MINISTRY OF TRANSPORT
PROJECT MANAGEMENT UNIT OF WATERWAYS

SOUTHERN WATERWAY CORRIDORS AND LOGISTICS DEVELOPMENT PROJECT

TERMS OF REFERENCE

CONSULTANT SERVICES CS-1:
CONSULTANT FOR DETAILED DESIGN, PREPARATION OF BIDDING DOCUMENTS FOR CIVIL WORKS

October, 2024

LIST OF ABBREVIATION

MOT	Ministry of Transport
WB	World Bank
DRVN	Department for Roads of Viet Nam
VIWA	Vietnam Inland Waterways Administration
PMU-W	Project Management Unit of Waterways
UBND	People's Committee
MRD	Mekong River Delta
SWCLD	Southern Waterways Corridor and Logistics Development Project
IWT	Inland Waterways Transport
FS	Feasibility Study
SE	Social Environment
RAP	Resettlement Action Plan
EIA	Environmental Impact Assessment
EP	Environmental plan
RP	Resettlement plan
EMDP	Ethnic Minority Development Plan
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
CMTV	Cai Mep Thi Vai
HCMC	Ho Chi Minh City

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1. INTRODUCTION

1.1. The Ministry of Transport intends to apply a portion of funds from the World Bank-financed for Southern Waterway Corridors and Logistics Development Project, (hereafter referred to as "the Project") to carry out surveys, detailed designs, preparation of cost estimates and construction bidding documents for civil works of the Project.

1.2. MoT has designated the Project Management Unit of Waterways as the Project Owner for this project preparation.

2. BACKGROUND

2.1. The Mekong River Delta (Mekong Delta) region consists of 13 provinces and cities with an area of about 4.1 million hectares, accounting for 12.3% of the country's natural land area, of which 83.3% of the area is for agricultural, forestry and fishery production. According to the 2019 Population and Housing Census, the region's population is 17.3 million people, accounting for 18.0% of the country's total population, making its density 55% higher than national average. With an extensive network of national, provincial, rural roads and 70% of the nation‟s inland waterways, the Mekong Delta plays an important role in Vietnam‟s national economic development. Most of bulk commodities are carried on inland waterways, however, due to limited investment and upgrading, those waterways are not exploited to their full potential. In order to bolster transport productivity and the economy in general, the Mekong Delta region need to pursue investment in upgrading of waterways to properly exploit the potential of the waterway transport system.

2.2. In recent years, several projects have been implemented to improve the inland waterway transport in the Mekong Delta, such as:

- Viet Nam Inland Waterways and Port Rehabilitation Project (1998 - 2006).
- Mekong Delta Transport Infrastructure Development Project (2008 - 2015).
- Soai Rap Channel Dredging Project (2012 - 2013).
- Cho Gao Canal Upgrading Project - phase 1 (2008 – 2016).
- Cho Gao Canal Upgrading Project - phase 2 (2022-2023).
- Socialization Project of Dredging, Maintenance and Upgrading of Dong Tranh River Channel and Tac Ong Cu – Tac Bai, Tac Cua route to Go Gia River.

2.3. The SWCLD project is intended to continue upgrading the inland waterway network in the Mekong Delta region by upgrading the East-West corridor connecting the Mekong Delta's central area - major economic areas such as Can Tho and Ho Chi Minh City - to class II waterways. It is recommended that the North-South corridor, which connects Dong Nai port with HCMC Port and Cai Mep Thi Vai deep-sea Port, be rehabilitated to allow vessels with a tonnage of up to 5,000 DWT to navigate. The waterways will pass through or border 8 provinces and cities: Ho Chi Minh City, Can Tho City, Vinh Long, Ben Tre, Tien Giang, Long An, Dong Nai and Ba Ria - Vung Tau Province.

Figure 1: Inland Waterway Corridors of SWCLD project

3. PROJECT OBJECTIVES

3.1. General objectives

Upgrading and rehabilitating infrastructure bottleneck sections of the waterway corridors will allow increased cargo volumes in larger vessels to navigate on corridors connecting the four largest ports in southern Viet Nam via more efficient routes, reducing transport costs, time, GHG emissions, and accidents. The project will increase the waterways capacity of an East-West corridor and North-South corridor, connecting the Can Tho port, the main port in Mekong Delta, the key Dong Nai manufacturing center, the HCMC port, and the CMTV deep-sea port. The project will also include navigational aids and sharp bend corrections, for safety along the busy waterways.

3.2. Specific objectives

(i) The East - West corridor has a total length of about 197 km, connecting the Can Tho port with the HCMC port via Hau river (Can Tho city)→ Tra On river → Mang Thit canal → Co Chien river → Cho Lach canal → Tien river → Ky Hon canal; (through Cho Gao canal); Rach La canal → Vam Co river → Nuoc Man canal → Can Giuoc river → Soai Rap river (Ho Chi Minh city): Upgrading to Class II Inland Waterways Standards with channel width B = 55 m for canal, B = 75 m for rivers, operating depth H = 3.5 m, minimum curvature radius R=320m

for canals and R=440 m for rivers, clearance T=7,5m (7m limitted) for self-propelled vessel 600T and 3-layer container ship navigating full time. Self-propelled vessel up to 1500T to navigate during high tides. In particular, this component will support the (a) dredging and bend correction of the waterways; (b) construction of embankments to protect the river/canal bank; (c) reconstruction of the Cho Lach 2 bridge; (d) the reconstruction of roads to connect with the existing roads; (e) reconstruction of drainage sewers; and (f) installation of navigation aids.

(ii) The North-South corridor has a total length of about 82 km, connecting the Dong Nai port with the HCMC port and the CMTV port via the Dong Nai river (Dong Nai port) → Nha Be river → Long Tau river → Dong Tranh river → Tac Cua river → Go Gia river → Thi Vai river (Cai Mep Thi Vai port cluster): Upgrading the Tac Cua River channel to a width of B=90m (including expansions at curves), with navigational depth of H=7.9m and minimum curve radius R=440m for rivers (R=410m for Tac Cua river is acceptatble to avoid protected forest), enabling self-propelled vessels of up to 3,000 tons and 4-tier container ships to navigate full time along the corridor, self-propelled vessels up to 5,000 tons to navigate during higher tides. The component will support river dredging, bend correction and installation of navigation aids.

Table 1: Channel length and technical class after upgrading and improvement

	East – West corridor			**North – South corridor**		
No.	**Channel**	**Length (km)**	**Class**	**Channel**	**Length (km)**	**Class**
1	Hau river (from Can Tho port to Tra On river)	17	Special	Dong Nai river (from Dong Nai port)	30	Special
2	Tra On river	9,2	II	Nha Be river	9,3	Marine channel
3	Mang Thit river	46,9	II	Long Tau river	9,1	Marine channel
4	Co Chien river	10,3	Special	Dong Tranh river	15,3	Marine channel
5	Cho Lach canal	7,9	II	Tac Cua river	6,4	Marine channel
6	Tien river	31,3	Special	Go Gia river	8,9	Marine channel
7	Ky Hon canal	6,8	II	Thi Vai river (to CMTV port cluster)	3	Marine channel
8	Cho Gao canal (*)	11,6	II			
9	Rach La	10,2	II			
10	Vam Co river	10,4	Special			
11	Nuoc Man canal	1,8	II			
12	Can Giuoc river	8,0	II			
13	Soai Rap river (from Can Giuoc river to Nha Be, Long Tau, Soai Rap	25,8	Marine channel			

	East – West corridor			North – South corridor		
No.	**Channel**	**Length (km)**	**Class**	**Channel**	**Length (km)**	**Class**
	confluence in HCM city)					
	Total	**197**			**82**	

Note: (*) to be implemented in Cho Gao Canal Upgrading Project (phase 2).

4. OBJECTIVE OF THE ASSIGNMENT

To complete and hand over to the Client of improvements on sustainable waterways infrastructure and climate resilient through preparation and delivery of approved detailed designs, preparation of bidding documents for civil works and procurement assistance and hand over the boundary markers.

5. SCOPE OF THE CONSULTANCY SERVICES

The scope of work of the consultancy service includes detailed design for the project, preparation of bidding documents for construction packages, update Resettlement Plans, preparing Ethnic Minority Development Plans (EMDP) where required, reviewing, and if/where required, updating relevant parts or preparing supplements for other Environmental and social (ES) documents such as ESIA/ESMP/DEMP, ESCP, SEP, LMP etc. The consultant will perform, including but not limited to the tasks as follow:

5.1. Review the Feasibility Study and Basic Design such as Input data, Design conditions, Applicable Standards, Scope, scale, technical solutions, quantity and cost estimate of construction work items. Propose required changes (if any).

5.2. Carry out data collection, topographical survey, geotechnical and hydrological surveys, survey of dumping sites to ensure the implementation of detailed design of the project according to regulations. During the implementation process of contract, the consultant is responsible for self-contact relevant agencies and provinces for procedures for survey and design work; Analyzing and evaluating all data, studies obtained, results and recommendations in its report.

5.3. Prepare detailed designs for the project includes major items such as: (i) the dredging and sharp rivers bend corrections of bottleneck sections on the East-West and North-South waterway corridors; (ii) the construction of embankments; (iii) the reconstruction of the Cho Lach 2 bridge; (iv) the reconstruction of roads to connect with the existing roads; (v) the installation of navigation aids for safety.

5.4. Prepare detailed cost estimates, including preparation of detailed analysis of inputs and prices for items such as materials, labor, equipment, tax, overhead, profit, etc…, breakdown of the foreign currency and local currency requirements, and preparation of the related disbursement schedules.

5.5. Prepare the bidding documents for construction packages (using the World Bank‘s

Standard/Sample Documents), including - relevant supporting documents such as instruction to Tenders; pre-qualification documents, draft contract documents; conditions of contract; general and technical specifications, environmental and social management requirements, BOQs and relevant drawings; Assisting PMU-W in construction supervision consultant selection (include preparing terms of reference of construction supervision consulting service) and civil work procurement activities that are following open competitive procedures.

5.6. Prepare documents and carry out boundary markers for site clearance based on detailed design documents for all routes/works within the project scope. Hand over to PMU-W boundary markers along waterways and bridge construction locations immediately after design drawings are appraised by the MOT and approved by PMU-W.

5.7. Review and update relevant environmental and social (ES) documents prepared during the project preparation such as the Resettlement Framework, Resettlement Plans, ESIA/ESMP/DEMP, ESCP, SEP, LMP and other relevant documents. Update these documents if necessary to ensure that ES assessment and management plans are up to date, incorporate environmental and social mitigation measures, commitments, obligations and recommendations into detailed designs and construction bidding documents. Prepare Ethnic Minority Development Plan (EMDP) where required, including meaningful consultation with ethnic minority people and submit EMDP to the WB for review and clearance; Carry out investigations, surveys, stakeholder consultations, information disclosure and other necessary works to update the Resettlement Plans for the project provinces that require land acquisition and site clearance.

