed for determining priority score of a road.

An integrated database system has the potential of becoming a valuable resource for LGED as well as other government departments, for example, government departments related to primary and mass education, secondary education and health service. Once an integrated database is available, useful analyses are possible even from within the GIS platform without requiring a custom-made programme.

1.2. Objectives of the research study

The main purpose of this prototype illustration study is to customise RPPM to illustrate that the information in the road and GIS databases can be effectively used to make RPPM more useful and interesting to decision makers for the purpose of rural road development as well as use as a potential tool to undertake many useful interactive analyses for other development purposes.

The specific objectives of this study are to:

- show the spatial features of prioritised roads on a map generated by RPPM; and
- illustrate the usefulness of displaying spatial features on a map.

In order to meet the above objectives, the research team in consultation with LGED officials had to develop a procedure for the collection of data from the field with the help of staff of the local offices of LGED.

1.3. Scope of the report

The project team in consultation of the LGED officials developed and reviewed a procedure for the collection of required data from the field. After reviewing the work load in the field, it was decided that the prototype illustration model would be developed and implemented for one upazila from the pilot district Tangail. Mirzapur was the selected upazila for this purpose.

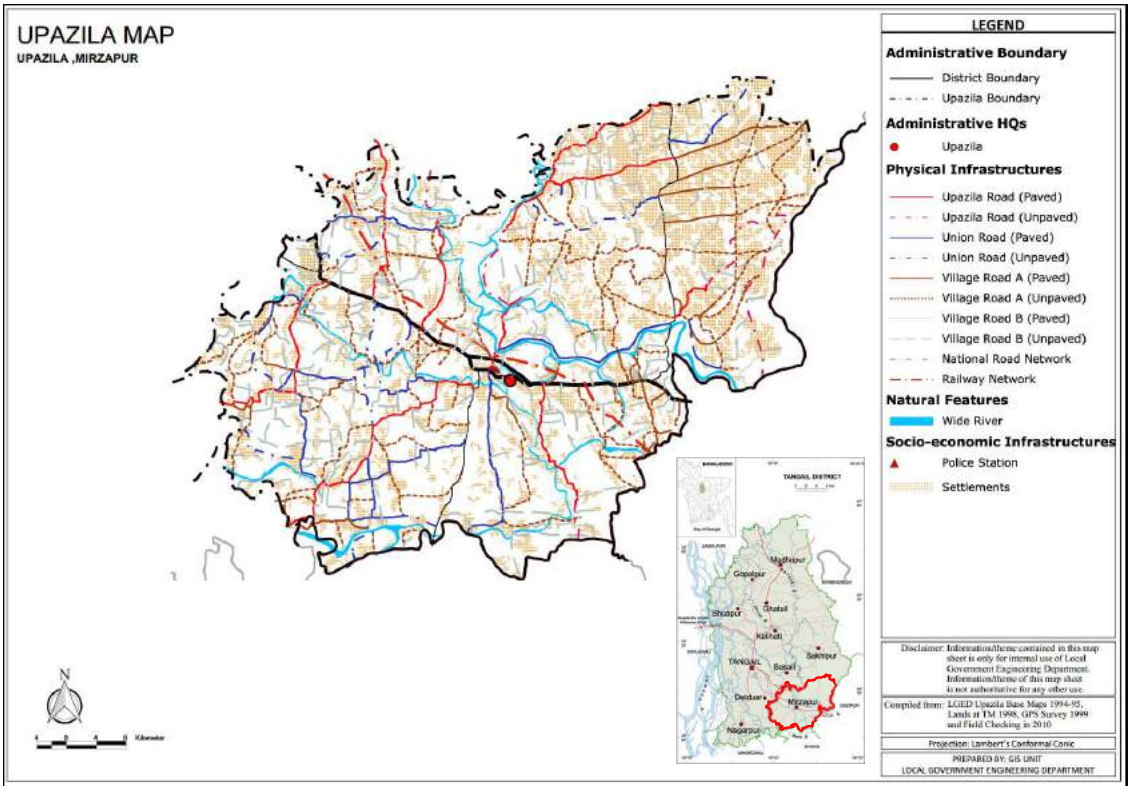
2 Data collection and updating of the GIS database for the prototype illustration model

2.1. Introduction

The existing road database of LGED provides the list of socio-economic facilities that are located in the proximity of a road. However, the spatial characteristics (i.e. location, and distance from the road) are not available. On the other hand, in the GIS database though spatial data of the features are available, it was not possible to link them with road database as no common field was available. Therefore, there was a need for collection of spatial data from the field to overcome this problem.

Mirzapur upazila is located in the south-east corner of Tangail upazila (Figure 2.1). The national highway (N4) passes through the upazila. There are 315 roads in Mirzapur upazila of which nine are upazila roads, 19 are union roads, 96 are Village Road Type A and the rest are Village Road Type B.

Figure 2.1: Mirzapur upazila in Tangail district



Source: Based on data generated by RPP

Given the constraints, it was found that it would not be possible to collect data for the selected features/structures for all the roads in Mirzapur. In consultation with LGED's officials at the Head Quarters and Mirzapur it was decided to collect data for 33 roads (Annex A). Three types of roads comprising nine upazila roads, 18 union roads, and six village roads of type A were considered. It was also decided that data would be collected for 14 types of socio-economic features/structures along these selected 33 roads. These were as listed below.

- Upazila Headquarters (UP HQ)
- Upazila Parishad Office (UP Office)
- Union Parishad Office (Un Office)
- Growth Centre (GC)
- Hat
- Bazar
- Government Primary School (GPS)
- High School
- Madrasa
- College
- Asryan project (a government rural housing scheme)
- Community Clinic (CC)
- Post Office (PO) and
- Family Welfare Centre (FWC).

2.2. Data Collection Procedure

The GIS unit of LGED unit prepared base maps for the selected roads (Figure B1, Annex B). Concurrently a spreadsheet template (Figure B2, Annex B) was developed to collect data of socio-economic facilities corresponding to the road. The map and the spreadsheet template were sent to the Upazila Engineer. The Upazila Engineer with his staff identified and matched different socio-economic structures in site for each road. They provided unique ID number, name and category for each socio-economic structure and also identified the road number of the connecting road for the facility. The collected data were input in a spreadsheet using the template.

The unique id numbers with the location of the facilities were put into the base map of the road. Once the tasks were completed, the Upazila Engineer sent the documents to the project team for further processing. A completed spreadsheet and base map for a road are provided in Annex B (Figure B3 and Figure B4).

