



**BANGLADESH INLAND WATER TRANSPORT AUTHORITY  
(BIWTA)**

**Ministry of Shipping**

**Term of References (TOR)**

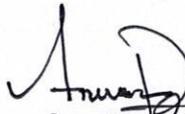
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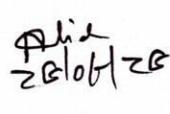
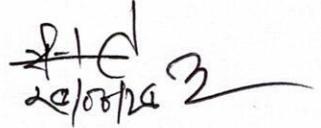
**Hiring Consulting Firm**

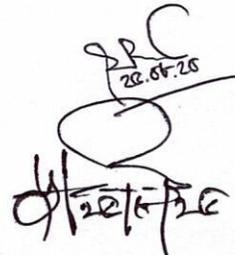
**For**

**Planning, Design, Development, Deployment, Support & Maintenance of  
“Pilotage Coupon and Pilot Management System”**

  
25.08.2025

  
20/6/2020

 20/06/20  
 20/06/20

  
20.06.20

BIWTA: With the flowing river

## 1. Background

Our world is changing at an incredible speed. Touch of change around the world. New technologies are constantly knocking at our doorstep. Goodbye is the old meditation idea. People of the world need to learn the skills to use the new technology. The pace of technological change is much faster than acquiring the skills to use the technology. As a result, a new challenge has appeared in front of the people of the world to keep pace with the technological change. We have to accept the development and spread of new technology whether we want it or not, otherwise we will fall behind in this world. Digital technology has been associated with excellence in today's world. We can easily imagine that in the coming decades, the fourth industrial revolution driven by technology will change the old structure in all areas of the world.

The Bangladesh Inland Water Transport Authority who controls the inland water transport in Bangladesh. It's also responsible for managing development and maintenance of inland water transport system. BIWTA provides pilotage services to assist in the navigation of certain vessels plying on inland waters of Bangladesh according to The Pilotage Ordinance, 1969. BIWTA is working under the umbrella of the Ministry of Shipping, have been maintaining their pilotage service activities in conventional ways. To meet the challenges of the Fourth Industrial Revolution (4IR), BIWTA decided to provide web-based pilotage services called "Pilotage Coupon and Pilot Management System".

## 2. Objectives

The main objective of this assignment is to develop a web-application and mobile application for "Pilotage Coupon and Pilot Management System".

- Selling online coupon and online pilot booking system with efficient manner.
- Reducing TCV (Time, Cost, and Visit) & Promote transparency and accountability.
- Efficiently manage human resource and vessel information regarding pilotage services.
- Easy report preparation & paperless pilotage services.

## 3. Target Audience

The target audiences of the platform are as follows:

- BIWTA
  - Office of the Hon'ble Chairman
  - Finance Department
  - Conservancy & Pilotage Department
- Vessel Owner/Organization

## 4. Scope of Work

### **4.1 Requirement Analysis and design:**

- Collect requirements for Pilotage Coupon and Pilot Management System and conduct a feasibility study of the System.



- Provide concrete development plan/methodology with all required Designs (System design, UI Design, Logical Design, Database Design, Architecture Design etc.) which should include context diagram of the proposed System, Sequence Diagram, Use Case Diagram, Process Flow Diagram, ER Diagram along with an appropriate project implementation plan.
- Bidder must prepare SRS (Software Requirement Specification), BRS (Business Requirement Specification) and submit to concerned authority as per ISO/IEEE template. The bidder must develop the system/application according to the approved SRS.

#### 4.2 System Architecture:

System architecture should define the process of developing and documenting covering the context of the proposed e-Service solution including all impactful and applicable architecture domains such as Micro-Service approach, accessibility, business, data, application, technology, integration, cross cutting issues like security, management operation etc.

The solution architecture will elaborate and further decompose the target architecture into architecture deliverables for each architecture domain. Vendor will submit a Comprehensive Solution Architecture in their technical proposal which may include business architecture, information architecture, application architecture, and technology architecture focusing on the scope mentioned in this TOR.