5.8. Take responsibility to explain/clarify the contents of the detailed designs documents so that MoT can complete the appraisal work to meet the applicable Government's regulations.

5.9. Conduct author supervision throughout the construction process until the project is completed and handed over for use.

6. DETAILED TASKS

The Consultant will carry out detailed designs for upgrading and rehabilitating infrastructure bottleneck sections of the waterway corridors (including related works such as dredging, bend correction, bridges, bank protection, navigation aids, etc…) and preparation of bidding documents for the construction packages. The Consultant will also be required to update the Resettlement Plans, prepare Ethnic Minority Development Plans where required and other relevant environmental and social safeguard documents (ESIA/ESMP/DEMP, ESCP, SEP, LMP etc.). Specific tasks under detailed designs, included but not limited as follows:

PART A. SURVEY, DETAILED DESIGN AND BIDDING DOCUMENTS

TASK A1. Data collection and review Feasibility study and Basic design

Review the inventories of the selected national waterway corridors prepared by the FS consultant, including geometric features, type and condition of related structures and other major features. Assess/quantify assets/properties/objects potentially affected relating to land acquisition, including cutting of trees, relocation of utilities etc. which should be addressed before tendering construction contracts. The FS documents will be provided by PMU-W.

Collect the relevant necessary data for detailed designs and cost estimation.

Review the approved design standards during the preparation of the project FS Report. Summarize the new standards expected to replace or supplement (if necessary) to submit to the PMU-W for MoT approval as a basis for application in the survey, detailed designs and construction of the works.

TASK A2. Topographical and hydrological surveys

Prepare an outline for the topographical and hydrological survey work, including the scope of survey, technical requirements, quantity, personnel and machinery and equipment, detailed progress and submit to PMU-W for approval before proceeding to the site. Inspection of machinery and equipment will be carried out to ensure that the survey work meets the quality and progress requirements of the Project. The Consultant must notify PMU-W of the time to carry out this survey work so that PMU-W can send staff to supervise. The survey volume and expected level of detail are stated in Appendix 1.

Carry out topographical surveys, including horizontal and vertical alignments and cross-sections, establishment of horizontal control points, bench marks and permanent reference beacons as required for the preparation of detailed design to enable construction quantities to be accurately calculated. In addition, the survey scope needs to cover the land use area of the project to to provide a basis for calculating the volume of site clearance.

The topographical survey of the dumping/storage areas for waste/excavated/dredged materials can only be conducted with an agreement on the location from the relevant authorities as per regulations.

Data collection from hydrological monitoring stations related to the rivers will also require additional temporary and permanent monitoring stations to collect detailed hydrological data at the construction sites of the proposed works. The number of additional stations and monitoring data will be determined based on the existing monitoring station system and the length and characteristics of the rivers/canals. The reading and monitoring of stations must be carried out in sync with the parameters measured at regular stations (if any).

Bathymetry surveys by echo sounder shall only be conducted on the entire length of waterways planned for rehabilitating/upgrading such as rivers/canals: Tra On, Mang Thit, Cho Lach, Rach La, Rach Ky Hon, Tac Cua. Bathymetry surveys shall be conducted along the entire width of the waterway and supplemented by topographic surveys of adjacent area. Specific requirements are in Appendix 1.

TASK A3. Geotechnical Survey

Prepare an outline for the survey work, including the scope of survey, technical

requirements, number of boreholes, personnel and equipment, detailed progress submit to PMU-W for approval before proceeding to the site. Equipment and Laboratory inspection will be carried out to ensure the survey work meets the quality and progress requirements of the Project.

Carry out geotechnical survey along waterways, rivers/canals improvement works and embankments, bridges, frontage roads, and navigation aids, dumping site, etc... The surveys should include drilling, sounding (depth), field inspection, soil and rock sampling and laboratory testing of the collected samples. Geotechnical surveys may involve methods like soil sampling, borehole drilling, in-situ testing (e.g., Standard Penetration Test, Cone Penetration Test), laboratory testing of soil and rock samples, and geophysical methods (e.g., electrical resistivity, ground-penetrating radar).

Laboratory testing shall include all tests necessary to determine the mechanical properties of the subsoil layers to the required accuracy which is directly relevant to the design of the project. The frequency and depth of boreholes shall be specified in Appendix 1.

In the case of drilling equipment being installed on waterways, signs and lighting shall be provided according to regulations to ensure waterways traffic safety. Results of surveys must be presented in geotechnical reports that include data on soil and rock properties, recommendations for foundation design, slope stability analysis, and other engineering considerations as necessarily required in line with applicable Government's regulations.

TASK A4. Materials Survey

Conduct a survey of the materials to be used for the construction of the project to determine the source and quality of the materials. The source of stone, sand and all other materials for bridges, frontage roads and bank protection works shall be identified. Sampling shall be taken from potential sources and appropriate tests shall be carried out to ensure compliance with the technical requirements.

TASK A5. Hydrodynamic model

To study hydrodynamic model to impact assessment of dredging, bend correction from which to propose technical solution such as bank protection, bridge piers, etc on rivers/canals to assess sedimentation, erosion and other impacts such as climate change, sea level rise on river/canal water levels, salinity levels.

The hydrodynamic model study needs to collect data (topography, hydrology, sedimentation transportation, salinity levels, sea level rise,..), model establishment and model validation, model establishment corresponding to propose construction solution and prepare a report of results.

TASK A6. Detailed designs of civil work items

Evaluate the technical solutions started in the FS Report and proposing adjustments and updates (if necessary) to ensure that the proposed design solutions are feasible. Based on the reality, changes in geometric dimensions, volume, length and depth are necessary to ensure the objectives of the Project.

However, the proposed design must not change the scale and objectives of the Project and must be approved by the PMU-W.

The detailed designs solutions for civil works must be consider minimizing negative social and environmental impacts, minimizing land acquisition, and minimizing impacts on livelihoods and be agreed with the PMU-W and comply with the list of technical standard approved by the MOT. Based on the results of the survey tasks, hydrodynamic model research and construction items to ensure the objectives about scale and technical class of the Project. These works must comply with design standards to waterway transportation both day and night and take into account channels, irrigation, location of water intakes and drainage. Integrate climate change into the detailed design with a view toward strengthening these measures to improve climate change. Drawings and technical parameters must be established in detail such as route plan, longitudinal section, cross section, all structural details ... according to Vietnamese standards and regulations. The buoy system and signs must comply with inland waterway and maritime standards (for maritime routes).

Detailed designs reports must be clear and accurate, honestly reflecting the research issues. The report must include analysis, evaluation, recommendations and alternative solutions of the research results. The detailed designs documents must include all construction items based on the FS approval and the consultant's recommendations (if any). The report must be well prepared, bound, signed and stamped in accordance with current regulations of Vietnam.

The consultant will develop a practical construction schedule that outlines the progress of the project, taking into account risk factors to allow sufficient time for completion on schedule and within the budget for contracts, supervision activities, and reporting. Project schedules shall reflect the impacts of seasons and climate at the construction site, based on typical results in similar World Bank-funded projects. In addition, construction schedules including determination of most cost-effective construction methods and equipment/personnel needs, packaging of works, and accompanying schedules to minimize impacts on livelihood of local people during dredging period.

Working with local agencies to archive the agreement on the contents of detailed designs (such as the connecting method of lighting electricity, longitudinal and cross drainage design, etc …), dumping sites and so on.

Adjust the detailed designs some of construction works items including cost estimates (if necessary) during the project implementation process to align with reality and ensure the quality and procedures of the project.

TASK A7. Prepare documents and carry out site clearance marking

Carry out necessary surveys to site (with PMU-W) of boundary markers along waterways, control points for bridges and bank protection. Prepare the marker document and hand over the boundary markers to PMU-W together with the construction contractor at the site.

The consultant will carry out the boundary marks of site clearance on the field according to the approved design document, hand over to relevant units

according to regulations.

Ensure that the determinations on the boundary of land acquisition consider the potential environmental and social impacts and risks of construction and operation phases of the proposed works. The scope of land acquisition is appropriate with the project demand to avoid acquiring land beyond the land needed for construction activities.

TASK A8. Establishing cost estimate

Analysis and update unit price for waterway construction and other construction works (dredging, roads, bridges, bank protection, and related construction items of the Project) including taxes and customs fees, appraisal costs (if any) ... to ensure correct and accurate calculation of volume and cost estimate for bidding. Ensure that the cost of environmental and social mitigation and management requirements are fully incorporated into the estimate costs and relevant terms and conditions in the bidding documents of each bid package.

Prepare the detailed table of volume and cost estimates for construction works including related taxes and other fees.

Prepare project cost estimate, packages cost estimate (if necessary)

TASK A9. Tender packaging and Preparation of Bidding Documents for Construction packages

Construction packages are divided in accordance with the geographical location and size of the package, suitable for competitive bidding between qualified contractors with different capacity or/and performance capabilities. The Tender packaging should be broadly consistent with existing arrangements specified in, and/or suggesting any modifications with due justifications to the Project Procurement Strategy for Development (PPSD) established by the PMU-W during the project preparation stage.

The Consultant should follow samples of the WB's Standard Bidding Documents (SBDs) for works with Rated Criteria (RC) and finalize templates of Bidding Document for all construction packages in both English and Vietnamese, acceptable to the WB, for use under the Project. Subsequently, the Consultant will prepare a set of complete bidding documents for each construction package in accordance with the requirements of the WB's Procurement Regulations and the Government of Vietnam.

The Consultant will prepare bidding drawings, including profile, waterway diagrams, construction solutions, sections, overall plan and other details necessary to describe the scope of work to the Contractor.

TASK A10. Author supervision during construction

The detailed designs consultant is responsible for supervising the author throughout the project implementation process for the detailed designs products prepared by the consultant. Author supervision includes but not limited as follows:

- Explain and clarify the construction design documents when requested by the Project owner, contractor and supervision consultant.

- Coordinate with the Project owner when requested to resolve problems and issues arising in the design during the construction process, adjust the design to suit the actual construction of the project, handle unreasonable design issues according to the request by Project owner.
- Promptly notify to the Project owner and supervision consultant, recommending corrective measures, whenever detecting construction works by any contractors that are deviated from the approved design.
- Participate in the acceptance of construction works when requested by the Project owner. In case of detecting construction items or construction works that do not meet the acceptance conditions, timely written comments must be sent to the Project owner.

