

TERMS OF REFERENCE

Analytical and technical foundation for Thu Duc City flood risk management project series

1. Introduction

The Netherlands is internationally well-known for its expertise on water management, which is therefore one of the cornerstones of the bilateral relationships the Netherlands maintains. Through the Netherlands International Water Ambition (NIWA), long lasting relationships with other countries are aimed for, which are fostered through strategic partnerships with seven so-called delta countries. Under the NIWA, several ministries are involved: Foreign Affairs (BZ), Agriculture, Nature and Food Quality (LNV), Economic Affairs and Climate (EZK) and Infrastructure and Water Management (I&W). The ultimate aim is to increase water security and water safety in the world of humans, plants and animals, and optimize the Dutch contribution to this aim.

The Netherlands and Vietnam have a 50 year relationship of international cooperation. Water plays a prominent role in that relationship. In 2010 both countries signed a Strategic Partnership Arrangement on Climate Adaptation and Water Management. Under this arrangement, the Mekong Delta Plan (MDP) has been delivered in 2013. In Vietnam, the Netherlands works in close cooperation with other development partners including the World Bank Group (WBG) to support the Government of Vietnam in its ambitions to increase resilience along the coast and in urban centers.

This assignment is financed through the Partners for Water Program¹. The Partners for Water Program is commissioned by the Ministry of Infrastructure and Water Management on behalf of the Interdepartmental Water Cluster. The scope of this assignment has been developed in close collaboration with the World Bank. The origin of this assignment has been intensive consultations between Ho Chi Minh City (HCMC) and WBG in 2022 which will be further explained in the next section.

This primary objective of this assignment is to provide the necessary analytical foundation to i) support the visioning and rationale for the Thu Duc City Resilient Development Project Series (three phases), and ii) detail and prioritize the investments of phase 1 of this project. This Terms of Reference discusses the details of this assignment with aim and expected scope and deliverables, planning and organization.

2. Background of this assignment

Per the request of Ho Chi Minh City People's Committee (HCM CPC), the joint HCMC – WBG working group (HWG) was established in December 2021 and formally launched on March 23, 2022, by the Chairman of the HCMC CPC and the World Bank Regional Vice President. The objectives of the HWG were to explore the city's medium- to long-term goals, to better understand the obstacles and risks constraining the achievement of these goals, and to analyze how HCMC could best leverage support from the WBG over the coming years to achieve these goals. Building on the collaboration, results from the 8 technical groups have been consolidated into a 'Cooperation Program' (hereby called Program) that will focus on the implementation of key priorities identified over a 10-year period. See Annex 1 for more background details.

¹ See for more information: <https://www.partnersvoorwater.nl/>

A relevant outcome of this engagement is that HCMC has approved a flood prevention program in January 2020. The current flood management approach is fragmented and lacks consideration of critical factors like tidal flooding and climate change. The existing infrastructure is insufficient and lacks synchronization. The existing data and planning method is also inadequate for comprehensive risk integration. Overall, there is a need to raise public awareness of flood risk management (FRM) and related environmental issues. HCMC has requested the WBG to assess its existing approach to FRM and develop a roadmap to establish a Flood Risk Management Information System (FRMIS)² as a tool for integrated urban flood risk management of the city. HCMC would also like the WBG to support related areas of institutional reform and capacity building.

A second important outcome of this dialogue between HCMC and the World Bank is that the HWG's technical groups have identified two important Flood Risk Management (FRM) investment projects for urban resilience, named "Thu Duc City Resilient Development Project Series" and "Integrated Urban Resilience Project in HCMC's urban core area" (see also Table 1). The estimated value of each project would range between 9 and 10 trillion VND (or US\$400-450 million). This medium-term investment program would enable HCMC to systematically address core challenges in its development pathway. The following sequence in Table 1 presents prioritized investment operations that can move forward immediately and are urgently needed to achieve the City's key goals. It is noted that this assignment solely focuses on Thu Duc City (three Phases) and thus only this project will be further described.