2.3. Updating of the GIS database with the collected information

Upon receiving the data from field, the data were compiled and attribute files of the different socio-economic structures were updated in the GIS database. In addition, three new columns were added to the attribute file. These three columns represented the unique id of the socio-economic facilities, and the id and names of their adjoining roads. Finally, the updated GIS database was linked to the road database and RPPM.

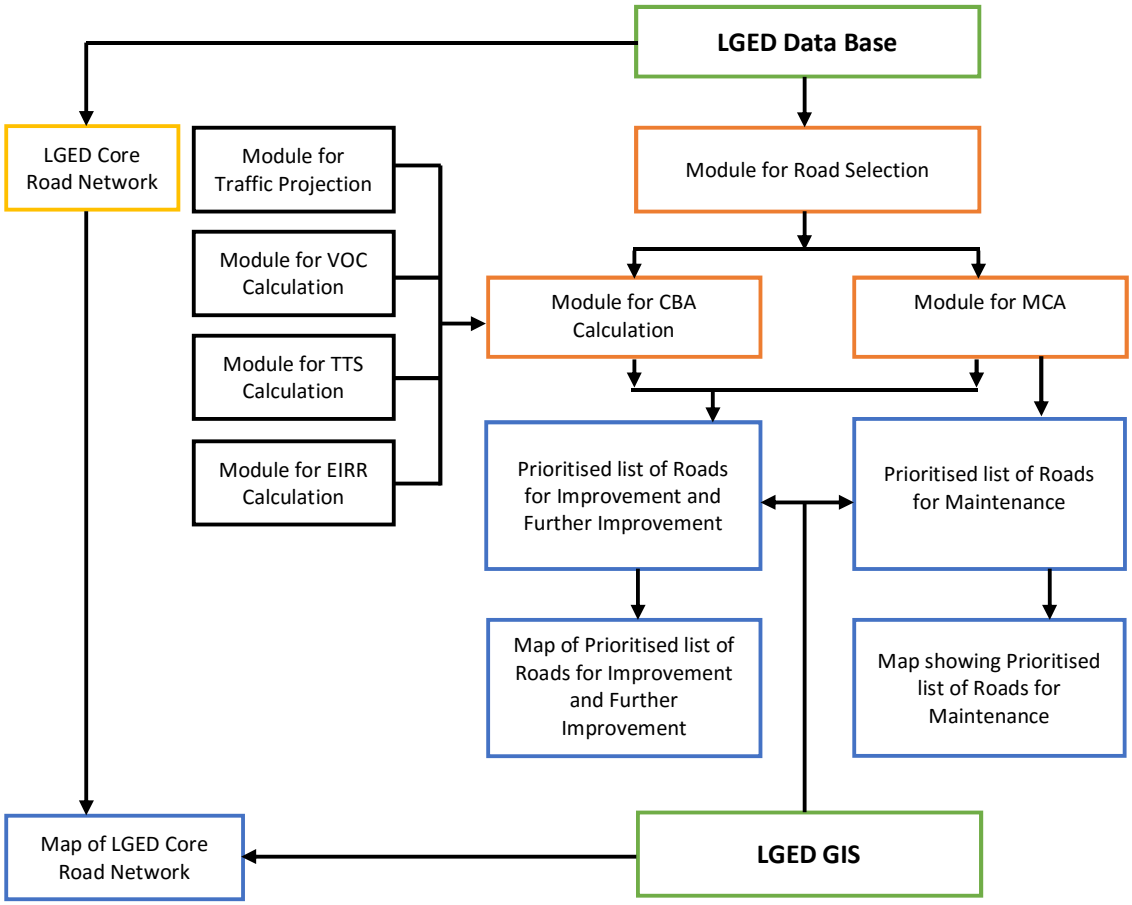
3 RPPM and prototype mapping illustration model

3.1. Schematic structure of RPPM and prototype illustration model

RPPM consists of three different subsystems. Figure 3.1 shows the schematic structure of RPPM showing the functional relationship of the three subsystems. It does not show the actual flow of data, however. One of the three sub-systems generates the core road network. Three interconnected modules form the second sub-system which uses the appraisal models for this study (Multi Criteria Analysis and Cost Benefit Analysis) to produce the prioritisation lists of roads for improvement, further improvement and maintenance. The third sub-system is the output subsystem which shows the results in the required format. The first two sub-systems work in the back end of the RPPM software and are not visible to the user.

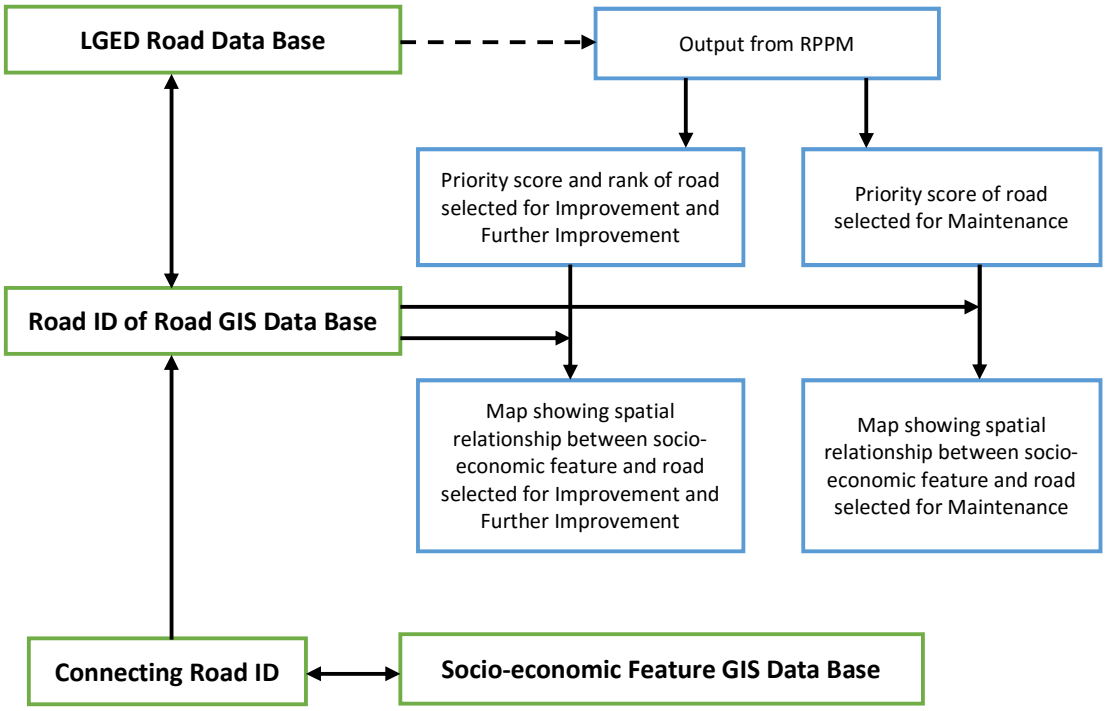
The sub-systems (other than sub-systems for output) use data from different tables of the road database. Using the data from the database, it determines the eligibility of roads in the database for different types of development (improvement, further improvement and maintenance), as well as if a particular road can be considered to be a part of the core network. Later, RPPM determines the priority ranking of each road by considering the results of CBA and MCA analyses. The output module integrates the GIS database with the results generated by the subsystems. In RPPM the integration with GIS is done only for road feature. As explained earlier, for other spatial features the integration is not possible due to absence of compatible data.