PART B. UPDATE ENVIRONMENTAL AND SOCIAL INSTRUMENTS AND PREPARE DREDGING AND EXCAVATION MANAGEMENT PLAN (DEMP) AND ETHNIC MINORITY DEVELOPMENT PLAN (EMDP) WHERE REQUIRED

The Consultant will:

(i) Review relevant ES documents prepared during project preparation period such as the Resettlement Policy Framework, Resettlement Plans, ESIA/ESMP, SEP, LMP and other relevant documents.
(ii) Conduct field survey, community consultations, information disclosure and other necessary tasks to update Resettlement Plans, ESIA/ESMP, SEP, LMP for the project.
(iii) Conduct the survey, FPIC, information disclosure and other necessary tasks to prepare Ethnic Minority Development Plans where required and Dredging and Excavation Management Plan (DEMP).

The Tasks include but not limited as follows:

TASK B1. Desk review and preparation of Inception report

During the inception phase, the Consultant will review the environmental and social safeguards documents including the ESIA/ESMP, RF, RPs, SEP and LMP that were developed during the project preparation phase. Cooperate with the project detailed design team relating to the Project's selected detailed design options to update: (i) the scope of the Project's impacts and identify any other potential risks and impacts during the technical design phase or due to design adjustments if any, (ii) land acquisition and resettlement, including the number of affected and relocated households based on the census survey results and the Project's updated compensation rates for affected land/ assets; (iii) resettlement arrangement for relocated households; and (iii) socio-economic survey of affected households to develop a database accessible to stakeholders. Plans for addressing related cross-cutting issues will be prepared so that related parties will solve such issues together to be in line with timelines of social impact and risk mitigation measures.

A brief Inception report will be prepared to summarise the findings under Task B1, include the Consultant's detailed approaches and methodologies for

updating the environmental and social safeguards documents, including the information and data sets required to update those documents.

TASK B2. Conduct Baseline Survey and Build Socio-Economic Data Set for Affected Households.

The goal of this task is to support PMU-W in developing socio-economic indicators for affected households, providing input information for updating environmental and social tools, and for project monitoring and evaluation. The consultant needs to review demographic, social, economic, and cultural data from field surveys to create an accessible data set for stakeholders.

The consultant must establish a reliable and easily understandable measurement indicator system, including indicators on gender, ethnic minorities, and vulnerable groups. The principles of the baseline survey include: (i) proposing an appropriate implementation method; (ii) designing questionnaires and data collection tools, and testing them in the field; (iii) suggesting a qualified survey team; (iv) delivering high-quality reports and data sets; (v) establishing an analysis and interpretation system.

The consultant will design the baseline survey, including preparing qualitative and quantitative data collection methods for the socio-economic conditions of affected households, detailing the survey design, sampling process, data collection tools, and supportive activities to enhance data usability. The consultant will propose suitable survey methods, including sample size and resources for the task, along with testing the data collection tools.

TASK B3. Update changes in scope of impact (if any) and legal policies related to land acquisition, compensation and support.

The purpose of this assignment is to assist the PMU-W in reviewing and re-evaluating the scope of impact of the project. At the same time, conduct a comprehensive assessment of the new regulations on land acquisition, compensation, support and resettlement under the Land Law 2024 to update the RPs in line with the RF.

The Consultant shall develop a detailed work plan related to this assignment to ensure that all activities in reviewing and updating the scope of impact and the new policies of the Government of Vietnam related to land acquisition, compensation, support, resettlement and livelihood restoration are fully implemented.

The Consultant shall review the previously prepared social safeguard documents and work closely with the design team to ensure that all changes are fully updated in the social documents.

The Consultant shall conduct meetings and work with relevant stakeholders to consult changes in the scope of impact when the detailed design is carried out. In addition, discussions with local resettlement agencies on resettlement arrangements and assessments of proposed resettlement areas should be conducted if necessary.

The Consultant shall conduct a review and study of current regulations of the Government of Vietnam related to land acquisition, compensation, support,

resettlement and livelihood restoration. Review and study of new legal regulations including (but not limited to) reviewing the 2024 Land Law and its implementing decrees/regulations to analyse gaps with the World Bank ESS5 and recommend solutions for bridging the gaps. In addition, conduct consultation meetings with affected households and stakeholders on changes in resettlement policies in the project.

TASK B4. Update Resettlement Plan (RP)

The Consultant will update the Resettlement Plan (RP) for each province based on the detailed designs of the project. The updated RP prepared for each project province will include the following contents:

- Analyse gaps between WB policies (ESS5) and Vietnamese government policies (Land Law 2024) related to land acquisition, compensation, assistance, and resettlement. Recommend solutions for filling the gaps.
- Coordinate with the project implementing agency, determine the cut-off date of land acquisition for project components and items and publicize it to affected households to ensure the eligibility of affected people and assets during project implementation.
- Include all changes (if any) in the scope of impacts into the Resettlement Plan (RP) based on the approved technical designs.
- Conduct a Census survey on 100% of affected households based on approved technical designs to update data on HHs'composition, age and gender of all family members, income level and occupation, vulnerability, legal land use rights (land use rights, occupation, lease, etc.), asset ownership, land use and occupations of affected people to update the RPs;
- Update compensation rates for all types of lands and non-land assets;
- Update replacement costs for all types of lands and non-land assets in the project area to update resettlement costs;
- Conduct consultations with stakeholders, especially with severely affected households and vulnerable groups on updating resettlement plan;
- Conduct an assessment and consultation on livelihood and income restoration needs of affected people to update the livelihood restoration program.;
- Disseminate the updated RP to local communities, including affected people and other stakeholders; and
- Assess the capacity of implementing agencies to implement the approved RP and develop a capacity building plan as required;
- Develop a feasible resettlement action plan including schedule, implementation arrangement, responsibilities and personnel...
- Update the monitoring mechanism including internal and external monitoring plans and the grievance redress mechanism that has been established in the original RP. The Consultant shall take measures to ensure that the Grievance Redress Mechanism is disseminated to affected people and the community and ensure that affected people are aware of and have

access to this Grievance Redress Mechanism through appropriate communication measures.

TASK B5. Prepare the Ethnic Minority Development Plan (EMDP)

Based on results of the census survey and social impact assessment, the consultant prepares an Ethnic Minority Development Plan where required in meaningful consultation with ethnic minority people according to requirements of the WB's ESS7 and the Vietnamese Government's regulations. The EMDP should be submitted to the WB for review and clearance.

The EMDP is prepared to ensure that all positives and negatives impacts on the ethnic minority people are incorporated and implemented so that EM people will receive social and economic benefits appropriate with their culture.

- Free, prior and informed consent (FPIC) should be obtained from ethnic minority communities (as specified in ESS7) during the EMDP preparation process; especially in cases where there are adverse impacts on ethnic minority people's land and natural resources, displacement or negative impacts on ethnic minority group's cultural heritages.
- The Consultant should propose feasible mitigation measures and appropriate measures to ensure the rights of ethnic minority communities and maximize the benefits of the Project and be consistent with their culture.
- Establish culturally appropriate grievance redress mechanisms and publicize to ethnic minority communities.
- Establish FPIC mechanism, meaningful consultation framework and monitoring mechanism for EMDP during the Project implementation phase from project design update to O&M of construction works; and
- Develop institutional arrangements for EMDP implementation, including cost estimates, financial plans, schedules, roles and responsibilities for EMDP implementation.
- Requirements for the preparation of an EMDP:
  - (i) Types of programs and sub-projects proposed for funding;
  - (ii) Potential positive and negative impacts of such programs or sub-projects on EM people;
  - (iii) Social assessment plans for such programs or sub-projects;
  - (iv) Framework to ensure FPIC with Affected Ethnic Minority Communities during project preparation and implementation phases;
  - (v) Institutional arrangements (including capacity building where required) to screen project-funded activities, assess their impacts on EM people, prepare EMDPs and address any complaints arising;
  - (vi) Monitoring and reporting, including the Project's appropriate mechanisms and standards;
  - (vii) The Grievance redress mechanism is accessible, understandable, and suitable to the culture and traditions of ethnic minorities. Special attention is paid to the traditional grievance redress of ethnic minority

communities.

(viii) Disclosure of information on the prepared EMDP.

(ix) The EMDP must be practical with details depending on the specific projects and the nature of the impacts to be addressed. The EMDP shall include, but is not limited to the following contents:

(x) Overview of the Project

(xi) Summary of social assessment results.

(xii) Summary of the results of FPIC - based consultations with affected EM communities during project preparation;

(xiii) FPIC – based consultation Framework with affected EM communities during project implementation

(xiv) An action plan including measures to ensure that ethnic minority communities will receive social and economic benefits appropriate with their culture, including, where necessary, measures to enhance the capacity of project implementing agencies.

(xv) Once potential adverse impacts on ethnic minorities are identified, an appropriate action plan including measures for avoidance, mitigation or compensation for such adverse impacts should be developed.

(xvi) Cost estimates and financial plan for the EMDP.

(xvii) Grievance redress procedures that are accessible and consistent with the EM communities' culture and customs to to address complaints arising during project implementation. During designing grievance redress procedures, the available legality of grievance redress based on EM 's customs and traditions should be taken into account.

(xviii) Appropriate mechanisms and standards for monitoring, evaluation and reporting on the EMDP implementation. Monitoring and evaluation mechanisms should include FPIC – based consultation with affected EM communities.

- An EMDP outline is presented in the ESS7 standard of ESF.

TASK B6. Update ESCP, ESIA/ESMP, SEP, LMP

The approved ESIA/ESMP, ESCP, SEP, LMP are available on the internet, at website https://viwa.gov.vn/tuyen-truyen-pho-bien-phap-luat/

Depending on changes in scope and scale of ES impacts identified through detailed design and surveys, the ES instruments will be updated partly or fully.

Based on the results of reassessing the project's impact scope, the consultant will identify the factors that require updating. This includes reevaluating the environmental and social factors identified in the previous ESIA report and identifying changes in specific environmental, social, and legal conditions.

The consultant will conduct field surveys, consult with community and engage with stakeholders including local authorities and social organizations to collect updated data on the site-specific environmental and socio-economic conditions at project sites. Review the the ESIA report, update or prepare supplement

assessments if there are updates in engineering proposals.

Based on contract packaging of the civil works, the consultant will establish site-specific baseline outstanding features, and coordinate with the engineers to propose corresponding site-specific mitigation measures. The each of the civil work packages that involve dredging, the Consultant will prepare a Dredging and Excavation Management Plan (DEMP) as supplement to the ESMP. Such supplement will be attached to the construction Bidding Documents.

The content of the DEMP, as minimal, will include the followings: (i) descriptions on the locations, and scopes of dredging and excavation; (ii) dredging and excavation methods; (iii) Key site-specific key conditions at the dredging areas and associated facilities including dumping sites; (iv) volumes and characteristics of excavated materials and dredging materials, options for transportation and storage; (v) potential socio-environmental impacts and risks of dredging and excavation; (vi) mitigation measures; (vii) environmental monitoring and supervision requirements. Please note that additional soil/sediment samplings may be required for the preparation of the section (iv).

