Terms of Reference for
"GIS Phase-1: Needs Assessment for Implementation of GIS Infrastructure in the Urban Resilience Project"

1. Background:

The population of Greater Dhaka Area exceeds 15 million with an immense population density of 43,500 per square km. With the steep urbanization in Dhaka, the city has become exposed to greater risks of natural disaster and climate change. The common threats are earthquake, urban flood, air and water pollution, temperature and heat waves, and fire explosion. Climate change risk evokes that one meter sea level rise will impact thirty percent of the urban population and have the city inundated around fourteen percent (ADB 2014). In addition to these risks, the Rana Plaza accident that resulted in the loss of 1,127 lives in 2013 demonstrated an urgent need for developing urban resilience and building safety in Dhaka. Similarly, Sylhet, which is vulnerable to earthquake, requires adequate preparedness for successful management of urban disasters.

The Urban Resilience Project (URP) was started in 2015 with support from the World Bank to strengthen the emergency response system and develop the capacity of the city corporations of Dhaka and Sylhet. The URP will serve as a new model to build capacity for emergency preparedness and response for both recurrent and large-scale events, as well as establish the best practices in disaster-prone urban environments. The URP includes a component to develop Geographic Information System (GIS) capabilities of the key agencies that include the Department of Disaster Management, Fire Service and Civil Defense (FSCD), the Dhaka North City Corporation (DNCC), the Dhaka South City Corporation (DSCC) and the Sylhet City Corporation (SCC) in relation to disaster management, especially utilizing a web-based GIS tools and services. The current GIS capabilities of these organizations are either non-existent or very limited. Some of these organizations have developed GIS data in the past, but could not continuously or periodically update the data. It is necessary that these organizations have the hardware, software and human resources to develop and maintain the data and access to a web-based system to share data with other organizations. Each of these organizations works with a number of other agencies or stakeholders (e.g. water, gas and power utilities) to reinforce the country's emergency management response capacity. A web-based system must allow emergency personnel as well as other stakeholders to access special tools and GIS data for planning and executing emergency management tasks.

Under the URP each key organization will be equipped with a functional Geographic Information System (GIS) unit to strengthen its disaster risk management capabilities by providing necessary hardware, software, staff training and GIS based analytical tools and technologies. Since the present status of GIS infrastructure, including system capacity, characteristics, quality and volume of spatial data, and available GIS tools and technologies of key agencies and related stakeholders are unknown, a comprehensive needs assessment study of the organizational GIS setup and probable applications of GIS in establishing an Emergency Management System (EMS) is required to understand and evaluate the GIS strength of all stakeholders and formulate an action plan.

The URP seeks to hire an eligible consulting firm which can perform the needs assessment and provide necessary recommendations on setting up or enhancing GIS cells in the key organizations.

2. Objective(s) of the Assignment:

The primary objective of the needs assessment is to understand the present organizational GIS capacity of all agencies and key stakeholders involved in the URP project, and formulate an effective work plan to develop or enhance GIS capacities of the agencies, how the information can be used in the EMS and prepare software requirement specifications (SRS) for GIS based tools.

3. Scope of Services:

The expected duration of the assignment is four (4) months commencing from the date of the execution of the contract. The consultant's scope of services during this period shall include, but not limited to:

3.1. Inspect present status of the organizational GIS setup of each organization

The consultant shall communicate with and visit all key agencies and stakeholders in the URP project, and inspect their organizational GIS structure in detail. Information to be collected should include the organogram of the GIS cell, human resources, hardware and software, GIS project history, GIS functions of the organizations, and GIS data inventory. A comprehensive questionnaire may be developed in support for this inspection. In addition to the key agencies mentioned above a list of other stakeholders are as follows but not limited to these (WASA, Titas, DESCO, Rajuk etc).

3.2. Assess spatial data

The consultant shall make a detailed assessment of existing GIS data from every key agency and stakeholder organization in the URP project. This assessment should include the characteristics, extent and quality of GIS data, relevance to the URP project, suitability of data for use in emergency decision support, and data gaps or missing information. The key agencies and stakeholder organizations are expected to support the consultant in data compilation. Disaster related spatial information of all agencies will be used on GeoDASH or other national data sharing web-based platform as specified in the project DPP.