Figure 3.1: Schematic structure of RPPM



For interactive mapping, attempts were made to integrate the spatial data in the GIS database with the road database. Figure 3.2 provides the schematic diagram of the prototype mapping illustration model. The developed prototype illustration model in RPPM produces interactive mapping outputs showing socio-economic facilities along a selecting road by using the tabular outputs generated by RPPM as shown in Figure 3.1.

Figure 3.2: Schematic structure of prototype illustration feature of RPPM



3.2. Outputs of prototype mapping illustration tool

As already mentioned, RPPM is a web-based application embedded in the GIS web portal of LGED as a tool for planning and prioritisation of rural roads. To use the application one must have access to RPPM from the GIS web portal of LGED.

Figure 3.3 shows the home page of the portal. There are three modules of which two (Maps and Road Priority) are applicable to RPPM. In the Road Priority module, a user can see outputs in tabular format and in the Map module the outputs can be viewed on a map. The prototype illustration capability of RPPM to show socio-economic facilities along a road has been designed and implemented as part of the Map module. Once a user is in the Map module the output of the prototype illustration can be viewed by selecting RPPM from the bottom of the window (Figure 3.4).

As the illustration tool has been developed as a prototype, currently it works only for the selected roads of Mirzapur Upazila. Once the additional information are made available in the database for other roads, RPPM would be able to show socio-economic facilities along other roads.

Figure 3.3: Home window of RPPM

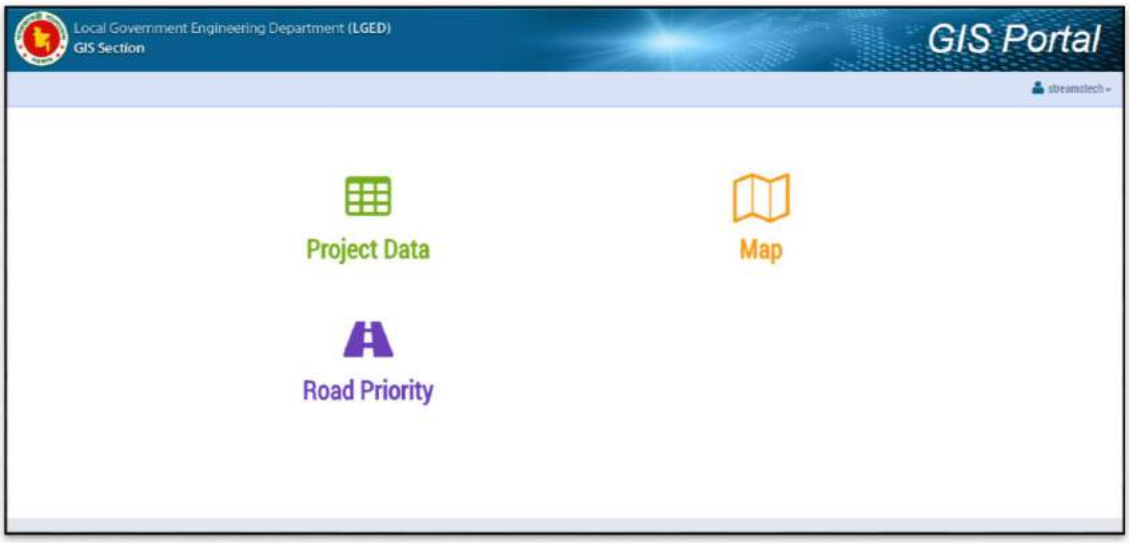
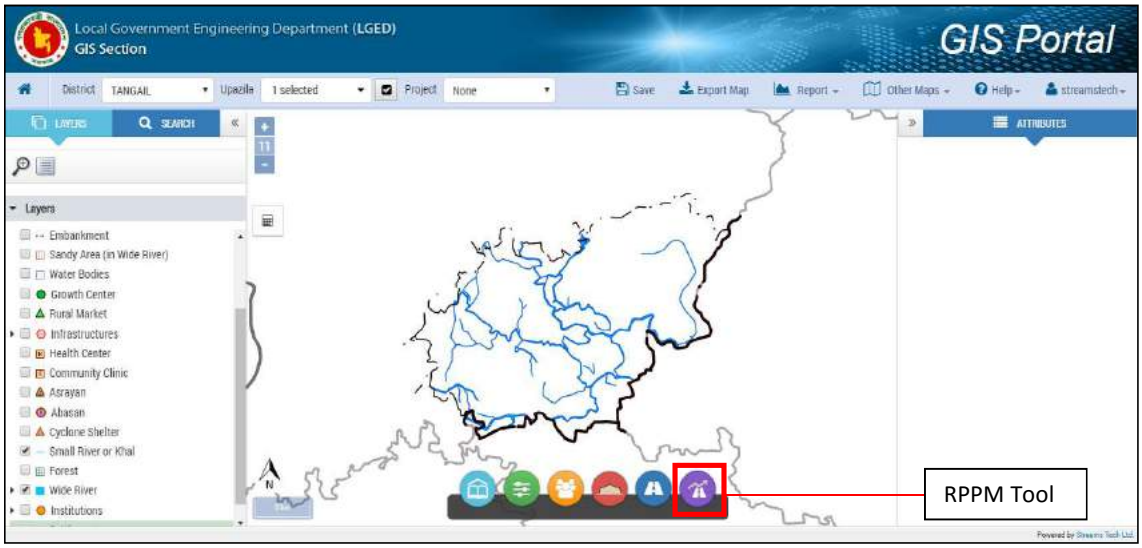


Figure 3.4: Home window of the map module



The selection of RPPM tool (Marked red in Figure 3.4, above) would lead the user to choose any of the development options available as shown in Table 3.1 for which RPPM can generate result. By choosing any of the options (as shown in Figure 3.5) other than “none” would generate map for the particular type of development for the selected geographic unit (Figure 3.6). The “none” option is used to deselect an option selected. The selection of “core network” will display core road network of the geographic unit. It may be mentioned here that a geographic unit can be an upazila or all upazilas of a district.