Table 1 – Potential Lending Program for Prioritized Investment Operations, 2022-2032

Project Name and Components	Lead agency	Cost estimate US\$ million	Timeframe
Thu Duc City Resilient Development Project Series (3 phases)		1,350	2024-2032
<i>Development Objective: Enhance TDC's flood risk management capacity and enable climate-resilient economic development to transform the City into a green, innovative regional hub.</i>			
Phase 1: The Integrated Flood Risk Management Investment for Thu Duc City with improving drainage through investments in Go Dua subcatchment in P1 of Thu Duc city – See Figure 1)	DOC, DPA, TDC, DOIC, DONRE		
Phase 2: The Integrated Flood Risk Management Investment for Thu Duc City with improving flood retention through green public spaces in area P3 of Thu Duc City (See Figure 1)	DOC, DPA, TDC		
Phase 3: The Integrated Flood Risk Management Investment with improving drainage through investments for Thu Duc City in P6 and P7 of Thu Duc city (See Figure 1)	DOC, TDC		

² See Annex for the concept and proposed roadmap of this FRMIS.

Development Objective: Enhance the resilience of HCMC through improvements to flood risk management and urban mobility (specific areas to be identified)

Improvement of the stormwater discharge and storage, and environmental sanitation in the urban core area

DOC, DPA

TOTAL INVESTMENT PROGRAM	1,800	2024-2032
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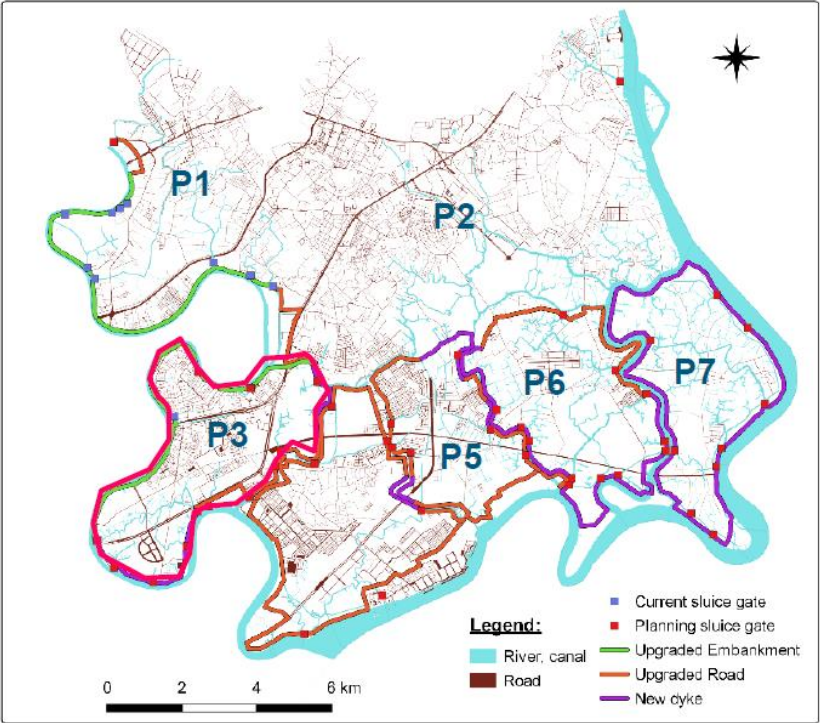


Figure 1. Zoning map of Thu Duc city.

Thu Duc is developing a new Spatial Development Masterplan with a vision to 2050, which is expected to be approved by Prime Minister in 2023. Under the engagement program in HCMC, the World Bank provided technical assistance to the Masterplan via the formulation of a strategic framework for flood risk management in Thu Duc city. In particular the support was to (i) provide a rapid assessment to identify areas at risk of floods; (ii) develop strategic recommendations for adapting Thu Duc City to flood risk in the future; (iii) development of intervention options and a roadmap for effective flood risk management; and (iv) prioritization of a set of low-regret investments for the short term, in line with the long-term adaptation process. Annex 3 provides the summary report of the WB-supported analysis.

Thu Duc City series description

Thu Duc City is developing rapidly as HCMC continues to expand outward despite challenges with recurrent flooding. As growth continues, the capacity for water retention will decrease, resulting in increased losses due to flooding over time. To avoid a rapid growth in flood risk that would detract

investment, a flood risk management system that uses green infrastructure solutions and strengthens the polder network should be put in place immediately. As retention capacity grows, land can be opened for further development that utilizes value capture mechanisms to ensure private beneficiaries are contributing to the cost of the investments. With this approach, the city would create an innovative system of constructing and funding parks and public spaces that both reduce flood risk and attract high skilled labor through the creation of attractive areas to live and work.