3.3. Identify needs for the establishment of a GIS based Emergency Management System

The consultant shall prepare a summary of the needs for establishing a GIS based EMS based on the assessment of GIS data and organizational GIS setup. Critical system information, data gaps and anomalies, and required physical infrastructure need to be identified in the need analysis. According to the provision of the DPP, the GIS technology, including hardware and software, should support and enable the use of web-based map sharing platform. The needs assessment should describe suitability of existing GIS information for use with web-based (GeoDASH) and development of web-based (GeoDASH) or other national data sharing web-based platform for emergency management.

3.4. Identify major challenges and constraints associated with stakeholder GIS data

During disaster response or preparedness, the key agencies and stakeholder organizations will simultaneously use GIS data from multiple organizations. Use of these data on GeoDASH or other national data sharing web-based platform and development of specific GIS tools, therefore, may require specific configuration and standards. The consultant shall identify these challenges and issues with agencies' GIS data, if any. In addition, the consultant should

also come up with effective recommendations on how to overcome those hurdles during the use of GIS data from different agencies. Sample field verification of GIS data will be done under the assignment to assess the data quality and accuracy.

3.5. Provide basic GIS and GeoDASH (or other national data sharing web-based platform) trainings to bring key agencies up to speed

Since some key agencies involved in emergency management currently lack any GIS capabilities, it is imperative that the staff of these organizations be given some basic trainings on GIS and GeoDASH to be able to relate how GIS can significantly enhance their abilities in planning for disaster management and during emergency operations. Two to three full day hands-on training sessions with appropriate examples and brief lectures on GIS concepts will prepare the staff for the successful implementation of GIS and building capabilities in the next phase of the project. These training sessions will cover both Web-based GIS (GeoDASH) and desktop GIS (e.g. QGIS) and include beginner and intermediate level GIS material. The training sessions will at the minimum address the following topics:

i. GIS fundamentals
ii. Viewing GIS from an end user perspective with examples
iii. Hands-on sessions using live data in GeoDASH or other national data sharing web-based platform
iv. Basic data capturing through GeoDASH or other national data sharing web-based platform
v. Create polygon/poly-line in ArcGIS or QGIS and prepare GIS data layers
vi. Upload data to GeoDASH or other national data sharing web-based platform

3.6. Develop software requirement specification (SRS) for a set of emergency management tools

The URP has identified a number of potential GeoDASH or other national data sharing web-based platform to enhance the emergency management capabilities of key agencies. These tools will perform the following tasks:

i. An App for Geo Referenced Data Collection and Management
ii. Evacuation Route Planning and Mapping
iii. Equipment Inventory Distribution, Tracking and Monitoring
iv. Utility Network Mapping and Monitoring
v. Disaster Progression Mapping (Simulation software)
vi. Damage Assessment and UDRI (Urban Disaster Resilience Index) Mapping
vii. Spatial Query and Decision Support

The consultant team will develop the software requirement specification (SRS) of these tools based on input from the URP team. The SRS will describe the full functionality of the tools and related GIS data requirements. The consultant team will also assess the suitability of existing GIS information, analyze the current analytical and visualization capabilities of GeoDASH or other national data sharing web-based platform to support the needs of the specific tools and evaluate the scalability of GeoDASH or other national data sharing web-based platform to be used for emergency management.

3.7. Identify the needs for setting up a GIS Cell in each key agency

Under the URP a GIS Cell will be established in each key agency for managing spatial data related to disaster management. The consultant shall identify the needs and requirements for setting up the GIS Cell and develop a roadmap for its implementation.

The needs assessment study should accomplish above objectives with specific recommendations on how key agencies can effectively utilize the GIS data from other agencies and stakeholder organizations in emergency planning and response.

4. Expected Deliverables:

Primary deliverables of this assignment include:

4.1. A detailed reports on the outcomes of the needs assessment (as described in Section-6)

4.2. Conduct Workshop/ training sessions on GIS and use of GeoDASH or other national data sharing web-based platform with necessary handouts and presentation materials as outlined in the Scope of Services item no. 3.5.