Consultation with stakeholders will be organized to present the site-specific mitigation measures. Feedback will be incorporated into the finalized site-specific mitigation measures.

Support will also be provided to PMU-W in preparing the Environmental and Social Commitment Plan (ESCP): based on findings from the ESIA and the project timeline, the consultant will assist PMU-W in updating the ESCP according to ESS1.

Update the Stakeholder Engagement Plan (SEP):

To clearly identify stakeholders during the project implementation, the SEP needs to be reviewed and updated during the detailed design phase. The consultant will update the Stakeholder Engagement Plan (SEP) in accordance with ESS10, aiming to facilitate stakeholder participation in the environmental and social assessment as well as the design and implementation of the Project.

To ensure the SEP is appropriately updated, the consultants need to implement strategies that attract stakeholder participation, including: (i) providing accurate information, (ii) managing community expectations, (iii) promoting understanding of issues and potential solutions, and (iv) leveraging local knowledge about risks.

Proposals should include engagement activities based on available information and the capacity to modify project design; identifying measures targeting vulnerable groups, such as women and children; and developing communication measures to receive input from the community.

Maintaining a grievance resolution mechanism (GRM) that is accessible and sensitive to all concerns is essential. The consultant will assist PMU-W in publicly announcing the updated SEP, ensuring it clearly explains participation opportunities and commits to providing information on the project's social and environmental activities.

<u>Update the Labor Management Procedure (LMP)</u>

The project will hire labor to construct and manage facilities. The consultant will assess potential labor management requirements and review existing laws and regulations to align with ESS2. Key areas to consider include:

Current national labor management processes with clear recruitment terms.

Regulations on equal opportunity and protection for vulnerable workers.

The role of labor organizations under national law.

Protection against all forms of forced labor and child labor.

Third-party labor management regulations to monitor contractor compliance.

Occupational health and safety measures based on EHSGs.

Grievance mechanisms for workers under current national law.

The consultant will refer to the prepared Labor Management Procedure and update it to fit the project's detailed design phase, while also assisting PMU-W in announcing the updated LMP to all stakeholders.

TASK B7 Preparation of Environmental Annex for Bidding document of each construction package

In addition to finalizing the ESHS (Environmental, Social, Health and Safety) terms and conditions in the main chapters of Bidding Documents (BD) for each civil work packages, the consultant will prepare an Environmental Annex for the BD of each civil work packages. The annex will include the following contents, as minimal: (i) brief description about the existing conditions at the sites of the package; (ii) key potential Environmental and social impacts and risks; (iii) mitigation requirements, which include selected mitigation measures in the approved ESIA/ESMP relevant to the work package, and the site-specific mitigation measures established during the detail design (including DEMP where appliable); (iv) contractor's responsibilities; (v) compliance framework

TASK B8. Support information disclosure and consultation

The Consultant will support PMU-W to conduct information disclosure and consultations at communal, district and provincial levels in the project area once social safeguards documents are updated during the detailed design phase.

Information disclosure: The resettlement policy framework, RP, EMDP, SEP. LMP etc., after being updated and approved by the WB and the Provincial People's Committee, will be widely disclosed at the provincial, district and commune People's Committees and at the community level. At the same time, they will be posted on the WB website and relevant local agencies' offices. In addition, the Consultant will organize meetings with the provincial, district and commune levels as well as with affected households and publicly disclose these documents as a part of the communication campaign and raising community awareness about the project.

Stakeholder Consultation: Based on the prepared SEP, the Consultant will conduct consultation meetings with relevant stakeholders (Provincial People's

Committee, District People's Committee, Commune People's Committee and affected households) and especially with local communities and affected households in the project area. Consultation will be in accordance with international good practices on stakeholder participation, consistent with or exceeding the requirements of Vietnam and the World Bank, along with the archiving of consultation minutes.

A consultation minute will include the location and date of the consultation, the number of participants in gender disaggregation, a summary of the topics discussed and comments received; and how the project will consider those comments.

7. CONSULTANT'S PROPOSAL

7.1. The Consultant is required to prepare his own proposal on the scope and quantity of additional surveys (if necessary) to be carried out in accordance with the current Vietnamese Standards on survey work and in accordance with the scope of work of the Project to ensure providing full and accurate input for the detail design as required by the Project. The financial proposal shall be based on the quantity, type of tests, measurement points and survey area.

The financial proposal of the Consultant shall include an estimate in man-months (including dredging, bank protection, roads, bridges, drainage systems, etc…) with a detailed estimate of the field investigation and survey. The scope of the investigation work is proposed but not limited to and does not overlap with the activities stated in Appendix 1 of this TOR.

7.2. Office expenses will be paid by the Consultant such as head office, field office, travel expenses (car, boat, ...), office equipment, clean water, electricity, information services ...

7.3. Consultant's financial proposal shall be made on basis of lump-sum contract. Various survey tasks should also be quoted on lump-sum basis as ceiling amounts with cost breakdown in unit-rates, so that payment will be made against actually conducted volume of surveys multiplying with quoted unit-rates and not exceeding the quoted ceiling. Provisional sums may be reserved for Survey tasks in the Consultant's offered price.

8. CONSULTANT'S INPUTS

8.1. The successful fulfillment of the scope of services requires professional qualification in the fields of inland waterways and associated facilities, flood control, irrigation, road and bridge (pavement, drainage, structural, soils and materials engineering) improvement/or upgrading, transport economics, transport engineering (multimodal and logistics systems and management of waterway information systems).

8.2. In view of the wide geographical region covered by the project's components and subcomponents and the budget available for the project it is anticipated that key professional staff will be drawn jointly from international and Vietnamese professionals.

8.3. The consultants will arrange two teams with the capacity of (i) undertaking detailed design and integration of multimodal transport systems including waterways, roads, and others, and (ii) knowledge, expertise, and experience in ESF, conducting ES assessments and preparing ES documents.

8.4. The implementation period of this consultancy service is 12 months (including 10 months for survey, design, preparation of bidding documents, updating/preparing ES instruments and 02 months for finalization supporting, editing and appraisal/ approval).

8.5. The expected staff of the Consultant is including but not limited to:

a) Key Staff (KS):

No.	Key Staff (KS)	Minimum required number of staff	Internationally /Nationally Experienced qualification (IE/NE)
K1	Design Team Leader (Senior Waterway/Marine Engineer)	1	IE
K2	Environmental Specialist	1	IE
K3	Social/Resettlement Specialist	1	NE
K4	Waterway/Marine Engineer	1	NE
K5	Bridge Engineer	1	NE
K6	Construction Economic Engineer/Quantity Surveyor (for cost estimate & BOQ)	1	NE
K7	Procurement Expert	1	IE
K8	Topographical Engineer	1	NE
K9	Geotechnical Engineer	1	NE

b) Other Staff (OS):

To support the foreign staff and key personnel during the service provision period, the Consultant may recruit domestic engineers/experts - those with good professional qualifications and extensive experience suitable for the assigned work and tasks, including:

No.	Other Staff (OS)	Minimum required number of staff	International /National experience (IE/NE)
O1	Waterway/Marine Engineer	2	NE
O2	Bridge Engineer	2	NE
O3	Road Engineer	1	NE
O4	Construction Economic Engineer/Quantity Surveyor (for costestimate & BOQ)	1	NE
O5	Hydrographic Engineer	1	NE
O6	Social/Resettlement Specialist	1	NE
O7	Ethnic Minority Specialist	1	NE
O8	Environmental Engineer	1	NE
O9	Hydrodynamic Model Specialist	1	NE
O10	Procurement Specialist	1	NE

c) Supporting Staff (SS):

No.	**Supporting Staff (NE only)**	**Minimum required number of staff**
S1	Design support engineer (CAD operator)	2
S2	Construction Economic Engineer	1
S3	Material Engineer	1
S4	Bidding document Specialist	1
S5	Gender / Community development Specialist	1
S6	Livelihood/Social development Specialist	1
S7	Statistics and data analysis Specialist	2
S8	Field social survey investigator	2
S9	Secretary, office manager	1
S10	Translator / Interpreter	1
S11	Administrative staff / Typist	1

Unlike key staff and other staff, CVs of support staff do not need to be reviewed before signing the contract. They also do not need to be named in the Consultant's proposals. The Consultant will propose support personnel when requested according to the documents specified in the Organization section. These documents must clearly state whether they are recruited as senior/mid-level or whether the recruitment period is long-term/short-term, so the salary level must be clarified in the detailed budget estimate for each document. All personnel must be independent and must not take advantage of their position for personal gain. The selection process of other personnel carried out by the Consultant must be transparent and based on pre-determined criteria including professional qualifications, foreign languages and work experience. It should be noted that officials and other personnel of state management agencies of the beneficiary countries of the project cannot be recruited as experts, except with a prior written proposal from the Investor. The final report will be prepared in both English and Vietnamese, consultants may have a translator on their team or propose alternative measures to ensure high quality and reliable translation.

Note: All consultant staff must have a practicing certificate corresponding to the proposed position in compliance with relevant regulations.

d) Professional qualifications of key staff

(i) **K1-Team leader for design (Senior Waterway Engineer) (IE)** in addition to defining and supervising the activities of other members of the consultancy team and liaising with the PMU-W, is expected to provide key technical inputs, training of Vietnamese staff and ensuring consistency of approach. The Team Leader should possess versatile experience with major complex projects. In addition to holding a suitable university degree, the Team Leader should be an experienced waterways engineer with more than 20 years of professional experience and with more than 10 years as the Team Leader of relevant

experience waterway including designing of entrance channel, construction of inland waterway, and waterways facilities (bank protection works, aids to navigation etc.) and in engineering design of bridges including extensive experience of working in and managing consultancy teams in developing countries on similar preliminary/detailed engineering design and technical-economical feasibility studies, and bidding documents preparation assignments use MDB-funded / ODA projects.

(ii) **K2 - Senior Environmental Specialist (IE):** must hold at least a Master degree in environmental science, engineering, or a relevant background. The specialist must have at least 15 years of work experience, including at least three projects with dredging activities and experienced in environmental impact assessment and management systems; be familiar with environmental impact assessment and management systems of multilateral funded projects; experienced in incorporating environmental mitigation measures into engineering design, especially in waterway projects, and have knowledge/experience in the Environmental and Social Framework of the World Bank.

(iii) **K3 - Senior social and resettlement Specialist (NE):** must hold at least a Master degree in social sciences, economics, community development or equivalent; with at least 10 years of relevant experience in social safeguard policies, social impact assessment, social risk management, involuntary resettlement, stakeholder engagement, preferably in large infrastructure projects including waterway projects; Have working experience in at least 02 ODA projects on position of social specialist; Have knowledge/experience in the ESF of the WB; Proficiency in English, both oral and writing, is required.