#### 4.3 System Development:

The system/software will be developed according to Software Requirements Specification (SRS) and BRS (Business Requirement Specification) using agile methodology. At the development stage, a development team will be mobilized who will start the coding process following the standard code convention, code level documentations, header of each file, algorithms, interfaces, code compression and APIs should be supplied with proper description within the given schedule as per the plan. The team will strictly follow the standard procedure of version control of codebase, database and related files using stable version control tools. The vendor will use standard project management tools to manage and track issues as well as monitor development progress. The client (Govt.) or client nominated representative/product owners need to have access and control to the version control system and in project management tools to manage and monitor the development process. The solution will include platform components, specific solution components, Core Services, and Shared Services as under.

**a) Web Application Development:** Design and development of the System along with a responsive UI and easily navigable web portal ensuring the designed UX.

**b) Programming Language:** The following popular languages are preferred such as Backend: Java (Spring Boot, MVC framework/latest suitable design pattern), Python (Django, MVC framework/ latest suitable design pattern) Frontend: React.js, Next.js, Vue.js, Tailwind CSS/Bootstrap.

**c) Database:** The database for the application is recommended to be implemented using popular open- source database such as MySQL, Oracle and PostgreSQL etc.

**d) Mobile Apps Development:** Development and deployment of Android and iOS mobile apps.

**e) Integration:** The platform/solution will have integration scope to share data and service as an integrated service among all stakeholders (i.e., National ID, Department of Shipping, Ministry of Shipping etc.) using standard API technology.

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**f) Language:** The System will be developed in Bangla and English language using open-source platform and provide different user level security.

#### **4.4 Capacity Development:**

Capacity development of the stakeholders should be done according to the needs of front-end users before UAT and the needs of back-end operation team after OAT so that users and Systems administrators can run the application properly. Refresher trainings will be necessary from time to time due to periodic refinements of the solution. The consultant shall deliver a plan for training of the Pilotage Coupon and Pilot Management System. It is required that the consultant works in partnership with BIWTA and other stakeholders identified by the BIWTA to ensure knowledge transfer and further build local capacity for maintenance of the System including trouble shooting, analytics and other advanced features.

**a) Operational Training:** 30 persons; The consultancy firm should arrange batch wise 2(Two) day long operational training in two batches (15 persons in each batch) (Training venue: BIWTA).

**b) Training of Trainers (ToT):** Around 10 persons

The consultancy firm should arrange batch wise 3 (three) day long ToT training with Audio-visual tutorial for the end user. (Training venue will be provided by the consulting firm).

**c) Advance technical training:** tools & technology used for software development, software installation/setup/deployment on local PC, data backup and restore process for 5 (Five) IT personnel should be conducted at the BIWTA office. This training should be of 20 (Twenty) day long (Outside Dhaka 3 days).

**d) Stakeholder Training:** Around 300 persons 2(Two) day long training in two batches (150 persons in each batch, Training venue: BIWTA).

**e) Pilot/Master Pilot Training:** Around 300 persons 2(Two) day long training in two batches (150 persons in each batch, Training venue: BIWTA).

**All training logistics (pen, paper, food, bag, etc.) and supports should be provided by the consultant.**

#### **4.5 Payment Method:**

The bidder must develop payment gateway for system needed. Security measures shall be given paramount importance through setting encryption standards, transaction monitoring tools, fraud detection measures, etc.

#### **4.6 User Acceptance Test (UAT):**

User Acceptance Testing (UAT), or application testing, must be done after software development or change request lifecycle before go-live. At this phase, all types of users must test the



developed application by themselves and have to provide detailed feedback/test report. Based on the UAT report, the firm has to update the application accordingly to ensure user satisfaction by making it more users friendly. Here, it is expected that, considering the type of users and their role in the application, the firm must propose a comprehensive UAT plan in their technical proposal which may cover the following:

- UAT activities to be performed (planning, designing test cases, selection of testing team, executing test cases and documenting, Bug fixing, sign-off etc.)
- Types of user wise roles and test items distribution
- Resource requirement
- Activity wise time requirement

#### **4.6 Piloting:**

Piloting of the system will be carried out over a period of 3 (Three) months from the date of acceptance of the delivery by the Client. All logical feedback by the client from piloting phase must be incorporated in the software by the vendor.