Table 3.1: Development options for which RPPM generates results

Development Type	Surface Type
Improvement	Low traffic volume earth road
	High traffic volume earth roads
	Partially paved
	Fully HBB
Maintenance	Partially paved
	Fully HBB
	Fully paved
Further Improvement/upgrading	Fully paved (Fully BC/RCC, or HBB + BC/RCC)

Figure 3.5: Map display options of RPPM

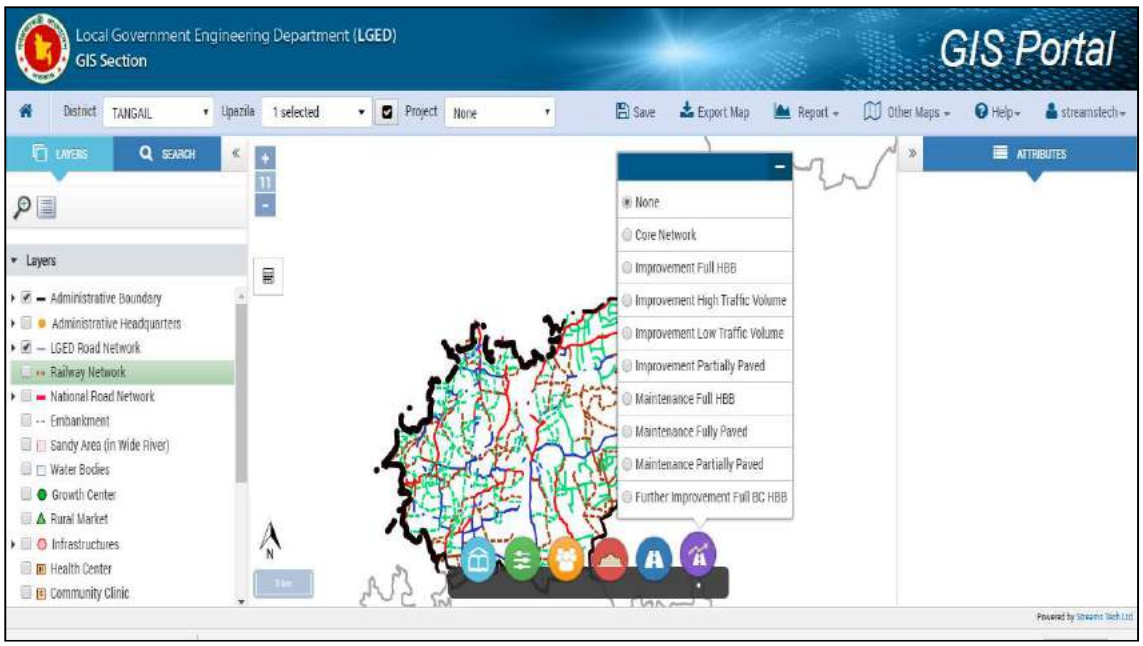
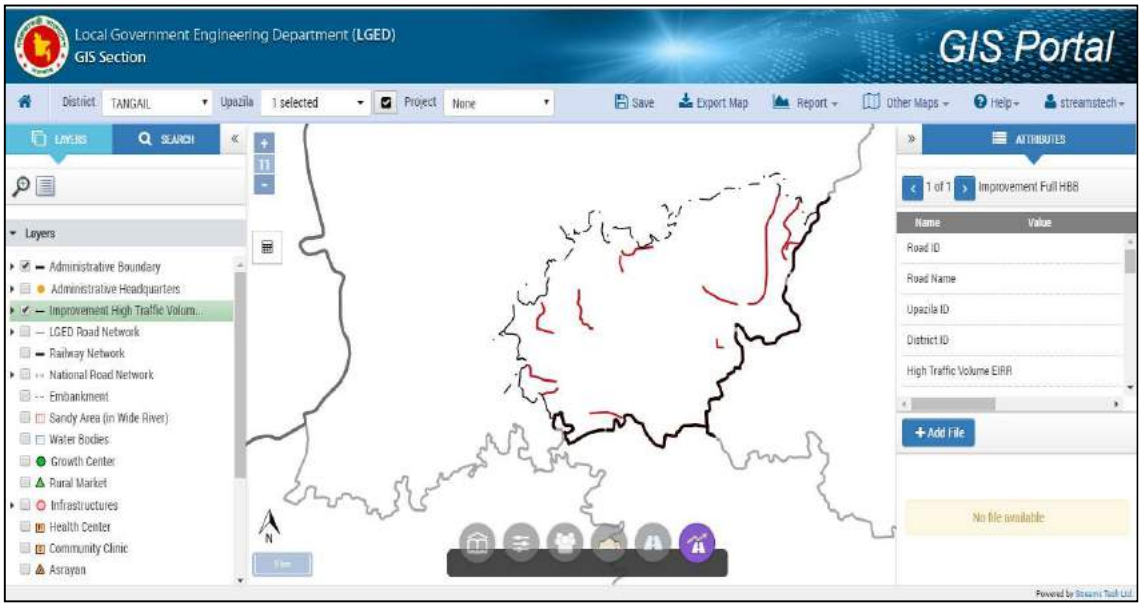
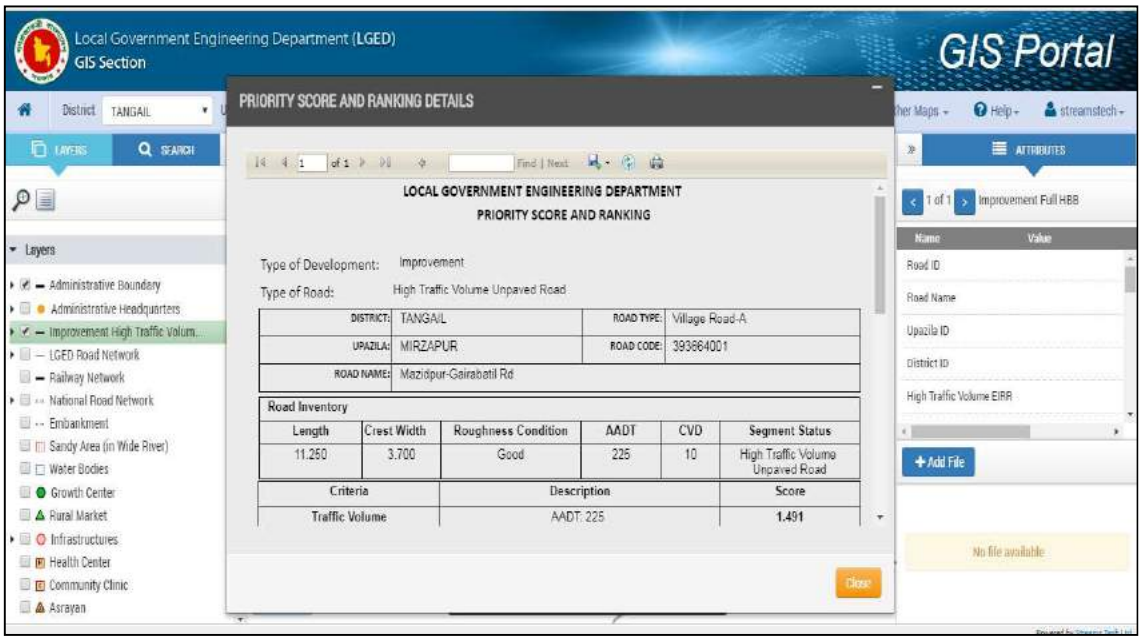