The recommended way forward for Thu Duc City is a series of three lending projects valued at between US\$400 and 500 million over the next 10-15 years, which would materially and sustainably reduce flood risk and adapt to climate change in Thu Duc City and HCMC under a strategic approach (see also Table 1). The approach to flood risk management incorporating living with nature in these series of projects would commence in 2024, 2025, and 2027. The Phase 1 project is focused on specific FRM interventions for area P1, and is also recommended to include a US\$25-30 million investment in the aforementioned FRMIS to be financed by World Bank or the City's own resources. Depending on size and scale of the program, between US\$1-3 million of associated Technical Assistance (TA) activities could be completed independently or embedded into the lending projects. The program is informed by recommendations from two technical groups: Planning and developing Thu Duc City as a creative and highly interactive urban area in the East; and Urban flood management.

3. Aim of this assignment

The first milestone of this program for Thu Duc City which is envisioned by end of 2023 is that HCMC will submit a project proposal to the national government for financing and approval of Phase 1. The project proposal requires a solid rationale and vision for the three project phases of the Thu Duc City Resilient Development Project Series, to show that this project fits into a wider strategy for Thu Duc City. Building on this rationale and vision, the Phase 1 scope must be further detailed with an outline of the prioritized interventions, an indication of costs and benefits, an initial assessment of impacts (environmental and social) and next steps for implementation. Both elements – rationale and vision for entire program and a detailed description of Phase 1 - which will feed into HCMC's project proposal are yet to be developed in close collaboration with the stakeholders and require supporting modeling and technical analyses which is the subject of this assignment.

In view of this first milestone by end of 2023, the primary aim of this assignment is to provide the necessary analytical foundation i) to support the visioning and rationale for the Thu Duc City Resilient Development Project Series (3 phases), and ii) to detail and prioritize the investments of Phase 1. The prioritization of flood risk mitigation actions will be based on a masterplan/pre-feasibility level assessment that will inform the project proposal for HCMC to the national government. This assignment's end product should provide a vision, rationale and breakdown of main components of the entire Thu Duc City programs (3 phases) and shall provide detailed options and recommendations for a well-balanced set of structural and non-structural risk management investments for Phase 1.

Specific objectives of this assignment are to:

- Using the existing tool, generate a thorough understanding of existing and future flood hazards and risks in Thu Duc City that includes the existing river flood protection and drainage infrastructure and its functioning during recent flood events, and identifies not only flood challenges at hand but recognizes and takes into consideration the importance of related aspects (e.g., maintenance issues) which provides a basis for exploring and prioritizing interventions (Task 2);

- Develop a clear vision and rationale with a breakdown of prioritized options and recommendations for urban flood risk management investment interventions for the entire Thu Duc City program using the modeling insights and evaluation of options; this program should be developed at conceptual level in close relation to the existing plans of HCMC and be aligned with the existing urban development vision of HCMC (Task 3);
- Further detail and prioritize a set of sustainable structural and non-structural investments for reducing/mitigating flood risk through tangible project concept development for Phase 1 including initial costing and screening of the environmental and social impacts, ensuring multiple benefits where possible (Task 4);
- Carry out consultation and engagement that involves local specialists, experts, government officials, and decision-makers to achieve verification of results and facilitate understanding of implications and informed decision making. Support HCMC with the preparation of a project proposal, ready for CBA and ESIA, for Phase 1 (Task 5);

The objectives listed above are detailed in the scope of the work, with proposed activities. The Consultant is expected to review these and, if necessary, make suggestions for any other activities to better achieve the objectives listed above.

Budget allocation: This assignment has various activities different in nature and with a different level of detail. For example, the Task 3 assessment is expected to be high-level and conceptual whereas the Task 4 assessment is expected to provide a more detailed analysis. To guide the consultant in preparing the proposal, the table below provides an indicative overview how the total project budget shall be allocated in this assignment.

Table 2: Indicative overview of the level of effort for the main tasks in this assignment.

Activity	Indicative allocation of budget
Project Management, Reporting (Task 1 – 5)	10%
Data collection, hazard and risk modeling in Task 1 – 4	10%
Thu Duc City program development Task 3	20%
Thu Duc City program Phase 1 development in Task 4 (detailing interventions Thu Duc City 25%, detailing FRMIS 5%)	30%
Field visits, stakeholder consultations, workshops (Task 1 – 5)	20%
Expenses such as international flights, hotel costs, workshop costs, report production, etc.	10%

4. Scope of Work and Deliverables

Before a more detailed breakdown is provided of the tasks expected from the Consultant to achieve the objective of this assignment, a couple of remarks are provided first which are relevant for the entire scope description:

- 1) **Geographical scope:** The geographical focus of this assignment is on Thu Duc City only. The tasks described below in terms of prioritizing and detailing structural and non-structural interventions and also the required modeling efforts, data processing and other activities described below shall focus on this geographical area. The only exception where the entire City of HCM is relevant is in

the further detailing of the Flood Risk Management Information System (FRMIS), for which a concept and outline is shared in the annexes of this TOR.