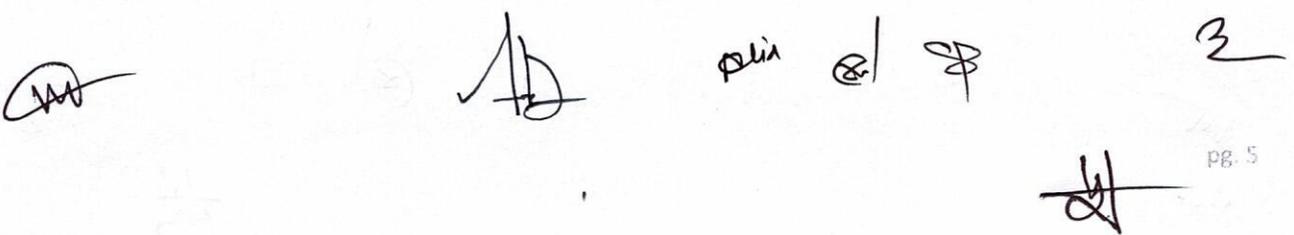
#### **4.8 Maintenance & Support:**

The services for maintenance of the software will be carried out over a period of 2(Two) years from the date of acceptance of the delivery by the Client. Some factors mentioned below are very important at the time of maintenance support service by the vendor.

- Providing 24x7 maintenance and support services for the System.
- Resolving all system bugs, regardless of their complexity.
- Developing, documenting, and reporting change documents, and managing source code and version control as well as providing source code with version control to PE after deployment.
- Implementing approved changes while ensuring no risks are posed to existing integrated services.
- Fix any security issues within 48 hours. Maintain routine (daily) back-up, Restore and recovery of data.
- Do required modification of the software for smooth operation.
- Conducting comprehensive testing at all levels before implementing changes in the production environment.

### **5. Functional Requirements**

Vendor will collect the comprehensive functional requirements from the concern department and incorporate them into the system SRS. The major modules and functional features are described hereunder, but not limited to:

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## 5.1. User Authentication and Access Control

Develop a web-based Pilotage Coupon and Pilot Management System Software and Mobile apps that only authenticate user can access the system. There are a few things we'll need to add to the application: login page with captcha, authentication functionality (to process logins and logouts), strong password encryption/decryption, password reset, user profile and role-based user access control (admin user can create role and assign permission).

There are two types of system user:

- a) **Vessel Owner:** needs to register before they can log in to a web application or mobile app. System should verify the user(applicant) while registration/login via the user's NID or phone numbers by sending an OTP to the user's mobile numbers/ user approval process by admin.
- b) **BIWTA Personnel:** Admin user of the system typically has the authority to create employee profiles and assign specific role permissions to them, meaning they can control what level of access each employee has within the system based on their job function.

## 5.2. Dashboard

Create Role-based dashboards for both BIWTA user and customer (Vessel Owner) that displays key information (booking, Coupon, pilot, transaction, etc.) in one place. Dashboards can contain charts, graphs, Numerical values, gauges, and other visual formats. They can also include alerts or notifications to signal when metrics have reached certain thresholds.

**5.3. Vessel Information:** Registered vessel owner can create/add vessel information by submitting required fields and documents. Created vessels can be used to make requisition for voyage or pilotage services.

**5.4. Pilot Information:** BIWTA responsible user can create/update pilot profiles and assign/dispatch for pilotage service.

## 5.5. Pilot booking

Vessel Owner/Master requesting a pilot to guide a vessel to a desired location through online. The process may involve providing information about the vessel, desired destination, and make payment for pilotage Coupon. BIWTA responsible user can accept or reject the requisition and assign a pilot to the vessel. The pilot will receive a notification by system or mobile SMS when he is assigned to the vessel. The vessel owner can cancel the requisition and system notify the other relevant user.

Pilot booking steps: registration>request for pilot> make payment> Pilot scheduling and allocation> confirmation & notification > booking amendment or cancellation.

## 5.6. Sell Coupons

Vessel Owner can purchase coupon through web/mobile application and use this coupon for pilotage services.

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### **5.7. Create Routes & Bit (pilot station)**

There are 23 routes for navigation. BIWTA admin user can create route and corresponding bit (pilot station) for each route. All the created routes and bit should be shown on Google Maps. Vessel owner can sail requisition for pilotage services on specific path/routes and make bit wise payment.

### **5.8. Pilot Fee Calculator**

The pilotage service is user-financed. Find out how much you have to pay in pilot fees and security fees by using the fee calculator.