4.3. All primary and secondary data collected during the assessment.

5. Team Composition & Qualification Requirements for the Key Experts:

The expected duration of the assignment is four (4) months commencing from the date of the execution of the contract, and about twenty two (22) man-months input from the key experts is estimated to successfully achieve the project objectives. A list of key experts for team composition and their qualification requirements are given below.

5.1. Key Experts with Input Requirements for the Project

SI. No.	Proposed Position for the Key Experts	Proposed Number of Experts for the Position	Estimated Input Man-months Required by Each Expert	Estimated Total Input Man-months Required
1	Team Leader	1	4.0	4.0
2	Emergency Management System (EMS) Specialist	2	4.0	8.0
3	Solution Architect	1	4.0	4.0
4	Software Requirement Specifications (SRS) Specialist	1	4.0	4.0
5	GIS Specialist	2	4.0	8.0
Total		**7**		**28.0**

5.2. Qualification Requirements and Responsibilities for the Key Experts

SI. No.	Proposed Position for the Key Experts	Education Requirements	Experience Requirements	Responsibilities Assigned in the Project
1	Team Leader	Minimum Masters in Engineering/ Urban Planning/ Disaster Management or related disciplines.	• Minimum 15 years of professional experience in disaster management or engineering discipline or urban planning. • Demonstrated experience on working with GIS/spatial technologies and leading the development of GIS-based software projects. • In-depth knowledge and expertise on GIS based assets and database management system, emergency management system, and application of geospatial technologies in urban resilience.	• Lead the team to achieve the ultimate objectives of the assignments. Ensure the quality of services and comply to the full requirements of the contract. • Successfully execute the assignment in due time. • Planned distribute tasks among the other key staffs. • Coordinate works in team, with the client and associated all stakeholders of DNCC as well as with other involved executing agencies under the URP project. • Maintain regular communication with the client and ensure deliverables on time. • Utilize experience and expertise in successfully carrying out required surveys, acquiring essential information for the need assessment, assessing project objectives and needs, and ensuring capacity building for urban resilience. • Manage the workshop/training program. • Prepare all sorts of reports including the need assessment report. • Any other responsibilities as required to fulfill the objectives of the assignments.
2	EMS Specialist	Minimum Graduate in Engineering Urban Planning/ Disaster Management or related disciplines	• Minimum 10 years of professional experience in engineering or IT discipline in context to development of emergency management systems for urban areas. • Demonstrated experience on hardware and software infrastructure planning, development and	• Work in the team to perform activities and assist the Team Leader in executing need assessment activities. • Perform necessary technical analysis for establishment of a GIS based EMS, integration and collaboration framework for the involved stakeholders during disaster response, major challenges with present GIS capacity of

SI. No.	Proposed Position for the Key Experts	Education Requirements	Experience Requirements	Responsibilities Assigned in the Project
			maintenance related to asset management and business operations. • In-depth knowledge and expertise on GIS based asset and database management system, emergency management system, and application of geospatial technologies in urban resilience. • Expertise in planning and development of institutional capacity building in terms of human resources, infrastructure, training and operations.	individual agency, and planning of an efficient GIS infrastructure for DNCC. • Provide necessary input to the development of a robust SRS for the GIS based system. • Conduct field visit to assess GIS capacity of all agencies associated with the resilience program. • Participate in project meeting and coordinate training program. • Assist the Team Leader in preparation of the need assessment report. • Any other responsibilities as required to fulfill the objectives of the assignments.
3	Solution Architect	Minimum Graduate in Computer Science and Engineering or IT related disciplines	• Minimum 5 years of professional experience in software development or IT solution projects. • Demonstrated experience on development and implementation of GIS based solutions to infrastructure industries and database management. • In-depth knowledge and expertise on GIS based asset and database management system, emergency management system, and application of geospatial technologies in urban resilience. • Profound knowledge on development and use of the GeoDASH application or similar open source geospatial solutions in context to disaster management.	• Work in the team to design and develop a complete solution architecture for the GIS based system for urban resilience utilizing the present GeoDASH application. • Process and manage project data in a geospatial database and develop essential decision support tools. • Assist the Team Leader and the EMS Specialist with the need assessment study and necessary technological issues. • Assist in developing SRS for the system. • Design and develop asset database management framework for the URP. • Evaluate the present GIS application e.g. GeoDASH and assess its features and tools for use in the URP project. • Any other responsibilities as required to fulfill the objectives of the assignments.