- 2) **Existing modeling tools:** There are several hydraulic models of the Thu Duc City area that have been developed by various organizations over the last 5 years. However, a hydro-hydraulic model has been established previously for strategic FRM integration recommendations in Thu Duc Spatial Master Planning. This MIKE Urban model has been developed by a group of independent Vietnamese experts. This model has a coupled 1D2D schematization and provides insight into the flood depths and durations for a given scenario of (time and space dependent) river water levels and rainfall. The boundary conditions from this model are generated by a larger model of the river network. These models have been recently updated with all latest data, including geographical data, infrastructures and hydrological and hydraulic data, etc., and ready for use. The use of this tool as a starting point will be essential to achieve sufficient technical detail, to fit the proposed activities within time and budget of this assignment, and to build upon previous work and avoid duplication.
- 3) **Data collection:** During the work of the HWG in 2022, an overview has been created of existing FRM data for HCMC and Thu Duc City in particular. In addition, as described above, the modelling analysis tools have already been updated with the latest data and ready for use. Therefore, there will no data collection is required for the modelling. In case of need, the Consultant shall exhaust existing datasets as good as possible for this assignment but complement missing data with other open source data where necessary. Availability of data and models update are shown in Annex 2.
- 4) **Option development:** The proposed investment options and recommendations for the Thu Duc City program and also the Phase 1 investments must contribute to creating a livable city and define clear guidelines for urban planning by marking areas unsuitable for urban expansion, and discuss the implications of integrating FRM interventions in the urban landscape. They must consider the development of green infrastructure, including linear parks along urban rivers, and the consequences that adaptations in the drainage network have on the city's urban road network and connections between urban zones. They must also address urban planning needs by defining corridors for the urban drainage network, for which space must be secured for future implementation. Finally, improvements in the drainage network should follow the principles of Delay-Store-Discharge urban water. Measures to delay runoff (e.g., green roofs and parks) and measures to store and infiltrate runoff (e.g., basins and wetlands) should be combined with current and potential public spaces and other urban land use in the area of interest.
- 5) **Stakeholder involvement:** Close involvement of and coordination with all stakeholders will be essential during this project. The relevant stakeholders are further specified in Task 5 below but is a task that should be integrated throughout the entire assignment, and have a strong and logical link to the contents and deliverables of the other tasks.

A specific requirement of this assignment is that all reports and materials to be used for consultation with HCMC should be available in Vietnamese, as well as in English.

After contract signature, the Consultant is expected to have first a kick-off with RVO and the World Bank to discuss the assignment planning and agree on the way of working together. As soon as possible after this, a kick-off meeting with DoC and TDC shall be organized to introduce and reach a common agreement on the study approach and plan before putting the implementation on the ground. The World Bank will coordinate all involving parties, including HCMC/TDC for identification of a date for this external kick-off meeting.

Following this kickoff of the project, the following tasks are expected to be carried out by the Consultant to achieve the assignment's objective:

Task 1: Verification and updating of flood hazard and risk modeling setup

Aim of this task is to ensure the analyses in this assignment are built upon from the existing models with the most updated data, and the accuracy of the modelling.

Immediately after the commencement of the assignment, the consultant shall undertake a quick evaluation of existing data and models (including the model for Dong Nai and Saigon river basin and Thu Duc city itself) developed and updated by the group of local experts as described above to ensure the latest update is included and the required accuracy of the models are acceptable. In case of need, complement missing data with other open source data where necessary may need to be collected to update the model. An initial overview of existing data relevant to this assignment is presented in Annex 2. The Consultant shall also evaluate and verify the existing models and make it ready for evaluating scenarios and interventions during this assignment.