### **5.9. Advanced searching and reporting**

The system should have ability to perform highly detailed and specific searches within a database or system, utilizing features like multiple filters, Boolean operators, and custom fields, to extract precise data for analysis and then present that information in a structured and visually appealing report format, allowing for deeper insights and informed decision-making. There will be some reports in Bangla & English as per departmental (BIWTA) requirements. Vendor will collect the reporting and searching requirements from the concerned department.

### **5.10. User Accessibility**

All users will be able to use the software from web and mobile application except Pilots will only be able to access the software from mobile application.

### **5.11. Location Tracking**

System will need to track the pilot and vessel for verifying proper pilotage services using mobile application or other tracking system.

### **5.12. Verifying Pilotage Service**

All vessel/ships that do not have pilot services will have to be manually verified by responsible officer and input the vessel number, date and other information's into the software after that generate report which vessel is not taking pilotage service.

### **5.13. Data Entry:**

The vendor will collect & entry/register at least 300 vessels data with details information into the system.

**N.B: The functional requirements mention above is not limited it will be increase according to the recruitment analysis.**

## **6. Non-Functional Requirements**

### **6.1. Web Application Requirements**

1. The application which is a web-based solution, should be hosted in a centralized Web-server

2. Application should support MVC framework or latest technology.
3. The web-based application should support cross browser platforms (popular web-browsers such Google Chrome, Mozilla Firefox, Opera, Internet Explorer, Safari etc.)
4. The application should have the ability to seamless integration with future module / components / applications
5. Application should be lightweight and rich client-side scripting
6. Mobile friendly user interface (UI) design.
7. Any web interface of this application should be fully responsive

### 6.2. Mobile Application Requirements

1. The mobile application version of the system should be developed for Android and iOS.
2. The mobile app should have the capability of displaying system notifications
3. Functionality for registration options for service recipients and online pilot booking.
4. App should enable compact view of services for service recipients.
5. There should be an option to auto synchronization with the central database with apps local database on the availability of the Internet connectivity.

### 6.3. Coding Conventions

The vendor must follow the standard coding styles to produce high-quality code for further usage of the code in terms of reusability, refactoring, task automation, language factors etc.

### 6.4. Integration Requirements

As a government system or e-Service application, integration with the required and other prescribed national systems is very important and essential. Here, vendor should have proper integration plan considering and understanding the scope of the e-Service application. Vendor will develop the necessary APIs for the system integration. The possible integration scopes of this e-Service application are mentioned below as a reference for the vendor

SL	Name of System to be Integrated	Organization
01.	SMS Gateway Integration	Telecom Operator
02.	Payment Gateway	SSL/ekPay/etc.
03.	NID	Bangladesh Election Commission/BTRC
04.	DoS ERP/ e-Service	Department of Shipping

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## 6.5. Hosting Requirements

Bangladesh Government is providing an extensive and standard hosting facility for all types of government organization applications and software that is named as National Data Center under Bangladesh Computer Council (BCC). It may be mentioned here that the vendor developed application will be hosted in government provided data center i.e. National data center (NDC). Before hosting the firm submits a hosting requirement specification to BIWTA for this software. The firm must host software in the NDC. Necessary technical/technology and quality upgradation support will be provided by the firm during hosting time, warranty period. Domain and hosting costs will be borne by BIWTA.

Note: If any implementing organization/BIWTA decides to host this eService solution in their own or any nominated data center, understanding the strength and capacity of this data center and hosting requirements, vendor must guide implementing organization well ahead of the time of system design phase. So, implementing organization can take necessary measures to ensure hosting facilities which will be required at the time of hosting the developed system.

## 6.6. Language Support

System's default language will be Bangla. The e-Service system should support multilingual option i.e. Bangla and English for both the Web version and Mobile Apps. All the user interfaces will be able to display and input controls can take input both in Bangla and English. System/App users can choose and set his/her preferred language in profile setting for the system interfaces. The system should support Unicode for the Bangla Language.

## 6.7. Digital user manual

For all types of usage, vendor must prepare easily accessible & focused training manual which will also be available in mobile apps & web application also. The user manual should be smart enough so that the target users can receive the training by himself or herself without a trainer intervention also. The content should not be prepared only based on text but also the info graphic, pictures, animation, diagrammatic presentation, multimedia should be used smartly.