Figure 3.6: Sample of map generated for a particular type of road development



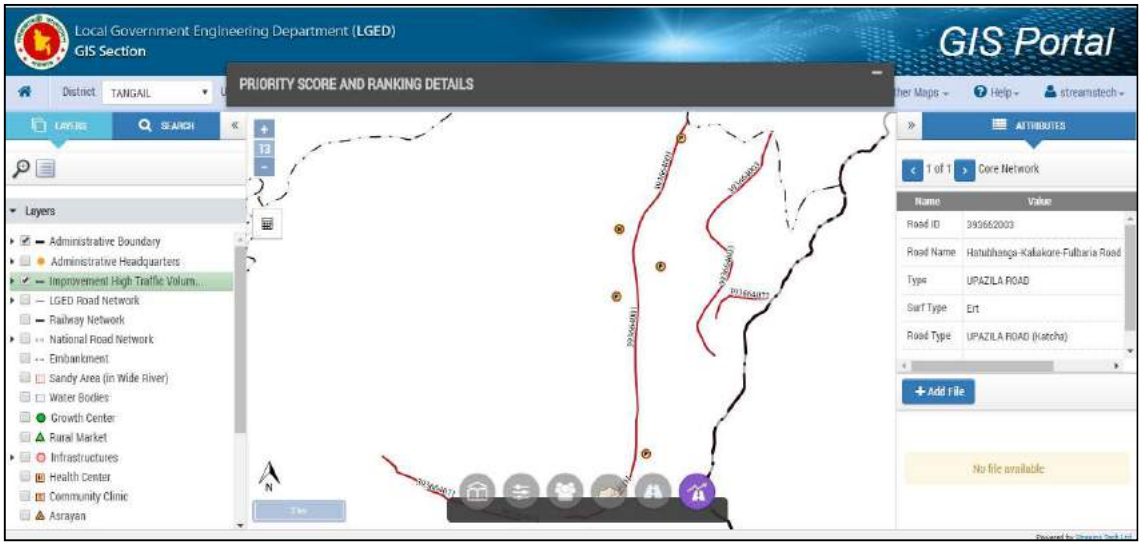
A user can also see scores and ranking of any road selected for any type of development in RPPM. If a user selects a particular road, it would provide a complete description of priority scores and ranking in a pop-up window (Figure 3.7). However, RPPM cannot provide the geographic location of the socio-economic facilities based on which the score and the subsequent ranking was generated.

Figure 3.7: Prototype illustration of road with socio-economic features



However, if any of the roads considered for prototype illustration is selected, the report would be displayed as a pop up (Figure 3.7) and the map would be displayed behind the pop up report. Once the report is minimized, the viewing window would show the socio-economic features that were considered for calculating the priority score and ranking for the road (Figure 3.8). Mapping illustrations for few other roads are shown in Annex C.

Figure 3.8: Prototype illustration of Road no. 393664001 of Mirzapur upazila, Tangail



3.3. Conclusion

For developing the prototype illustration model, the GIS database of Mirzapur Upazila was edited and the database structure was changed. The links between the road database and GIS database of Mirzapur had to be developed manually. In future, during the next update of any of the two databases (GIS or road database), these links are to be maintained. If these links are lost in the updating process, the prototype illustration model will not work any longer. Therefore, those links need to be maintained.

The prototype illustration model could not be run successfully for all the roads for which data were collected from the field. This was due to mismatch of information collected from the field and the corresponding information in the GIS database. The location of some of the facilities in the field did not match the location of those features printed in the base map. This problem may need further investigation to understand the extent of the problem and to consider its solution.

4. Concluding remarks

The prototype illustration model to show the spatial features of a road has been successfully run. However, the model could not be run successfully for all the roads for which data were collected from the field. This was due to mismatch of information collected from the field and the corresponding information in the GIS database. The location of some of the facilities in the field did not match the location of those features printed in the base map.

It is understood that the software development and database developments are continuous processes and there would be always scope for improvement. It is recommended that before considering country-wide implementation of RPPM including the prototype illustration model, a review of the data collection and updating processes of the databases and the structure of the current GIS database may be made.

For the present prototype illustration model exercise, information on 14 spatial features were collected from the field. For any future data collection, the inclusion of spatial information on two more items namely, location of bridges and culverts on a road may also be considered. This would help managing the road structures and drainage issues better in the future.

Annex A: Particulars of 33 roads considered for prototype illustration

Table A.1: List of roads considered for prototype illustration

S.N.	Road Name	Road ID	Road Type	Priority ranking In corresponding intervention (and surface type) category, from RPPM				
				Improvement			Maintenance	Further Improvement
				Low traffic	High traffic	Paved	Paved	Paved
1	Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	Upazila Road					1
2	Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002						
3	Hatubhanga-Kaliakore-Fulbaria Road via Khatar Hat road.	393662003				2		
4	Kurni-Fatepur Kanchanpur Road	393662004				8		
5	Deohata Dhantara G C road	393662005				1	1	
6	Mirzapur Patharghata Takterchala road	393662006				3		
7	Kadim Dhalla RHD-Sawali bazar to Adabari at Natiapara NHW-Kanchanpur GC UZR	393662007						
8	Gorai Shakhipur RHD(Start from Pakua Busstand)-Kanchapur GC via Patharghata bazar Road	393662008						
9	Mirzapur GC (Tre Mohan Kheya ghat) - Hatubanga GC road via Latifpur UPC	393662009				14		
10	Mirzapur HQ Haria bazar via Kamarpara Bazar Road	393663001	Union Road			13		
11	Kaitala bazar-Hatia UP (Shakhipur Upazila) road	393663002				9		
12	Mahera UP-Chowali bazar-Fatepur UP Road	393663003						
13	Jamurki GC-Mahera UP Road	393663004				19		
14	Bhabkhanda Bazar-Khagutia bazar Anaitola UP Road	393663005				28		
15	Anaitara UP to Fatehpur Bazar	393663007			2			
16	Subullah Barati bazar Banail UP road	393663008				12		