Finally, the Consultant is expected to setup a flood risk model to evaluate economic damages and affected population using the flood hazard information. For the purpose of this assignment, an economic risk assessment based on land use maps is sufficient. Land use maps and population distribution maps shall be generated for current (2023) and future conditions (2050, 2100). Vulnerability curves for different land uses may be adopted from global data sources, but shall be tailored for the local setting of HCMC where possible. The inherent uncertainty within these exposure and vulnerability data will require validation and sensibility checks. Indirect damage (e.g. due to business interruption, traffic disruption, etc.) can be included by adding a (justified) markup to the direct damages, sector-specific indirect damage calculations are not expected in this assignment. An initial damage and risk computation must be carried out for the present-day conditions. These results must be calibrated/validated to match historical records and local knowledge. If necessary, the exposure and vulnerability model parameters (e.g., replacement values, indirect damage, the threshold for damage initiation, etc.) must be revised to provide realistic estimates of damage and risk. The final parameter settings must be discussed with and agreed upon with the World Bank and stakeholders.

Expected deliverables of this task are:

- a technical report describing the data collection and flood hazard and risk model setup;
- a well-organized database with relevant spatial and tabulated datasets for later use. The metadata format should comply with international and local standards required by the relevant national agencies;
- an updated and calibrated flood hazard model to evaluate pluvial and fluvial flood events in Thu Duc City;
- a validated risk model to evaluate economic damages and affected population.

After review, these deliverables shall be made final by the Consultant. The Consultant shall only proceed with hazard and risk production runs (next task) if these deliverables have been approved.

Task 2: Flood hazard and risk modeling baseline situation for existing and future conditions

Aim of this task is to estimate the flood hazard and risks in the existing and future conditions of the city, including urban development, land-use plan, public investments, climate change and land subsidence, but without any intervention on the flood risk management now and future.

Before formulating the alternative intervention options in the three phases of the proposed FRM program in Thu Duc City, the Consultant shall produce flood risk analysis with different return period of the flood events (e.g. extreme 3-hour rainfall events for different return periods, combination with tidal river

flooding events), using the detailed updated hydro-hydraulic models and LiDAR 2020 data. The Consultant shall define relevant combinations of the different flood hazard based on their joint probability to generate hazard maps for a selected number of different return periods (at least 6 return periods, e.g. 1yr, 10yr, 25yr, 50yr, 100yr, 200yr). The Consultant is expected to include the envisioned and justifiable approach in the proposal.

The updated flood hazard mapping of the entire Dong Nai and Saigon river basin should be used as an input for the specific flood risk analysis of Thu Duc city. The risk analysis should be made for both the current situation (2023) and future (2030 and 2050) – the draft spatial development masterplan of Thu Duc city, presenting gridded EAD (Expected Annual Damage), and PML (Probable Maximum Losses). These shall include both direct and indirect damages. Current and expected city plans, such as public investments plan, urban, land use and socio-economic developments, land subsidence, and impacts of climate change (CC projected in 2050 and 2100) should also be taken into account of the risk analysis.

The expected deliverables of this activity are the following:

- Updated flood hazard maps for entire Dong Nai and Saigon river basin
- Updated detailed flood hazard and risk maps for Thu Duc City
- Risk estimates in budgetary terms

Task 3: Formulation of project proposal for Thu Duc City FRM program

The aim of this task is to formulate a vision and conceptual intervention package for the FRM investment program (three phases) for Thu Duc city with an optimized set of interventions including initial costs and benefits, and screening of critical social and environmental aspects.

To undertake this task, the consultant shall proceed the analysis in the following steps:

Step 1: Formulation of an alternative FRM approach in Thu Duc city. In 2022, the HWG analyzed a polder approach with various polder options for FRM in Thu Duc city. See Annex 3. However, both the city and their experts wanted to explore another intervention option which is more balanced between physical and adaptive urban development. Therefore, flood risk analysis needs to be carried out for an alternative package of interventions (e.g., using a polder approach for P1 to P5, and no polder for P6 and 7 but applying a more adaptive urban development or “living with the flood” for these Ps). The consultant will calculate the required technical specifications of interventions (e.g. a certain amount of required storage/retention), and use these to formulate FRM options. These options, and their implications for urban planning, shall be discussed in consultations with the city to come to preferred intervention options.