## 6.8. Tools and Technologies to be used

Vendor is recommended to choose the appropriate tools and technologies (Open Source java/python is preferable) to be used for the development and implementation of the e-Service application. The selected vendor has to consult with BIWTA, to finalize the tools, technologies, framework and platform with the approval of same authority's consent. The main components of the software will be web-based applications. It should be run in Linux/ Windows /OSx operating system at user's end and should be compatible with all major browsers such as – Internet Explorer, Firefox, Google Chrome, Opera etc.



The System UI should be compatible with Tab & Smart Phone browsers and in case of Mobile Apps should be support both Android and IOS. Understanding the details scope of this project, vendor is requested to submit a detail “Tools & Technology plan” in their technical proposal following the table format mentioned below

Issues/Phases/Purpose	Used Technology/Tools	Justification for Use	Alternative Tool Technology
Project Management			
Version Control			
System Design			
Development (Frontend)			
Development (Backend)			
API/Web Service			
Apps			
Testing			
Integration			
Hosting and Development.			
Web/Application Server			
OS			
Reporting			
Security			
Database Management			
UX/UI Design			
Backup and Recovery			

**7. Security and Privacy Requirements (But not limited to)**

The vendor should follow any of the industry standard secured development methodology such as (but not limited to) Comprehensive Lightweight Application Security Process (CLASP) by OWASP etc.

2. The vendor should consider (but not limited to) common vulnerabilities such as SQL Injection, Cross Site Scripting (XSS) etc.

3. Vendor will undertake responsibility for Input Validation Controls, Authorization/ Authentication Control and other security controls in place in both testing and production environment of application.

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4. The following vulnerabilities must be checked and ensured security from the beginning:

- a. Cross Site Request Forgery (CRSF)
- b. Cross Site Scripting (XSS)
- c. Session hi-jacking
- d. Session Fixation
- e. SQL Injection and Code Injection
- f. Input Validation/Filtering
- g. Output Escaping
- h. Secure File Access

5. The vendor shall minimally provide Access control, Authentication and accountability security mechanisms for backend operations of the System.

6. The proposed security solution shall be scalable and should not affect the performance by creating a bottleneck or single point of failure to the overall system.

7. The system should provide tamper-proof audit trails and logs for administrator or auditor to check for the actions committed by users. The audit trails shall consist of following details but not limited to:

- a. Login and logout
- b. Attempts to access unauthorized resources
- c. User profile changes
- d. Past audit events.
- e. Track all actions performed on documents attached/uploaded.
- f. The system should have provision to assign the access rights of other resources on need basis to authorized users.
- g. Information in the System that is deemed to be sensitive shall be encrypted and protected from accidental and/or unauthorized modification.
- h. The System shall provide automatic session disconnection for inactive user after session time [Proposed best practice session time] is over.



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i. The system shall protect the audit trails from being modified by unauthorized personnel or privileged users.

8. Electronic payments & transactions should comply with all standardized security features, message protocols and encryption.

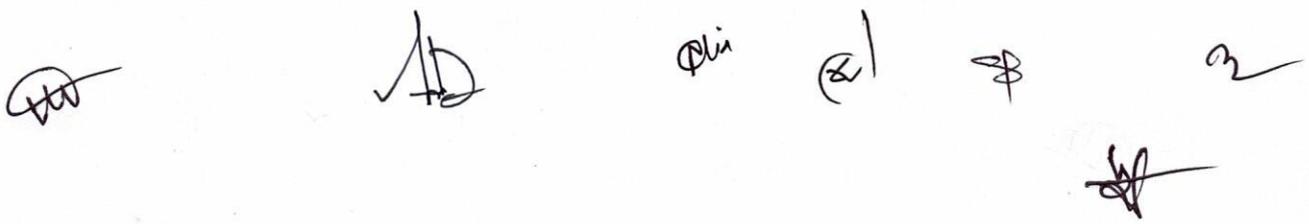
**8. Duration & Team Composition**

No	Title	Duration (Month)
01	Software Design, Development and Deployment with capacity Development.	9 Months
02	Piloting	3 Months
03	Support and Maintenance Period	24 Months
Total: Thirty-Six Month		36 Months

**8.2 Team Composition:**

Applicants are expected to provide the structure; responsibility matrix, and CVs of the proposed team members stating names, highest qualification, professional certification, length of experience, role/function(s) and location of technical staff and other related information. The information should be duly signed by the concern member(s) with the confirmation of accuracy and availability during the assignment tenure. It will carry a high score in terms of the following specific criteria: i) general qualification of the Key Professional(s); and ii) adequacy for the assignment.