S.N.	Road Name	Road ID	Road Type	Priority ranking In corresponding intervention (and surface type) category, from RPPM				
				Improvement			Maintenance	Further Improvement
				Low traffic	High traffic	Paved	Paved	Paved
17	Bhatgram Union Parishad to Boratia Hat Road	393663009						
18	Patharghata Bazar-Tarafpur UP Bhabon Road	393663010		6				
19	Bashtail U.P-Tarafpur U.P road	393663011				16		
20	Zamurki G C (Gurutia)-Mazalia-Banail UP (Kuraliapara Bazar) road	393663012				22		
21	Kadim Dhalla RHD-Barati bazar-Nagar bhatgram bazar-Warshi UP road (upto dhamrai border)	393663014				15		
22	Warshi R&H road to Warshi UP road	393663015			1			
23	Azgana UP (Hatubanga GC) - Kuripara road	393663016				6		
24	Nagar Bhatgram Bazar-Warshi UP road.	393663017				10		
25	Zamurki GC-Gunutia - Fazilhati UP via Majhalia bazar road.	393663018		30				
26	Shohagpara RHD - Araigonj UP road	393663019				11	2	
27	Moyshamora High School to Ngaroara Bazar Road	393663020				25		
28	Mazidpur-Gairabatil Rd	393664001	Village Road A		6			
29	Rashid Deohata-Bangshai River	393664002						
30	Auvirampur-Khatiarhat Rd	393664003			5			
31	Shatiachura-Chukuria Rd	393664004				33		
32	Thalpara-Karail Rd	393664005				17		
33	Gollibazar-Majhalia Rd	393664006			2			

Table A.2: Number and type of socio-economic features for selected roads

S.N.	Road ID	Upa-zila HQ	Up. Parishad Office	Union office	Growth centre	Govt. primary school	Mad-rasa	High school	Coll-ege	Asra-yan	Bazar	Hat	Com-munity clinic	Family Welfare Centre	Post office	Total
1	393662001		1		1	3	1	2			4		1			13
2	393662002		1			5		1			5		2			14
3	393662003		1			4		2			4		2		1	14
4	393662004		1			4		2			3			1		11
5	393662005		1			8					2		1			12
6	393662006					5	1	1				1	3	2	1	14
7	393662007					5	1	2			1		1	1	1	12
8	393662008					1	1	1			1				1	5
9	393662009		1		1	5		1			1		2			11
10	393663001	1			1	3		2	2		2		2		2	15
11	393663002											1	3	1		5
12	393663003		2			4		3			1			1	1	12
13	393663004					2		1			1			2	1	7
14	393663005		1			3					1	1	1			7
15	393663007		1			3	1	1				2	1	1	1	11
16	393663008		1			4	1	1				2	1	1	3	14
17	393663009		0			2		1					1		1	5
18	393663010		1			0	1	1								3
19	393663011		2			2	1	1	1	1	1					9
20	393663012		1			6		1			1		1		1	11
21	393663014					1									1	2
22	393663015		1			3					1		2	1		8
23	393663016			1		2		1			1		1			6
24	393663017					2					1		1	1		5
25	393663018					4		1			2					7
26	393663019					4		1					1	1		7

27	393663020		1			2		1				1	1			6
28	393664001					3		1								5
29	393664002		1		1	3		1								6
30	393664003					2						1				3
31	393664004		1			2										3
32	393664005					1						1	1			3
33	393664006					3		1								4