SI. No.	Proposed Position for the Key Experts	Education Requirements	Experience Requirements	Responsibilities Assigned in the Project
			• Expertise in planning and development of complete solution architecture for a robust GIS database system for use in urban resilience.	
4	SRS Specialist	Minimum Graduate in Computer Science and Engineering or IT related disciplines	• Minimum 5 years of professional experience in software development or IT solution projects. • Demonstrated experience in preparation of SRS for small to large scale enterprise solutions. • In-depth knowledge and expertise on desktop- and web-GIS applications and their SRS. • Profound knowledge on development and use of the GeoDASH application or similar open source geospatial solutions in context to disaster management.	• Develop a complete SRS for the EMS tools and applications which could be utilized under the URP project. • Assist the Solution Architect in designing the GIS solution framework for the URP project. • Document the complete SRS and assist in preparation of the need assessment report. • Analyze and report the current features of GeoDASH for evaluating its effectiveness in the URP project. • Any other responsibilities as required to fulfill the objectives of the assignments.
5	GIS Specialist	Minimum Graduate in Civil Engg./ Urban Planning/ Disaster Management/ Geography and related discipline with adequate training in GIS	• Minimum 5 years of professional experience in GIS application projects and similar studies. • Demonstrated experience in use of latest GIS tools and technologies and their application in urban resilience or development projects. • Knowledge of GIS based asset and database management systems, emergency management system and application of geospatial technologies. • Experience with development and use of web-based GIS based	• Perform site visit to the offices of every agency under the URP project and collect essential information on their present GIS capacity and infrastructure. • Prepare necessary base maps and reports for survey and data collection as and when required. • Process, store and manage all primary and secondary information in a geospatial database for subsequent analysis, reporting and mapping. • Assist the Team Leader and the EMS Specialist as and when required. • Prepare training materials and conduct training sessions on GIS and GeoDASH.

SI. No.	Proposed Position for the Key Experts	Education Requirements	Experience Requirements	Responsibilities Assigned in the Project
			applications.	• Assist in preparation of contents for the need assessment report. • Any other responsibilities as required to fulfill the objectives of the assignments.

6. Reporting Requirements and Time Schedule:

SI. No.	Deliverable	Description	Submission Time	Mode of Submission	Number of Copies	File Formats
1	Inception reports	Includes the methodology of work, time schedule of delivery, key personnel's outputs etc.	Within ten (10) days of contract sign.	Printed copy and pdf copy	Three (3) Printed copy and CD for pdf copy	• Pdf
2	Mid-Term Progress Report	Detail progress of work and outputs	Within two (2) months of contract sign.	Printed copy and pdf copy	Three (3) Printed copy and CD for pdf copy	• Pdf
3	Draft final reports	Draft report to summarizes all tasks performed under the assignment with key outcomes and necessary recommendations. All primary and secondary information which will be collected and processed during the	Two weeks (2) before the completion of the contract.	Printed copy, pdf copy raw data	Three (3) Printed copy and CD for raw data	• Pdf and other raw data format.

SI. No.	Deliverable	Description	Submission Time	Mode of Submission	Number of Copies	File Formats
		course of work. Findings and recommendations of Workshop/ training with materials and presentations.				
4	Final reports	Final report to summarizes all tasks performed under the assignment with key outcomes and necessary recommendations. All primary and secondary information which will be collected and processed during the course of work. Findings and recommendations of Workshop/ training with materials and presentations.	Upon completion of the contract.	Printed copy, pdf copy raw data	Three (3) Printed copy and CD for raw data	• Pdf and other raw data format.