Risk analysis should also be formulated for each completion of phases over the period of 10 years. This will help the city to be able to capture the future risk each time a project is completed. The methodological approach and process for risk assessment to be used in this step are the same as described in Task 2 above. Exploration of all options, including the options developed in the 2022 HWG as well as this additional alternative/option is needed to enable the city to identify an appropriate option for their spatial masterplan development and investment plan. **Step 2:** Development of alternative specific FRM intervention options for all three studied areas of Thu Duc city. A principle for FRM intervention has been specified for each of three areas by Thu Duc city as follows:

- Areas P1, P2 – immediate reduction of localized flood risk, including improvements to drainage infrastructure, as well as the implementation of a flood risk management information system (FRMIS) and a land information system for HCMC;

- Area P3, P4, P5 - development of flood retention and adaptive areas, including investment in a network of linear parks and water retention areas paired with implementation of localized policies to promote retention in private land development;
- Area P6, P7 - development of an *adaptive* flood risk management through reclaiming a certain areas of land using value capture mechanisms to enable mixed use land development;
- Alternative specific FRM intervention options for each of three studied areas may also consider the following flood adaptation principles:
 - Maximizing the use of sustainable nature-based solutions such as water storage, attenuation, (groundwater)infiltration, etc. while minimizing reliance on high-cost infrastructure solutions;
 - Maximizing gravity versus pumped drainage options, on the basis of simulations with the hydrodynamic model and expert judgement, and the extent to which gravity drainage is possible and where or when polders and pumping stations may be needed;
 - The impact of urban expansion on the respective roles of gravity and pumped drainage and recommendations on reserving land for the future need of drainage corridors to cope with urbanization;
 - Sensitivity simulations of climate change scenarios (changed rainfall, sea level rise), socio-economic scenarios (land use changes, city growth), and possibly soil subsidence, including conclusions on the way this affects the choice between gravity versus pumping drainage options. studied areas of Thu Duc city.
- The extent to which “living with floods” is acceptable in the longer term, and how this may be achieved without increasing flood risk.

Step 3: Carrying out a high-level flood risk assessment for each of the studied areas with alternative flood risk management interventions. The main emphasis in this task is to get a first order estimate of the benefits of the investments of the FRM options to justify that the investments in FRM interventions are cost-effective. The Consultant is expected to evaluate the proposed flood risk management interventions for Thu Duc City with the methodological approach and numerical tools developed in Task 1 and 2. It is not anticipated that this will done with great detail and many simulations, but merely a high-level analysis to be able to discriminate between the effectiveness of various options and justify the selected interventions, and for use in consultations with stakeholders. Thus, the tool shall be used to screen different options for the different areas to arrive at a well-balanced and justified set of interventions for the different areas (see Step 4).

Step 4: Formulation of a conceptual proposal for the entire FRM program (including three phases) for Thu Duc city. The project proposal should at least include the following sections:

- Descriptions of the long term resilient urban development and strategic FRM options for Thu Duc city;
- Alternative FRM interventions program for Thu Duc city, including justification;
- Objectives and scope of the FRM program in Thu Duc city as a whole and objective of each phase, expected main results of each phase and implementation schedule for each phase with key decision moments and inputs/outputs. Opportunities for involvement of the private sector into the implementation of phase 2 and 3 should be explored where possible;
- High-level cost estimate of investment of each phase and initial cost-benefit assessment and results of screening of environmental and social impacts;
- Key considerations for a (posterior) technical detailing of the interventions, social and environment impact assessment, cost & benefit analysis for each phase;

The expected deliverables of this activity are as the following:

- Flood hazard and risk mapping analysis for the baseline and strategic FRM interventions at the TDC scale;
- A strategic vision and a set of alternative interventions options for the different parts of Thu Duc City;
- High level cost estimate and benefits for the proposed interventions of the FRM program in Thu Duc City, and overview of key environmental/social aspects from screening;
- Document listing key recommendations for more detailed technical studies, cost-benefit analysis and impact assessment of the proposed interventions in each of study areas;
- A conceptual proposal for the entire FRM program for TDC.

Task 4: Detailing and prioritization Phase 1 project

The aim of this task is to assist HCMC in preparing the investments for Phase 1, including supporting the city in drafting a project proposal and advancing technical support for later stages such as project Pre-Feasibility Study and Feasibility Study preparations.

It is expected that the consultant first downscales the updated hydro-hydraulic model of the Thu Duc city in detail for the Go Dua – Tam Phu area and surroundings in area P1 with additional secondary drainage pipes and sluice gates of the existing drainage system. The selected consultant shall also review the new spatial master plan of the Thu Duc city and provide technical support on an integrated FRM investment project 1 in the Go Dua – Tam Phu area in the Northeast region (see table 1). It is noted that HCMC expects to develop the project area become an eco-urban environment in which FRM interventions are integrated through for example the inclusion of green retention spaces, urban parks and other features.