Annex B: Particulars of 33 roads considered for prototype illustration

Figure B1: Sample base map of selected roads

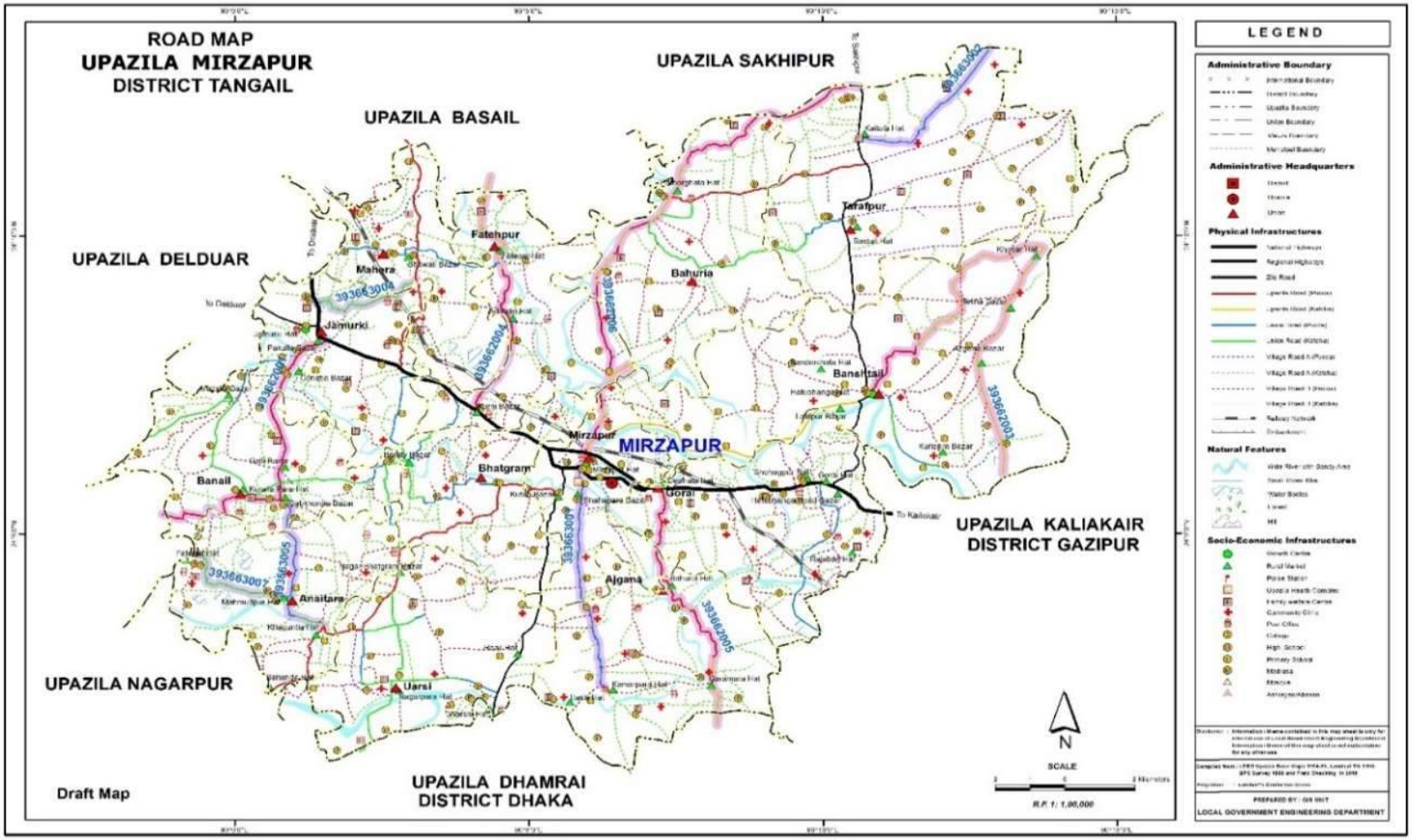


Figure B2: Spreadsheet template for data collection

SI No	Road Name	Road ID	Map Identifier	Social Infrastructure Name	Type of Structure
1	Mirzapur HQ Haria bazar via Kamarpara Bazar road	393663001	1	ABC Primary School	Primary School
2	Mirzapur HQ Haria bazar via Kamarpara Bazar road	393663001	2	DEF Primary School	Primary School
3	Mirzapur HQ Haria bazar via Kamarpara Bazar road	393663001	3	XYZ Hospital	Hospital
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
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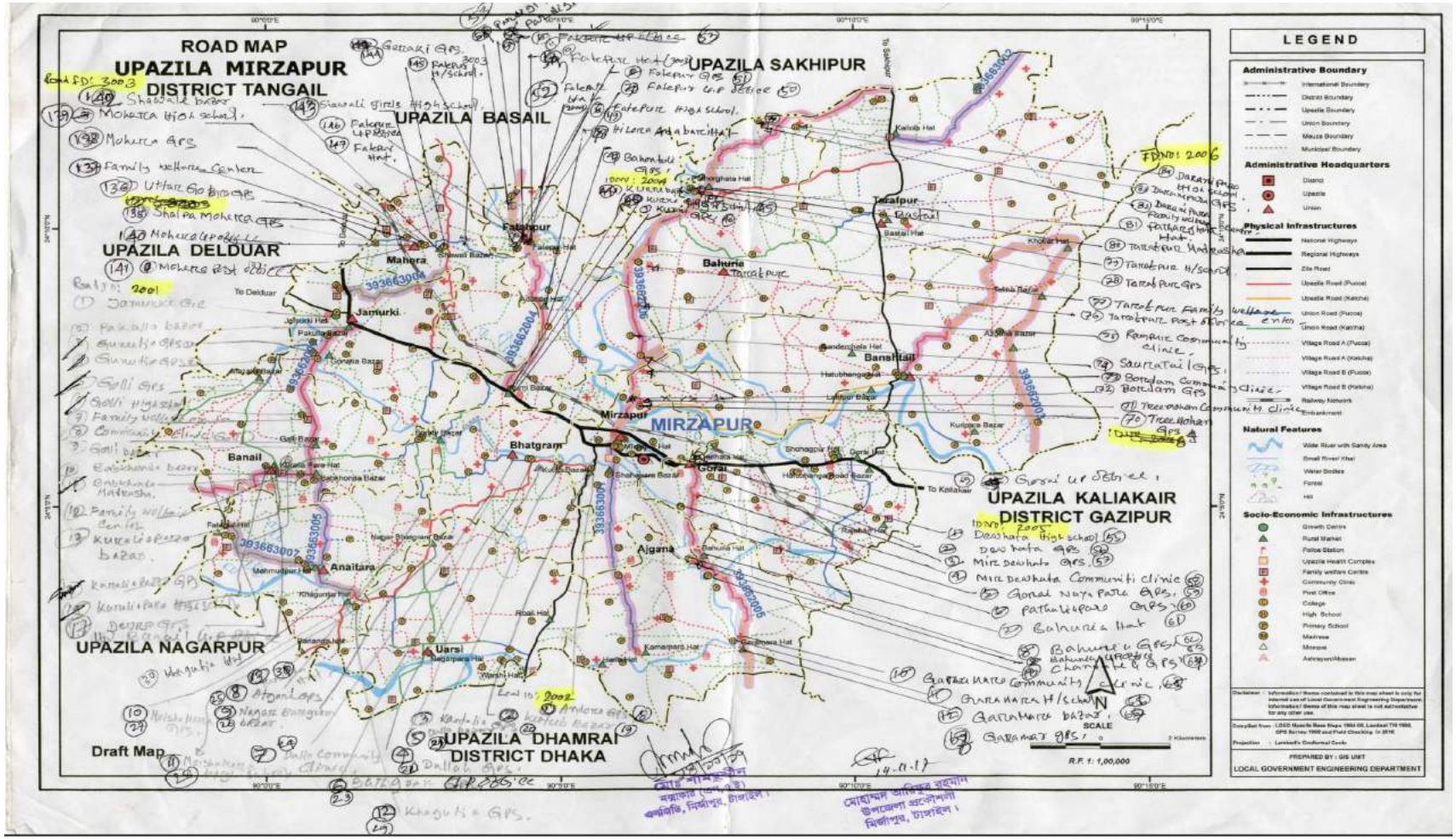
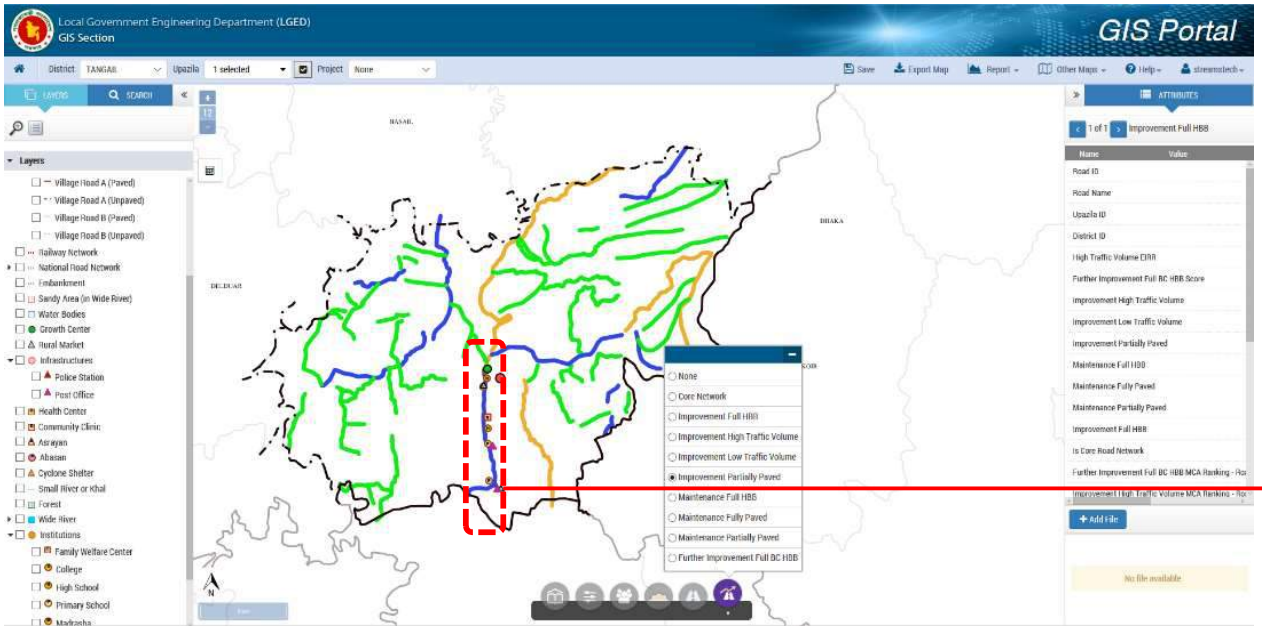
Figure B3: Sample of filled up spreadsheet