SL	Position	No. of Persons
1.	Project Manager	1
2.	Software Architect/Team Leader	1
3.	Business Analyst	1
4.	Database Administrator	1
5.	Sr. Software Engineer/Sr. Programmer	2
6.	Software Engineer/Programmer	3
7.	App Developer- Android & iOS	2
8.	Front-End and UI/UX Expert	1
9.	QA Expert /Tester	1
10	System Administrator/ DevOps engineer	1
11	Security Expert	1
12	Support Engineer	1
Total		16


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**Qualification of the Key Personnel:**

SL	Position (Nos)	Minimum Qualification
1	Project Manager	<p>i) Minimum academic requirement is graduation in Computer Science and Engineering/ICT preferably having a degree from a reputed university.</p> <p>ii) Minimum 5 years of experience in managing large scale IT projects with minimum total of 10 years of experience in ICT industry.</p> <p>iii) Past Experience in leading such an assignment, role including software design and development, preferably in Bangladesh Government IT projects.</p> <p>iv) Must have minimum 2 (Two) e-Government application/ Digital Service application (For design, development, deployment and implementation) project for the public sector with the Govt. Organization.</p> <p>v) ITIL/PMP/Prince2 certification is preferable.</p> <p>vi) Strong leadership abilities with a documented track record of leading diverse teams to meet project objectives.</p>
2	Software Architect/ Team Leader	<p>i) Minimum graduate in Computer Science and Engineering/ICT relevant disciplines from any University.</p> <p>ii) At least 12 years of demonstrated experience in projects of similar size, of which 5 years in the capacity of Project Manager or Team leader.</p> <p>iii) Minimum 5 IT /ICT enabled software projects management (Design, Development and Implementation) experience</p> <p>vi) Experience with IT architecture (microservice architecture) methodologies</p> <p>v) Strong leadership, communication, stakeholder management, and problem-solving skills.</p>
2	Business Analyst	<p>i) Bachelor's/Honors degree</p> <p>ii) 3+ years of experience as a Business Analyst or related role.</p> <p>iii) Strong analytical skills and attention to detail</p> <p>v) Develop and maintain key documents and artifacts, including Business Case, BRS, SRS, Epics, User Stories, Functional and Non-functional Specifications, Business Process Modeling and Notations (BPMN), and Wireframes</p> <p>iv) Excellent communication skills, including the ability to communicate complex concepts to both technical and non- technical stakeholders</p>
3	Database Administrator	<p>i) Minimum graduate in Computer Science and Engineering/ICT relevant disciplines from any reputed University. Having additional</p>

		<p>Degree/Certification in the field of database administrator or database management will be preferable.</p> <p>ii) At least 6 years of experience in database design. Data normalization, data analysis, and database management. This includes proficiency in installing, configuring and troubleshooting SQL Database systems on RDBMS such as Oracle, MS SQL Server, PostgreSQL, MySQL, and familiarity with NoSQL databases, etc.</p> <p>iii) Expertise in backup and recovery procedures, performance tuning, and security measures related to databases.</p> <p>iv) Must have minimum 3 ICT enabled application or software or applications projects experience in the field of Database related skills.</p> <p>v) Professional Database Administration certification will be an advantage</p> <p>vi) Knowledge of Windows Server and Linux environments</p> <p>vii) Demonstrated ability to implement robust database security protocols to prevent unauthorized access, breaches, and data leaks</p>
5	Sr. Software Engineer/ Sr. Programmer	<p>i) Minimum graduate in Computer Science and Engineering / ICT relevant subjects</p> <p>ii) Minimum 8 years of experience in the field of IT solution development.</p> <p>iii) Must have experience in web and mobile application development with a solid understanding of multiple programming languages, tools and technologies.</p> <p>iv) Must have minimum 3 ICT enabled application or software project experience in the field of web-based software programming/coding/scripting as a core development team member.</p> <p>v) Technical Proficiency in java/.net /python, MVC, SQL/Oracle etc.</p>
6	Software Engineer/ Programmer	<p>i) Minimum graduate in Computer Science and Engineering / ICT relevant subjects</p> <p>ii) Minimum 3 years of experience in the field of IT solution development.</p> <p>iii) Must have minimum 2 ICT enabled application or software project experience in the field of web-based software programming/coding/scripting as a core development team member.</p> <p>v) Technical Proficiency in java /python, MVC, SQL/Oracle etc.</p>
7	App Developer-Android & iOS	<p>i) Minimum graduate in Computer Science and Engineering/ICT relevant disciplines from any University.</p> <p>ii) Must have minimum 03 years of experience in Android and iOS app development.</p> <p>iii) Proficiency in Kotlin/Flutter/Swift, and Java technology.</p> <p>iv) Experience working with remote data via REST, JSON and third-party libraries and APIs.</p> <p>v) Experience with offline storage, threading, and performance tuning</p> <p>vi) Strong knowledge of security best practices specific to mobile app development.</p>