At least the following activities shall be carried out by the consultant:

- Simulate urban flood hazard scenarios for alternative infrastructural and non-structural interventions for a proposed project in Go Dua – Tam Phu area. According to the National building code, investment drainage element dimensions shall be designed with rainfall intensities of 10 year and 5 year for main and secondary pipeline respectively and the urban city must be protected from a 100-year river flood. Flood modeling shall be carried out for proposed options of investment with conditions of 5, 10- and 100-year return period scenarios. Current climate, climate change projected in 2050 and 2100 conditions shall be considered to ensure sustainable and low regret investments.
- Optimize investment interventions the Go Dua – Tam Phu area that to be invested in Project 1; an optimized intervention option including structural elements and required dimensions will be selected based on hydraulic computations and socio-economic, environment considerations; MCA and B&C analysis will be done in optimization process.
- Recommendations on Nature-based and green designs for flood infrastructures (e.g. retention spaces as eco-parks)..
- Recommendations on how private urban developers could be involved for eco-urban development relating regulation and institutional issues;
- Collect data and perform a screening of environmental and social risks of the proposed investment projects in Thu Duc city. The screening should consider the potential accumulated direct and indirect impacts and risks to the social and environment, and propose mitigation

measures for each of the identified potential impacts and risks during and after the construction periods. In case not enough data is available at this time, specify where additional analysis is required. A strategic risk and impacts reduction framework, including monitoring, supervision of the implementation and capacity building/training official staffs and mobilization of consultants for the implementation of mitigation measures and plan should also be formulated.

- Support DOC with drafting a coherent project proposal including the identified interventions and recommendations, and the FRIMS described below. Responsibility for writing the final proposal in accordance with existing government regulations lies with DOC.

In addition to the optimization of the investments on flood risk management in Thu Duc city as described above, consultant is also expected to provide an outline for the establishment of a Flood Risk Management Information system for HCMC. Over the last 20 years, HCMC had spent billions of US dollars in building up flood protection and storm water drainage systems to prevent the city, including Thu Duc city, from flooding. At the same time, a number of tools and platforms have been built to operate the FRM infrastructure systems and guide the integrated flood resilient urban development. Unfortunately, those existing platforms/tools are fragmented and inefficient. A conceptual design and implementation framework for establishment of the FRMIS for HCMC was developed and consulted with HCMC by the World Bank team during the development of a HCMC-WBG Collaboration Program in 2022 (see Annex 4). To make this conceptual design implementable, the Consultant is expected to:

- Prepare a high-level overview of what the benefits are of having a FRMIS for HCMC;
- Visualize a design with the main components of FRIMS, what data will be necessary to feed into FRIMS (existing data but also new data to be developed), and from what data sources
- Breakdown a better cost estimate for every component and element (including manpower) that are essential for FRMIS establishment, using the rough estimate made in the conceptual design in Annex 4;
- Develop a more detailed and practical implementation plan for FRMIS establishment, using the roadmap proposed in Annex 4.

Outputs and Deliverables

- Report on optimized and prioritized FRM investment elements to be integrated into eco-urban that will be developed in the Go Dua – Tam Phu project area; this includes nature-based solutions applied in the upper/ surrounding land areas to mitigate peak run-off into the project areas; Technical basis for Thu Duc city interventions including design specifications of main intervention elements such as improved canals, embankments, sluice gates, pumps, etc.,
- Report on initial screening of environmental and social impacts of proposed investment projects in Thu Duc city;
- Reporting on conceptual designs of FRMIS establishment in HCMC including estimated cost.
- Draft Project Proposal for project 1 including infrastructural/ non-structural interventions in project area and FRMIS investments. This draft will be used by the HCMC in project proposal preparation and submission (expected, end of 2023)

Task 5: Stakeholder engagement and support HCMC/TDC with project preparation

Under the guidance of the World Bank, the consultant shall undertake proactive consultations with various stakeholders in HCMC/TDC and national agencies (if required) as an on-going process with requirements for information disclosure, consultation and engagement throughout all study phases, from the data collection stage to the identification of options, and proposal development. Meaningful consultation should be undertaken with relevant stakeholders at the relevant administrative levels of the

study areas, in order to come to an informed and supported intervention strategy for the city, taking into account required technical specifications for interventions as well as the implications different options have for urban planning. The extent and degree of engagement required by the consultation process should be aligned with the outcomes of the initiative and with concerns raised by stakeholders.