	A	B	C	D	E	F	G	H
1	**SI No**	**Road Name**	**Road ID**	**Map Identifier**	**Social Infrastructure Name**	**Type of Structure**		
2	1	Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	1	Jamurki Gc	GC		
3	2	Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	2	Pakulla Bazar	Bazar		
4	3	Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	3	Gunotia GPS-1	Primary school		
5		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	4	Gunotia GPS-1	Primary school		
6		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	5	Golli GPS	Primary school		
7		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	6	Golli High School	High school		
8		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	7	Family welfare center	Communiti Clinic		
9		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	8	Golli Communiti Clinic	Communiti Clinic		
10		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	9	Golli bazar	Bazar		
11		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	10	Babkhonda bazar	Bazar		
12		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	11	Babkhonda Madrasha	Madrasha		
13		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	12	Family welfare center	Communiti Clinic		
14		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	13	Kuraliapara bazar	Bazar		
15		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	14	Kuraliapara GPS	Primary school		
16		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	15	Khuraliapara High school	High school		
17		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	16	Banail UP Office	UP Office		
18		Pakulla-Lawhati Road Via Bhabkhanda Bazar	393662001	17	Dewra GPS	Communiti Clinic		
19		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	18	Andora GPS	Communiti Clinic		
20		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	19	Kutub bazar	Bazar		
21		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	20	Kantalia GPS	Primary school		
22		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	21	Dulla GPS	Primary school		
23		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	22	Dullah Bazar	Bazar		
24		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	23	Bathgram UP office	UP Office		
25		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	24	Dulla Community Clinic	Communiti Clinic		
26		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	25	Atghori GPS	Primary school		
27		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	26	Nagar Bathgram bazar	**Bazar**		
28		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	27	Moishamara GPS	Primary school		
29		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	28	Moishamara High School	High School		
30		Mirzapur-Pakutia GC (Nagarpur Upazila) road	393662002	29	Khagutia GPS	Primary school		

Figure B4: Sample of updated data

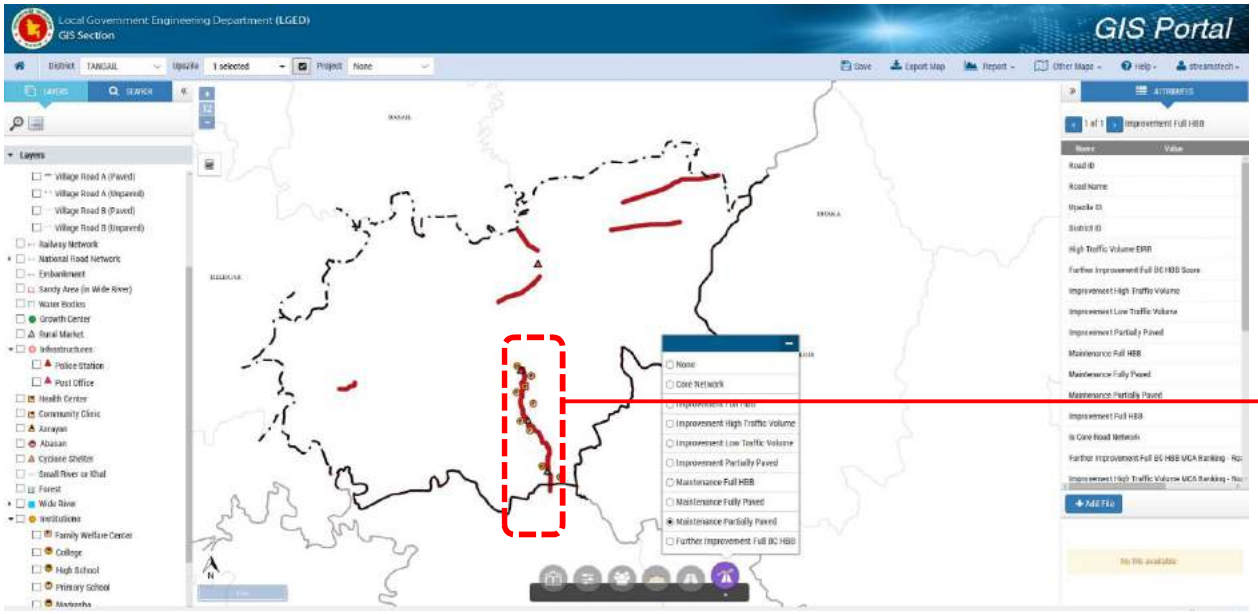


Annex C: Mapping illustrations



Legend

- Primary School
- High School
- College
- Upazila Head Quarter
- Growth Center
- Community Clinic
- Rural Market
- Post Office
- Union Head Quarter



Legend

- Primary School
- High School
- College
- Upazila Head Quarter
- Growth Center
- Community Clinic
- Rural Market
- Post Office
- Union Head Quarter