8	Front-End and UI/UX Expert	<p>i) Minimum graduate in Computer Science and Engineering / ICT relevant subjects.</p> <p>ii) Minimum 3 years of experience in the field of IT solution User interface design and Experience.</p> <p>iii) Proficiency in HTML5, Tailwind CSS/Bootstrap, React.js, Vue, Next.js, etc.</p> <p>iv) Proficiency in using UI/UX design software such as Adobe XD, Figma, Sketch, and other related tools.</p>
9	QA Expert / Tester	<p>i) Minimum graduate in ICT relevant subject from any University. Having master's degree or specialization diploma/degree/certification software Quality Assurance/Software Testing/relevant subject will be preferable.</p> <p>ii) Should have minimum 3 years of profound experience in the field of software Quality assurance in web-based application or Software development.</p> <p>iii) Sound knowledge of various software QA methodologies, tools and best practices.</p> <p>iv) Ability to draft and execute test plans, test cases, and ensure their comprehensive coverage.</p>
10	System Administrator/ DevOps engineer	<p>i) B.Sc. in or M.sc in Computer Science and Engineering/ICT related Subject preferably having a degree from a reputed university.</p> <p>ii) Must have minimum 5 years of profound experience in the field of infrastructure management ensuring the highest security standards.</p> <p>iv) Professional certification is essential.</p> <p>v) Strong Knowledge of virtualization technology such as Vmware Esxi, Proxmox, Xen, KVM/ Configure and maintain Windows/Linux Servers, database servers, Load Balancer (Nginx, HAProxy), Containerized platform (Docker).</p> <p>vi) Strong understanding of network configurations, protocols, and security practices, along with practical experience in firewalls, VPNs, and intrusion detection/prevention systems.</p> <p>vii) Knowledge of backup, disaster recovery, and continuity planning.</p>
11	Security Expert	<p>i) B.Sc. in computer science/ engineering or equivalent with advance training on data and system security or equivalent</p> <p>ii) Minimum 5 years of relevant experience</p> <p>iii) Certification on information, system or network security would be an added advantage</p> <p>iv) Multi-Domain knowledge, Security Frameworks Methodologies understanding, Public Cloud knowledge.</p> <p>v) Ability to assess vulnerabilities, recommend mitigation measures, and ensure compliance with security standards.</p>
12	Support Engineer	<p>i) Minimum graduate in Computer Science and Engineering/ICT from any reputed University</p> <p>ii) Should have minimum 3 years of profound experience in the field</p>

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	of IT support. iii) Software maintenance support service/help desk will be preferable iv) Proven ability to diagnose and troubleshoot infrastructure issues, as well as implement solutions and preventive measures.
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**9. Data backup and recovery**

Data backup and recovery are crucial processes that involve creating copies of data and restoring it in case of loss or corruption. Data backup and recovery are vital for maintaining business operations, preventing financial and reputational damage, and complying with data protection regulations. Vendor will provide proper data backup and recovery strategies (Automated Backups, Backup Frequency, Backup Types, Off-site/Redundant Storage) and implement methods to ensure data is regularly backed up and can be restored effectively after an incident.