(iv) **K4 – Waterway Engineer (NE):** will inter alia, be for all studies to start up waterways and embankments condition and inventory surveys, to carry out alignment selection, to start up survey activities, and to train his counterparts in the performance of their duties during his absence. In addition to holding a suitable university degree he must be a versatile waterways engineer with more than 15 years of professional experience and with more than 8 years of relevant experience including extensive experience and guiding local consultancy teams on similar preliminary/detailed engineering design.

(v) **K5 - Bridge Engineer (NE)**: will be responsible for hydrological and flooding analysis, inspection and rehabilitation design of existing structures and design of new structures. In addition to holding a suitable university degree, the Bridge Engineer is expected to be a highly versatile structural engineer with more than 15 years of professional experience and with more than 8 years of relevant experience including extensive experience and guiding consultancy teams on similar structures design, bridge rehabilitation, bridge design.

(vi) **K6 - Construction economic engineer/Quantity Surveyor (NE):** (Leader for cost estimation and BOQ) must have at least a university degree in construction economics, at least 15 years of experience as a project cost estimate leader and a first-class construction valuation practice certificate. In addition, the person in charge of cost estimate must have 8 years of experience in cost estimate and BOQ preparation in international projects for construction of

maritime/port/waterways.

(vii) **K7 – Procurement Expert (IE)**: will graduate from technical university majoring in transport, construction, waterways or equivalent engineering disciplines and having; At least 15 years of experience as procurement expert under MDB-financed projects and having participated in Bidding document preparation for at least 2 MDB-funded / ODA projects with considerable dredging/waterways/maritime works

(viii) **K8 - Topographical Engineer (NE):** will graduate in surveying/civil engineer or a related field. Survey Engineer with more than 15 years of professional experience and with more than 8 years of relevant experience in survey works. Knowledge of surveying techniques and instrumentation. Ability to work independently in organizing and conducting/supervising surveys. Experience with surveying underground utilities and in the setting out of waterways and related facilities would be an asset.

(ix) **K9 - Geotechnical Engineer (NE):** will be responsible for all geotechnical surveys and investigations for the rehabilitation sections, for soils and embankment investigations including foundation investigations for all new and improved structures, and for materials investigations for all works. In addition to holding a suitable university degree he must be a versatile Soils and Materials Engineer with more than 15 years of professional experience and with more than 8 years of relevant experience including extensive experience of working in and guiding local consultancy teams in developing countries on similar preliminary/detailed engineering design and technical-economical feasibility studies.

e) Professional qualifications of other staff

(i) **O1 - Waterway/Marine Engineer (NE):** requires knowledge and experience in the design of hydraulic works and shipping channels as well as understanding of changes in hydraulic regimes due to the impact of the proposed or existing construction system to propose appropriate technical solutions to ensure stability, limit erosion, and design dredging. In addition to possessing a suitable university degree and a corresponding practice certificate, this Engineer must have at least 15 years of professional experience working in this field and more than 10 years of experience working in related fields of structural design of bank protection embankments or river and sea-based works.

(ii) **O2 - Bridge Engineer (NE):** University graduate in bridge engineering, with a corresponding design certificate. This position requires more than 10 years of experience in designing bridge works. Ability to work independently in organizing and performing related tasks.

(iii) **O3 - Road Engineer (NE):** Graduated from a university with a related major and a relevant design certificate. This position requires more than 10 years of experience in designing road projects. Ability to work independently in organizing and performing related tasks.

(iv) **O4 - Construction Economic Engineer/Quantity Surveyor (NE):** Prepare estimates and total estimates for all project items, estimates and costs for construction and installation packages, other related costs such as site clearance,

project management, inspection, appraisal, etc. according to State regulations. This engineer must have a minimum of a university degree in construction economics with relevant professional experience and practice certificate. This position requires a minimum of 10 years and more than 7 years of working experience in related fields.

(v) **O5 - Hydrological Engineer (NE):** Graduated from a university with a relevant major and a relevant practice certificate. The engineer needs more than 10 years of experience in surveying and designing hydrological projects. Ability to work independently in organizing and performing related tasks.

(vi) **O6 - Social/Resettlement/Policy Specialist (NE)**: Participate in preparing research toolkits; Participate in conducting socio-economic surveys, social impact assessments, community consultations, meetings and workshops with stakeholders. Bachelor's degree in social sciences or a closely related field is required. At least 8 years of working experience in the field related to the assignment with ODA projects (WB, ADB, AFD or other donors). Experience in resettlement planning, social risk management and stakeholder engagement in multilateral funded projects is required.

(vii) **O7 - Ethnic Minority Specialist (NE):** Participate in preparing research toolkits and EMDP; Participate in conducting socio-economic surveys, social impact assessments, FPIC, meetings and workshops with stakeholders, including EM people; Participate in writing related reports; University degree in social sciences (culture, sociology, psychology, ethnology, anthropology or equivalent). Minimum 8 years of experience in social, ethnic minority, and community development planning/assessment for infrastructure and transportation projects funded by MDB or other donors).

(viii) **O8 - Environmental Engineer (NE):** Graduated from a university of environmental or relevant engineering. Minimum 10 years of relevant working experience, work experience in environmental monitoring/supervision in at least one waterway-related project. Experience in environmental management of multilateral funded projects is preferred.

(ix) **O9 - Hydrodynamic Model Specialist (NE):** will be a university graduate in surveying/civil engineering or a related field. Survey Engineer with more than 15 years of professional experience and with more than 8 years of relevant experience in survey works. Knowledge of surveying techniques and instrumentation. Ability to work independently in organizing and conducting/supervising surveys.

(x) **O10 - Procurement Specialist (NE):** will graduate from universities majoring in economics, transport, construction, water science or equivalent engineering disciplines and having a Bidding Certificate (construction and installation field) or a Professional Certificate in Bidding according to Circular 02/2024 of the Ministry of Planning and Investment. The specialist must have at least 10 years of experience as procurement expert under investment projects and having participated in Bidding document preparation for at least one (01) ODA project with considerable construction works.

Domestic support staff must meet the following requirements:

- University degree in related fields and have professional qualifications

(postgraduate preferred), have a relevant practice certificate and have at least 10 years of experience.
- Experience working with infrastructure development projects in the transport sector
- Ability to speak and write English well.

f) Key staff evaluation:

The technical proposal should include CVs for all listed personnel (both Key Personnel and Other Personnel).

- Only Key Personnel listed in ITC, Data Sheet 21.1(iii) shall be considered in the evaluation under ITC Clause 21.1(iii). The evaluation of Key Personnel shall be based on the qualifications of the proposed key positions regardless of nationality. In other words, positions requiring international experience do not require international consultants. These positions may be held by Vietnamese personnel with international experience.
- All other personnel (except domestic support personnel) shall be considered in the evaluation under ITC Clause 21.1(ii).
- The CVs of Key Personnel and Other Personnel shall be included in the tender for evaluation. The CVs of domestic supporting staff are not considered for evaluation during the bidding process but must be submitted to the PMU-W for review and approval before mobilization.
- All staff must be independent and must not take advantage of their position for personal gain. The selection process for other staff by the Consultant must be transparent and based on pre-determined criteria including professional qualifications, foreign languages and professional experience. Officers and other staff working in state management agencies of the project beneficiary country cannot be recruited as experts, except with a prior written proposal from the PMU-W. The final report will be prepared in both English and Vietnamese, so the Consultant may have a translator on the team or propose alternative measures to ensure high quality and reliable translation.

9. TIME TABLE FOR SERVICES AND REPORTS

9.1. Design Drawings and Reports:

The Consultant will submit the reports and documents (but not limited) as listed below to the indicated schedule within the time periods from the date of contract signing, as follows:

(i) **One (01) month** after notice to proceed, the Consultant will submit an Inception Report (06 copies including 03 copies of Vietnamese language and 03 copies of English language and 02 copies of electronic files) defining the scope of field survey and investigation works, proposed design standards, the design methodologies and proposed design codes. The report will also include a detailed of the consultant's work program and propose contents requiring support from MOT/PMU-W (if any).

(ii) Review report on FS reports and basic design within **02 months** (06 copies including 03 copies of Vietnamese language and 03 copies of English language and 02 copies of electronic files). The consultant will review the construction

design solutions in the FS and propose design changes and adjustments (if any) for PMU to consider.

(iii) The report of survey the topography, geotechnical and hydrology of the Project's waterway corridors, bridges, frontage roads and bank protection within **05 months (**12 copies including 06 copies of Vietnamese language and 06 copies of English language and 02 copies of electronic files for each type of the report).

(iv) Draft of design drawings and reports for all construction work items will be submitted within **06 months** (10 copies including 05 copies of Vietnamese language and 05 copies of English language and 02 copies of electronic files) for the Review Consultant and PMU-W to comment.

(v) Draft final report, design drawings, bill of quantities, cost estimates, material investigation reports and the bidding documents will be submitted within **08 months** (08 copies including 04 copies in Vietnamese language and 04 copies in English language and 02 copies electronic files). The Review Consultant, PMU-W and World Bank will provide comments on the drafts within **01 month** after receipt of the required documents; The Consultant is responsible for completing all the above documents within **01 month** (16 copies including 08 copies in Vietnamese language and 08 copies in English language and 02 copies electronic files) to PMU-W for appraisal by MOT.

(vi) Final Report (20 copies including 10 copies Vietnamese language and 10 copies English language and 2 copies of electronic files) will be submitted by maximum **01 month** since the receipt of comment of appraisal/approval from the MOT/PMU-W and World Bank comments on the draft final report, bidding document.

(vii) Arrange and hand over to PMU-W boundary markers of dredging works within **12 months** (ie 01 month after notice to proceed and the Ministry of Transport/PMU-W approval) including work items (bridges/roads, bank protection …).

9.2. Bidding documents:

The Consultant will prepare and submit the bidding documents within the time periods from the date of contract signing, as follows:

(i) Draft construction packages document (in consistent with, or possibly with recommended modifications with due justifications to the PPSD) must be submitted within **08 months** together with the draft final of detailed designs concurrence with PMU-W and endorsement by the World Bank.

(ii) The Draft Final Bidding Documents will be submitted within 10 months. The MOT/PMU-W and World Bank will provide comments on the drafts within one month after receipt of the documents. Then, the Consultant shall incorporate any changes required and prepare twenty (20) sets and two (2) copies of electronic files (for each contract package) of the tender documents (Additional copies might be required on request of PMU-W to be used for the bidding purposes).

(iii) Bidding Drawings should be submitted in A3 size. All documents will follow the current, relevant Standard Bidding Documents of the World Bank and Vietnamese applicable standards. The Final Bidding Documents for

construction packages include the following main documents:

Volume 1:

- Instructions to Tenderers, General Information, Form of Tender Guarantee
- Form of Tender and form of Contract
- General Conditions of Contract and Particular Conditions of Application
- Form of Performance Bond and Form of Guarantee of Advance Payment
- Bills of Quantities
- Various Schedules

Volume 2:

- Technical Specifications

Volume 3:

- Bidding Drawings.

Volume 4:

- Information on materials (only for reference)

9.3. Update Resettlement Plans and prepare Ethnic Minority Development Plans

The Consultant shall submit the following deliverables to the PMU for submission to the WB and relevant stakeholders:

- **Inception report:** will be submitted in **01 month** after the contract is signed. This report will outline the implementation methodologies including questionnaires, data collection tools, monitoring methods inclusive of technical tools of each method, tables and report contents, and inform the Client of the initial key findings, clarify important issues related to the tasks in TOR, Client's personnel, facilities, or supports. This includes the time and responsibilities of the monitoring team performing the above tasks. Prepare a detailed workplan for all activities conducted during the contract implementation, including the assignment of tasks, number of office and field working days of each key expert.
- **Deliverables and submission deadline**: are described in Table below.
- Drafts must be submitted to the Client one month in advance for review and comments.
- All reports will be prepared in Vietnamese and translated into English. Final reports in English and Vietnamese, and data recorded in CD-ROM/USB will be submitted to the Client.
- All reports must be submitted to the WB for review and approval and approved by the PMU in line with current regulations. In case the report must be revised based on WB's comments, the revised report will be submitted to the PMU within 05 (five) working days so that the PMU will submit it to WB for review and approval.

9.4. Summary schedule for deliverables

No.	Deliverables	Quantity		Submission deadline
		English	Vietnamese	
1	Completed Inception reports for Task A1 and Task B1 (included FS review)	03	03	02 month after contract signing
2	Completed Survey reports (Tasks from A2 to A5 and Task B2) as accepted by the Project Owner	06	06	05 months after contract signing
3	Updated Resettlement Plan (uRP) / Ethnic Minority Development Plan (EMDP), ESCP, ESIA/ESMP, SEP, LMP (Tasks from B3 to B6) submit PMU-W and WB comment as accepted by the Project Owner	05	05	08 months after contract signing
4	Draft Final Report of Detailed Designs, draft Bidding documents (harmonized NCB template for works with rated criteria) (Tasks from A6 to A9) submit Review Consultant, PMU-W and WB comment as accepted by the Project Owner	05	05	08 months after contract signing
5	Completed Draft Final Report of Detailed Designs for MOT appraisal, Tender packaging and draft final Bidding documents for all construction packages (Tasks from A6 to A9) including Environmental annex for the construction Bidding documents (Task B7)	06	06	10 months after contract signing
6	Information disclosure and consultation plans (Task B8) and Final Report of Detailed Designs for PMU-W approval and final Bidding documents for all construction packages including Environmental annex for the construction Bidding documents (Tasks from A6 to A9 and Task B7)	10	10	12 months after contract signing

10. PAYMENT SCHEDULE

Payments under the Lump-sum contract shall be made in installments at certain percentage,

each of which should be closely linked with the completed delivery of the clearly required outputs/services/reports by the Consultant upon verification and acceptance by the Client. The following Payment schedule is provided **indicatively** and will be finalized in the Request for Proposal to be issued to shortlisted consultants. In Financial proposals, consultants are required to breaking down the Total Contract Value into separate costs for lump-sum items, that may include but not limited to (i) Survey Cost, (ii) Design Cost, (iii) Cost for finalizing Bidding Documents, and any other relevant costs:

No.	Deliverables	Submission deadline	Payment schedule
(1)	Possible Advance - up to Consultant's discretion		10% advanced payment of the Total Contract Value (included Survey Cost) after contract signing against bank guarantee for the same value and subject to equal repayment in 04 subsequent installments
1	Accepted Inception reports for Tasks A1 and B1 / FS review by the Project Owner	02 month after contract signing	(Cumulative) Payment up to 20% the Total Contract Value (included Survey Cost), after first repayment of advance (if any)
2	Data collection and completed Survey reports (Tasks from A2 to A5 and Task B2) as accepted by the Project Owner	05 months after contract signing	(Cumulative) Payment up to 90% Survey Cost (only), after second repayment of advance (if any)
3	Draft Final Report of Detailed designs, Bidding documents (Tasks from A6 to A9); Updated Resettlement Plan (uRP) / Ethnic Minority Development Plan (EMDP), ESCP, ESIA/ESMP, SEP, LMP (Tasks from B3 to B6) as accepted by the Project Owner	08 months after contract signing	(Cumulative) Payment up to 65% of Total Contract Value, after third repayment of advance (if any)
4	Completed Draft Final Report of Detailed Designs for MOT appraisal, Tender packaging and draft final Bidding documents for all construction packages (Tasks from A6 to A9) including Environmental annex for the construction Bidding documents (Task B7) as accepted by the Project Owner	10 months after contract signing	(Cumulative) Payment up to 80% of Total Contract Value, after final repayment of advance (if any)

No.	Deliverables	Submission deadline	Payment schedule
5	Final Report of Detailed Designs, Tender packaging and final Bidding documents for all construction packages (Tasks from A6 to A9) including Environmental annex for the construction Bidding documents (Task B7) as approved by the Project Owner / Hand over to PMU-W boundary markers and carry out the boundary marks of site clearance on the field / Information disclosure and consultation plans (Task B8) as accepted by the Project Owner	12 months after contract signing	(Cumulative) Payment up to 100% of Total Contract Value, excluding retention amount as agreed for author supervision cost
6	Final payment (for author supervision cost)	after final acceptance for all accomplished construction works at the project closing	Final Payment the agreed retention amount for author supervision cost (normally 5% of Design Cost)
	Total		**100%**

11. OTHER REPORTS AND ELECTRONIC DOCUMENT FORMAT

In addition to the regular reports mentioned above, the Consultant will provide special reports as required by the work:

11.1. Recommendations for technical evaluation to the evaluation reports for supervision consultant and civil works, technical inputs assisting contract award recommendations (when necessary).

11.2. Upon request, the Consultant will prepare relevant files and documents for reporting to competent authorities in English and Vietnamese. The number of copies will depend on the work requirements.

11.3. Upon request, the Consultant will prepare other reports for PMU-W to carry out management work. These reports can be prepared in English or Vietnamese depending on the requirements.

11.4. Electronic Document Format

11.5. All electronic documents submitted to PMU-W including plans, drawings, technical requirements, reports and other documents must comply with the following requirements:

- Design drawing files must be prepared using Auto Cad (*.dwg) and/or MicroStation (*.dgn) and other specialized copyrighted software.
- Documents and reports must be prepared using Microsoft Word, Excel, Project, etc.

12. COPYRIGHT, RIGHT TO USE DOCUMENTS AND INFORMATION DISCLOSURE

12.1. Copyright in all drawings, reports, technical specifications, bill of quantities, calculations, software, models, source codes and object codes and other documents provided by consultants related to the project shall belong to PMU-W. The Consultants shall indemnify PMU-W against any claim in respect of any action, demand, suit or demand arising out of or for any infringement of intellectual property rights in connection with the provision of the consulting services.

12.2. The Consultants/sub-consultants (if any) shall ensure that all goods and services (including, without limitation, all computer hardware, software, and systems) obtained by the Consultants/sub-consultants shall not be subject to any payment provided or reimbursed by the Employer or used by the Consultants/sub-consultants in the performance of the services shall not infringe or infringe any industrial property or intellectual property rights or claims of a Third Party. The Consultants with the consent of PMU-W may publish, either alone or in conjunction with others, articles, photographs and illustrations relating to the Project.

13. STANDARDS OF PERFORMANCE AND ACTION

13.1. In performing the Consulting Services, the Consultant shall demonstrate the highest level of ethics, integrity and diligence in full consistence with the best standards of the consultancy profession in order to serve the ultimate interests of the Client. The Consultant shall promptly replace any personnel assigned to such work whom the Client finds as unsatisfactory.

13.2. In the course of work under this Contract, including field work, the Consultant's personnel providing the Services are required to complete time schedules or any other documentation used to determine the time and costs incurred, as instructed by the Client. The Consultant shall maintain accurate and systematic records and accounts relating to the Services, which shall clearly identify all fees and costs. The Employer reserves the right to audit, or nominate a reputable accounting firm to audit, the records of the Consultant relating to the amounts declared under the terms and any extensions of the Contract, and for three months thereafter.

14. SUPPORT FROM THE PROJECT OWNER

14.1. The PMU-W shall be responsible for selecting a qualified consultant to perform this assignment. The PMU-W shall assign a staff in charge of the package to coordinate with the consultant throughout the duration of the consultancy service.

14.2. The PMU-W shall provide the consultants with access to all available data, information and internal documents relating to the consultancy services.

14.3. The PMU-W shall also provide the Consultant with written support when dealing with local authorities and agencies relevant to the consultant's work.

APPENDIX 1: REQUIREMENTS FOR SITE SURVEY

1. TOPOGRAPHICAL SURVEY AND DATA COLLECTION

1.1. Purpose

The consultant must prepare a survey outline to submit to PMU-W for review and approval before performing the topographical survey task to serve the detailed designs phase and serve as a basis for geotechnical survey and hydrological survey.

Collect data on current status of infrastructure related to the Project such as bridges, power lines and saltwater prevention culverts that may restrict navigation and prolong journey of inland vessels. In addition, it is necessary to collect information on current status of existing navigation aids system, ferries, local roads and other architectural structures that may fall within the project's scope of impacts.