**10. Deliverables**

The deliverables include the following with tentative timeframe:

Sl.	Tasks/Deliverables	Timeframe
1	Inception Report	Within two (2) weeks after signing the contract
2	System requirement specification (SRS) with System Design	1 <sup>st</sup> Month
3	Web Application (Software Development) & Mobile Application Development	2 <sup>nd</sup> – 7 <sup>th</sup> month
4	UAT, SQTC Report, Security Audit Reports	8 <sup>th</sup> month
5	Training (Operational, ToT, Technical)	8 <sup>th</sup> month
6	Final Deployment with source code, Bug Fixing, Functional Traceability Matrix, Integration, Backup and recovery strategy implementation, User Manual	9 <sup>th</sup> month
7	Piloting	10 <sup>th</sup> -12 <sup>th</sup> month
8	Support and Maintenance service	13 <sup>th</sup> -36 <sup>th</sup> month

## 11. Payment Schedule

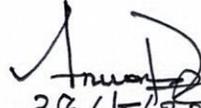
Sl.	Tasks/Deliverables	Payment (% of total contract amount)	
1	Inception Report & System requirement specification (SRS)	5%	
2	Web Application (Software Development) & Mobile Application Development	25%	
3	UAT, SQTC Report, Training	15%	
4	Final Deployment with source code, Bug Fixing, Functional Traceability Matrix, Integration, Backup and recovery strategy, User Manual	10%	
5	Piloting	15%	
6	Support and Maintenance service	1 <sup>st</sup> year	15%
		2 <sup>nd</sup> year	15%

  
25.08.2025

(Al-Amin)

Assistant Programmer

ICT Department  
BIWTA, Dhaka

  
20/6/2020  
(Anwar Parvez)

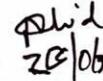
Programmer

ICT Department  
BIWTA, Dhaka.

  
20/6/2020  
(Mohammad Selim)

Joint Director

Conservancy & Pilotage Department  
BIWTA.

  
28/08/25

(Md. Nahid Bin Islam)

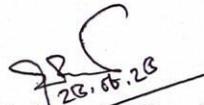
Deputy Director (Budget & Admin)

Finance Department,  
BIWTA, Dhaka.

  
29/08/20  
(Md. Abdullah Al Batee)

Joint Director

Conservancy & Pilotage Department  
BIWTA.

  
28.08.20  
(Md. Subur Khan)

Joint Director

Conservancy & Pilotage Department  
BIWTA.

  
22/6/20  
(Md. Abdus Salam)

Additional Director (Waterways)

Conservancy & Pilotage- Department  
BIWTA, Dhaka.



#### 4.7 Piloting:

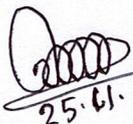
Piloting of the system will be carried out over a period of 3 (Three) months from the date of acceptance of the delivery by the Client. For the successful piloting Vendor will provide the following:

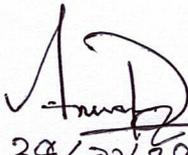
- Vendor will provide all necessary support and continuous training in pilot phase to ensure smooth operation.
- All logical feedback by the client from piloting phase must be incorporated in the software by the vendor.
- Vendor will submit a performance assessment report at the end of the pilot phase covering pilot result/output, impact/outcome, scalability, stability and sustainability for full-scale implementation.
- The criteria/key factors based on which the pilot evaluation will be conducted should be mentioned in the proposed plan.

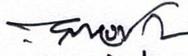
#### 4.8 Maintenance & Support:

The services for maintenance of the software will be carried out over a period of 2(Two) years from the date of acceptance of the delivery by the Client. Some factors mentioned below must be provided by the vendor at the time of maintenance support service.

- Providing 24x7 maintenance and support services for the System.
- Resolving all system bugs, regardless of their complexity.
- Developing, documenting, and reporting change documents, and managing source code and version control as well as providing source code with version control to PE after deployment.
- Implementing approved changes while ensuring no risks are posed to existing integrated services.
- Fix any security issues within 48 hours. Maintain routine (daily) back-up, Restore and recovery of data.
- Do require modification of the software for smooth operation.
- Conduct comprehensive testing at all levels before implementing changes in the production environment.

  
25.11.25  
প্রকৌঃ আল-আমিন  
সহকারী প্রোগ্রামার

  
25/11/25  
প্রকৌঃ আনোয়ার পারভেজ  
সিস্টেম এনালিস্ট

  
20/11/25  
মোঃ সুলতানুল আরেফিন  
পরিচালক (আইসিটি)