1.2. Scope of work

Topographical survey and data collection of existing works during detailed designs phase for SWCLD Project including following items:

- Collecting data on existing works.
- Setting out site clearance benchmarks for the following work items: Mang Thit river, Cho Lach canal, Cho Lach 2 bridge, Rach La canal.
- Underwater and on land topographical survey of Mang Thit river.
- Underwater and on land topographical survey of Cho Lach canal and Cho Lach 2 bridge.
- Underwater and on land topographical survey of Rach La canal.
- Underwater topographical survey of Rach Ky Hon canal.
- Underwater topographical survey of Tra On river.
- Underwater and on land topographic survey of Tac Cua river.
- Topographical survey of dumping site (on land).
- Survey area for each canal sections as follows:

No.	Work description	Unit	Quantity
1	**Mang Thit river and canal**	**46,9 km**	
1.1	On land topographic survey scale 1/1000, contour line 1m	100ha	1,32
1.2	Underwater topographic survey scale 1/1000, contour line 1m	100ha	7,27
2	**Cho Lach canal and Cho Lach 2 bridge**	**7,9 km**	
2.1	On land topographic survey scale 1/1000, contour line 1m	100ha	0,34
2.2	Underwater topographic survey scale 1/1000, contour line 1m	100ha	0,75
3	**Rach La**	**10,2km**	
3.1	On land topographic survey scale 1/1000, contour line 1m	100ha	0,33
3.2	Underwater topographic survey scale 1/1000, contour line 1m	100ha	2,19
4	**Rach Ky Hon**	**6,8km**	
4.1	Underwater topographic survey scale 1/1000, contour line 1m	100ha	0,79

No.	Work description	Unit	Quantity
5	**Tra On river**	**9,2 km**	
5.1	Underwater topographic survey scale 1/1000, contour line 1m	100ha	2,33
6	**Tac Cua river**	**6,4 km**	
6.1	Underwater topographic survey scale 1/1000, contour line 1m	100ha	1,28
7	**Disposal area**		
7.1	On land topographic survey scale 1/1000, contour line 1m	100ha	1,381

1.3. Requirements on applicable standards and technical specifications

a) General requirements

- Investigate and collect data on current status of structures related to the Project such as bridges, power lines, saltwater prevention culverts, existing navigation aids systems, ferries and landing stages, water and waterway usage (for waterway transport, boat parking, fishing, water intakes, water discharge, aquaculture etc.) frontage roads and other architectural structures, existing settlements, infrastructures, public works (schools, markets, clinics, offices etc.), tourism/religious activities or facilities that may be located within the project's areas of influences.
- Comply with current procedures and regulations for surveying and establishing topographic maps.
- Surveying equipment must have valid inspection and an accuracy appropriate to technical requirements of measurement standards.
- Topographic maps must fully present terrain, geological objects, above-ground structures, underground structures, low-voltage and high-voltage power lines, communication networks, related planning, etc. and special geological objects, historical relics, temples, shrines, cemeteries, etc.
- Concrete benchmarks controling coordinates, elevations adhere to technical specifications for use in subsequent phases.
- Establish topographic documents according to regulations and submit them on time.

b) Applicable codes, standards

In topographic survey work, applicable standards and specifications include but are not limited to those in the following table:

No.	Name of standards, specifications	Code
1	National technical regulation on establisment of leveling network	QCVN 11: 2008/BTNMT
2	National technical regulation on estabilsment of horizontal control network	QCVN 04: 2009/BTNMT
3	Technical measuring and processing GPS data in engineering survey	TCVN 9401:2012
4	Surveying in construction – General requirements.	TCVN 9398:2012
5	Survey for Construction - Basic Principles	TCVN 4419-1987

No.	Name of standards, specifications	Code
6	Technical regulations for direct topographic measurement for the establishment of topographic maps and geographic base databases at scale 1:500, 1:1000, 1:2000, 1:5000	Circular 68/2015/TT-BTNMT
7	On the use of parameters for conversion from the World Geodetic System WGS-84 and the National Geodetic System VN-2000; Instruction on the use of parameters for conversion from the World Geodetic System WGS-84 and the National Geodetic System VN-2000.	Decision 05/2007/QD-BTNMT Document 1123/DDBD-CNTD
8	Hydraulic structures - Topographic survey requirements	TCVN 8478:2018

1.4. Implementation quantity

Quantities of topographic survey and data collection of existing works are as follows:

No.	Work description	Unit	Quantity
	Data collection of existing works	**Lump-sum**	1
I	**TOPOGRAPHICAL SURVEY**		
1.1	**Mang Thit river / canal and disposal sites**	**46,9 km**	
1.1.1	Horizontal control network grade IV	point	24,00
1.1.2	Leveling network grade IV	km	61,90
1.1.3	Buy State coordinates and elevation markers	mark	5,00
1.1.4	Traverse control network level 1	point	47,00
1.1.5	Traverse control network level 2	point	94,00
1.1.6	Technical leveling network	km	46,90
1.1.7	On land topographic survey scale 1/1000, contour line 1m	100ha	1,32
1.1.8	Underwater topographic survey scale 1/1000, contour line 1m	100ha	7,27
1.1.9	Measurement and drawing of longitudinal section of embankment scale 1/1000	100m	135,31
1.1.10	Measurement and drawing of cross section of embankment scale 1/200	100m	173,20
1.1.11	Measurement and drawing of longitudinal section of frontage road scale 1/1000	100m	20,82
1.1.12	On land topographic survey scale 1/1000, contour line 1m (for disposal sites)	100ha	0,68
1.1.13	Site clearance benchmarking	benchmark	267,00
1.2	**Cho Lach canal and disposal sites**	**7,9 km**	
1.2.1	Horizontal control network grade IV	point	4,00
1.2.2	Leveling network grade IV	km	22,91
1.2.3	Buy State coordinates and elevation markers	mark	3,00
1.2.4	Traverse control network level 1	km	10,00
1.2.5	Technical leveling network	km	7,91
1.2.6	On land topographic survey scale 1/1000, contour line 1m	100ha	0,32

No.	Work description	Unit	Quantity
1.2.7	Underwater topographic survey scale 1/1000, contour line 1m	100ha	0,75
1.2.8	Measurement and drawing of longitudinal section of embankment scale 1/1000	100m	154,85
1.2.9	Measurement and drawing of cross section of embankment scale 1/200	100m	198,21
1.2.10	Measurement and drawing of longitudinal section of frontage road scale 1/1000	100m	38,87
1.2.11	On land topographic survey scale 1/1000, contour line 1m (for disposal sites)	100ha	0,50
1.2.12	Site clearance benchmarking	benchmark	268,00
1.3	**Cho Lach 2 Bridge**		
1.3.1	Horizontal control network grade IV	point	1,00
1.3.2	Leveling network grade IV	km	1,37
1.3.3	Traverse control network level 2	point	1,00
1.3.4	Technical leveling network	km	1,37
1.3.5	On land topographic survey scale 1/1000, contour line 1m	100ha	0,02
1.3.6	Measurement and drawing of longitudinal section of bridge scale 1/1000	100m	3,45
1.3.7	Measurement and drawing of cross section of acess road scale 1/200	100m	5,40
1.3.8	Site clearance benchmarking	benchmark	20,00
1.4	**Rach La and disposal sites**	**10,2 km**	
1.4.1	Horizontal control network grade IV	point	6,00
1.4.2	Leveling network grade IV	km	25,20
1.4.3	Buy State coordinates and elevation markers	mark	3,00
1.4.4	Traverse control network level 2	point	21,00
1.4.5	Technical leveling network	km	10,20
1.4.6	On land topographic survey scale 1/1000, contour line 1m	100ha	0,22
1.4.7	Underwater topographic survey scale 1/1000, contour line 1m	100ha	2,19
1.4.8	Measurement and drawing of longitudinal section of embankment scale 1/1000	100m	7,05
1.4.9	Measurement and drawing of cross section of embankment scale 1/200	100m	9,02
1.4.10	On land topographic survey scale 1/1000, contour line 1m (for disposal sites)	100ha	0,20
1.4.11	Site clearance benchmarking	benchmark	26,00
1.5	**Rach Ky Hon**	**6,8 km**	
1.5.1	Horizontal control network grade IV	point	4,00
1.5.2	Leveling network grade IV	km	21,40
1.5.3	Buy State coordinates and elevation markers	mark	2,00

No.	Work description	Unit	Quantity
1.5.4	Traverse control network level 2	point	19,00
1.5.5	Technical leveling network	km	9,20
1.5.6	Underwater topographic survey scale 1/1000, contour line 1m	100ha	2,33
1.6	**Tra On river**	**9,2 km**	
1.6.1	Horizontal control network grade IV	point	5,00
1.6.2	Leveling network grade IV	km	24,20
1.6.3	Buy State coordinates and elevation markers	mark	2,00
1.6.4	Traverse control network level 2	point	19,00
1.6.5	Technical leveling network		9,20
1.6.6	Underwater topographic survey scale 1/1000, contour line 1m	100ha	2,33
1.7	**Tac Cua river**	**6,4 km**	
1.7.1	Horizontal control network grade IV	point	4,00
1.7.2	Leveling network grade IV	km	21,80
1.7.3	Buy State coordinates and elevation markers	mark	2,00
1.7.4	Traverse control network level 2	point	14,00
1.7.5	Technical leveling network	km	6,80
1.6.6	Underwater topographic survey scale 1/1000, contour line 1m	100ha	1,28
1.6.7	On land topographic survey scale 1/1000, contour line 1m (for disposal sites)	100ha	0,001

1.5. Implementation time

The implementation time for topographical survey and data collection of existing works shall be 90 days.

2. HYDROLOGICAL SURVEY

The consultant must prepare a hydrological outline to submit to PMU-W for review and approval before performing the task. In addition to utilizing hydrological data conducted in previous studies, during this phase, it is necessary to carry out additional hydrological surveys to verify data from previous studies and update hydrological data of the project at the time of detailed design implementation.

2.1. Purpose

Carry out data collection and hydrological survey to provide input data for the hydrodynamic model to calculate hydrological and hydraulic parameters to serve the detailed design of ship navigation channels, bank protection, bridges, roads, navigation aids, etc. within the scope of the Project.

2.2. Scope of work

Collecting meteorological and hydrological data and establishing monitoring stations includes:

- Collecting documents and data that have been done in the previous step.
- Collecting data on the highest, average and lowest water levels of the year during

the monitoring period; hourly water levels and salinity, flow and sediment content from 2016 to 2023 at hydrological stations in the Project implementation area.

- Monitoring water levels at peak tide and low water times.
- Monitoring flow rate and flow.
- Measuring salinity and suspended matter flow.
- Taking samples of bottom mud and sand.
- Preparing a hydrological survey report.
- Water level monitoring: The total monitoring is 14 days, divided into 02 periods, each period of 07 consecutive days during the high water period (peak tide/flood) and low water period. 24-panel monitoring mode (24-hour/day and night monitoring)
- Monitoring of flow rate and flow volume: Total monitoring time of 14 days, divided into 2 periods, each period of 07 consecutive days during the high water period (peak tide/flood) and the low water period. 24-panel monitoring mode (24-hour/day and night monitoring).
- Measuring salinity and silt content: Total time of 4 days and also divided into 02 periods coinciding with the water level and flow monitoring time. 24-panel measuring mode.
- Sampling of bottom mud and sand: At the water level monitoring point at beginning and end points of the proposed canal (Mang Thit and Cho Lach canals). Number of monitoring points: 05 for each river/canal.

2.3. Requirements on applicable standards and technical specifications

a) General requirements

The hydro meteorological survey records must show the following information:

- *Water level:* There must be records of observed or long-term water levels and related data from monitoring stations. The longer the period of recording of such data, the better for statistical analysis. In general, for fixed structures, the time series of water level data and discharge records must be at least the same number of years as the operating life of the structures. In cases where the study river sections are too far from the nearest national monitoring stations, additional monitoring stations must be established to determine the correlation between new stations and existing stations, and there must be curves of the relationship between water level and water flow, water level and water surface slope.
- *Water flow*: In addition to collecting data over time from relevant monitoring stations, measurements should also be made to determine the ratio of channelization at forks and shoals, as well as the flow distribution on the cross-section for specific water levels. Data from other irrigation projects along the studied river section for one or more purposes (such as flood control, irrigation) should also be collected, as well as the temporal variation of these data.
- *Flow velocity and flow direction*: Flow velocity and flow direction as well as the flow regime at the studied channels should be thoroughly investigated.
- *Sedimentation and transport characteristics*: In order to design the protection of embankments, abutments, bridge piers as well as calculate the impact of works along

the canal, it is necessary to collect data from monitoring stations on sedimentation transport and conduct sampling to determine the distribution and size characteristics of sedimentation.

- *Meteorology*: It is necessary to collect data on wind, fog, rainfall, air temperature changes, which are necessary information to provide to contractors or to determine wave height for design work.

b) Applicable standards and regulations

In hydrological survey, applicable standards and regulations include but are not limited to the following table:

No.	Work description	Code
1	Hydrometeorological monitoring - Part 2: Monitoring river water level and temperature	TCVN 12636-2:2019
2	Hydrometeorological monitoring - Part 9: Monitoring river water flow in tidal influence areas	TCVN 12636-9:2020

2.4. Implementation time

The implementation time for hydrological survey and data collection shall be 120 days.

3. GEOTECHNICAL SURVEY

3.1. Purpose

The consultant must prepare a survey outline to submit to PMU-W for review and approval before performing the geotechnical survey task for the items of dredging, bank protection, bridge, culvert, navigation aids and spoil relocation areas as required in detailed design phase. This is to determine geotechnical cross-section with physio-mechanical criteria of subsoil, characteristic parameters of soil strength to serve as basis for studying and selecting optimal economic-technical design solutions for the Project.

3.2. Scope of work

The scope of the Project's geotechnical survey includes:

- Geotechnical survey for dreding and spoil relocation areas.
- Geotechnical surveys for bank protections (vertical-wall bank protection, inclined-slope bank protection).
- Geotechnical survey for bridge and access road.
- Geotechnical survey for culvert design.
- Geotechnical survey for navigation aids.

Requirements for the application of technical standards and specifications are as follows:

a) General requirements

- Geotechnical survey work must comply with current Standards, Regulations, and Norms. Some general requirements for geological survey work are as follows:
- Collect, study surveyed data of the Feasibility study report phase.
- Geotechnical exploration drilling, field testing, and laboratory testing are carried out

in accordance with corresponding detailed design steps.

- Ensure high accuracy in borehole depth and geotechnical layer for each borehole.
- Collect sufficient samples for use in laboratory testing.
- Testing samples must be stored and transported in accordance with regulations.

b) Applicable standards, specifications

In geotechnical survey work, applicable standards and specifications include, but are not limited to, those listed in the following table:

No.	Name of standards, specifications	Code
1	Road - Specifications for survey	TCCS 31:2020/TCĐBVN
2	Soil - Classification for civil engineering	TCVN 5747:1993
3	Soil quality - Determination of PH	TCVN 5979:2021
4	Soils - Sampling, packing, transportation and curing of samples	TCVN 2683:2012
5	Construction soil - Determination method of soil physio mechanical properties for laboratory testing	TCVN 4195:2012 ÷ TCVN 4197:2012; TCVN 4198:2014; TCVN 4199:1995; TCVN 4200:2012÷ TCVN 4202:2012
6	Soils - Nuclear method for determination of moisture content and density of soil in situ	TCVN 9350:2012
7	Soils - Field testing method – Standard penetration test (SPT)	TCVN 9351:2012
8	Soils - Method of cone penetration test (CPT)	TCVN 9352:2012
9	Construction soil - Field Vane Shear - Test in cohesive soil	TCVN 10184:2021
10	Hydraulic structures - Components and volume of geological surveys in setting up investment project and design stages	TCVN 8477:2018
11	Hydraulic structures - Method for correction of soil test results	TCVN 9153:2012
12	Flexible Pavement - Determination of Elastic modulus of soils and pavement components using Static Plate Load Method	TCVN 8861:2011
13	Flexible pavement - standard test method for determination of elastic modulus of pavement structure using Benkelman beam	TCVN 8867:2011
14	Test method for Unconsolidated - Undrained and Consolidated - Drained for cohesive soils on triaxial compression equipment	TCVN 8868:2011
15	The process of boring engineering geology	TCVN 9437:2012

	investigationss	
16	Standard test method for Piezocone penetration testing soils (CPTu)	TCVN 9846:2013
17	Method for measurements of pore pressures in soil	TCVN 8869:2011
18	Water quality - Determination of pH	TCVN 6492:2011

3.3. Work quantity

The numbers of boreholes and Vane shear tests (VST) for expected work items are in the following table.

No.	Items	Borehole Amount (hole)		Borehole Depth (m/hole)	
		On land	Underwater	On land	Underwater
1	**Dredging**				
1.1	Mang Thit River	0	8	0	6
1.2	Cho Lach Canal	0	0	0	0
1.3	La Channel	0	0	0	0
1.4	Ky Hon Channel	0	0	0	0
1.5	Tra On River	0	1	0	6
1.6	Tac Cua River	0	0	0	0
2	**Embankment**				
2.1	Mang Thit River				
	Sloped Embankment	174	52	22	15
	Vertical Embankment	3	1	30	20
2.2	Cho Lach Canal				
	Sloped Embankment	104	85	22	15
	Vertical Embankment	54	23	30	20
2.3	La Channel (Embankment)	7	3	22	15
3	**Frontage road**				
3.1	Mang Thit River				
	Frontage road	5	0	7	0
	Culvert / box culvert	1	0	30	0
3.2	Cho Lach Canal				
	Frontage road	8	0	7	0
4	**Cho Lach 2 Bridge**				
	Bridge Abutment	6	0	68	0
	Retaining Wall	6	0	46	0
5	**Disposal sites**	12	0	10	0
6	**Navigation aids system**				
6.1	Mang Thit River	12	0	18	0
6.2	Cho Lach Canal	0	0	0	0
6.3	La Channel	0	0	0	0

6.4	Ky Hon Channel	0	0	0	0
6.5	Tra On River	4	0	18	0
6.6	Dong Tranh River	0	0	0	0
6.7	Tac Cua River	0	0	0	0
6.8	Nuoc Man Canal – Can Giuoc River	6	0	18	0

- Expected quantities of geotechnical survey are in the following table:

No.	Description	Unit	Quantity
1	**Dredging, disposal sites, embankment and frontage road**		
1.1	Rotary drilling, pump for washing, sample tube on land, borehole depth from 0m-30m, soil and rock grade I-III	m	11.553,0
1.2	Sample amount	sample	5.779,0
1.3	Testing for determination of 9 normal physio-mechanical properties of soil samples	sample	3.502,0
1.4	Odometer consolidation test for determination compression properties (for on land boreholes)	sample	171,0
1.5	Outdoor vane shear test (VST)	test	4.219,0
1.6	Standard penetration testing (SPT) (for all boreholes at vertical embankment location, 2m/test)	test	1.215,0
1.7	Odometer consolidation test of cohesive soil layer at the bottom of boreholes (01 borehole/test to calculate pile tip bearing capacity for vertical embankment)	test	57,0
1.8	Unconfined compression test (UC) for vertical embankment location	test	24,0
1.9	Consolidated undrained triaxial compression test (CU)	test	171,0
1.10	Concrete corrosion water sample test	sample	6,0
1.11	Groundwater level monitoring for on land boreholes	công	1.062,0
2	**Cho Lach 2 Bridge**		
2.1	Drilling length into the ground L<=100m	m	408,0
2.2	Drilling length into the ground L<=60m	m	276,0
2.3	Soil samples collection (2m/sample)	sample	342,0
2.4	Laboratory test for determination of physio-mechanical properties	sample	206,0
	Testing for determination of 9 normal physio-mechanical properties of soil samples	*sample*	*165,0*
	Testing for determination of 7 physio-mechanical properties of disturbed soil samples	*sample*	*41,0*
2.5	Odometer consolidation test for determination compression properties (for abutment and retaining wall boreholes)	sample	24,0
2.6	Outdoor vane shear test (VST) for abutment and retaining wall boreholes)	test	80,0
2.7	Standard penetration testing (SPT) (for abutment and	test	342,0

	retaining wall boreholes, 2m/test)		
2.8	Odometer consolidation test of cohesive soil layer at the bottom of boreholes (01 borehole/test to calculate pile tip bearing capacity)	test	12,0
2.9	Unconfined compression test (UC) for bridge boreholes	test	21,0
2.10	Concrete corrosion water sample test	sample	2,0
2.11	Groundwater level monitoring for on land boreholes	công	36,0
3	**Cement Deep Mixing (CDM) Pile Testing**		
3.1	Cement reinforced soil samples testing	sample	24,0
3.2	Unconfined compression test (UC) for cement reinforced soil samples	sample	24,0
3.3	Testing the properties of soil, water and cement samples for cement deep mixing pile		
3.3.1	*Laboratory physio-mechanical tests of soil, organic matter loss on calcination*	*test*	*6,0*
3.3.2	*Water analysis test, pH properties*	*test*	*6,0*
3.3.3	*Water analysis test, S2O4- content properties*	*test*	*6,0*
3.3.4	*Water analysis test, chloride content properties*	*test*	*6,0*
3.3.5	*Cement testing, strength by standard method*	*test*	*6,0*

** Note:*

The quantities mentioned above are only estimated. Actual quantities will be based on those performed and accepted after completion of survey drilling, field testing and laboratory testing.

** Conditions of drilling stop:*

- For sand: drill until reaching load-bearing layers (SPT≥50) minimum 3m.

- For clay: drill until reaching load-bearing layers (SPT≥30) minimum 3m.

- For rock: drill until reaching solid rock layers (RQD≥50%) minimum 3m in case of boreholes for the design of bridge, bank protection having sheet pile wall and pile foundation. In case of other boreholes, drilling depth must be at least 1m into solid rock layers.

- In case of boreholes for channel items, only drill until reaching expected depth or when above conditions of drilling stop are achieved.

For all other boreholes, when expacted drilling depth are reached but above conditions of drilling stop are still not met, stop drilling and notify the Client, the Design Lead or the Designer's personnel in charge of Geotechnical work for their consideration and decision. In all cases, borehole depth must be agreed by Design Lead.

3.4. Implementation time

The implementation time for geotechnical survey and data collection shall be 120 days.