As part of this assignment, it is expected that the Consultant will hold meetings with relevant agencies (e.g. DARD, DOC, DOT, DONRE, etc.), departments and local authorities at the national (if needed) and HCMC level, as well as with other local stakeholders, community service organizations, private sector, NGOs, etc. At the city side, both DOC and Thu Duc city are the focal agencies for this study. Therefore, it is also requested the consultant to have close coordination and consultation with the focal agencies throughout the process.

With regard to stakeholders consultation, the Consultant is also expected to document the public participation. Specifically, the Consultant shall:

1. Describe the public participation methods, timing, type of information provided and collected from the public and stakeholder target group consultations. Instruments used to collect the information should also be documented (to be included in an appendix);
2. Summarize the issues identified during the public participation process and discuss the public input that has been incorporated or addressed in the process. Concerns that were raised by the public but not considered in the study should be justified.

The Consultant is expected to pay explicit attention in the proposal how the stakeholders will be involved during the entire process and a clear layout of a stakeholder engagement should be part of the proposal.

Outputs and Deliverables

- Stakeholders consultation meetings notes
- Kick-off and monthly meetings notes
- Data organizations and handover to the World Bank and RVO
- All presentations and documents prepared by consultant

5. Implementing arrangements

Roles of Contracting Agency RVO and World Bank: The Contracting Agency is RVO and is responsible for the final approval of deliverables. Local point of contact from the Government of The Netherlands is the First Secretary for Water and Climate Affairs at the Netherlands Embassy in Hanoi. The Consultant must communicate with RVO on all matters pertaining to this assignment.

The World Bank has an active role in this assignment as main commissioner for the overall HCMC FRM project, and will therefore be included in the review of deliverables, stakeholder consultations and progress meetings. A point of contact within the World Bank team shall be provided during the kickoff meeting. The Consultant is expected to coordinate actively with the World Bank on technical matters and stakeholder consultations, keeping both RVO and the Embassy copied in communications. A kick-off meeting shall be organized with the participation of all involving parties (the consultant, WB, RVO and Embassy) to discuss and agree on the approach and plan of implementation. During the implementation of the Project, for additional data gathering, product validation and/or feedback from the Government, the World Bank will facilitate the organization of sessions with HCMC.

Timeline: The assumed commencement of the project is expected to be June 2023. The assignment will be carried out during 6 months so that the final outcomes should be available by December 2023. The Consultant is expected to provide a detailed planning of all activities including also a schedule of moments of engagements with stakeholders. The planning should also allow sufficient time for review of deliverables and also take into account holiday seasons.

Progress meetings: A monthly meeting will be established between RVO, the Consultant, the Embassy and the World Bank during the execution phase. Dates for monthly meeting will be set up at the kick-off meeting. Additional meetings may be organized upon need. The Consultant is expected to give detailed insight into the progress of the assignment during these progress meetings. For this purpose, a change log, progress report or other methodology shall be used, to be agreed upon in the kickoff meeting. The emphasis should be on planning, outputs, key project risks, possible mitigation measures that can be taken by the Consultant and/or the Client/Beneficiaries, and the principal owner to address these risks. Additionally, it is recommended to provide an online platform where all assignment output can be accessed by relevant parties.

Quality control and assurance: The Consultant must carry out quality control and quality assurance prior to submitting all draft deliverables. Upon request, the Consultant must provide insight into quality control carried out for specific deliverables. These can include but are not limited to, internal draft versions of reports, internal quality control sheets of model set-up, modelling logs, calibration and validation, and internal checklists on data sets.

Report review procedure: Drafts of the deliverables must be sent to RVO. The draft deliverables will be reviewed by RVO, the World Bank and the HCMC stakeholders. RVO will coordinate the delivery of a compiled and structured list of comments to the Consultant within 2 weeks after delivery of the draft reports. The Consultant must deliver the final deliverable and a separate document with a response to all comments, along with how these have been incorporated into the final deliverable. RVO will be responsible for final sign off of the deliverables.

Deliverables requirements: All draft and final deliverables must be written in English and Vietnamese. All report deliverables must be submitted in MS Word and Adobe PDF. All reports should have an easy-to-read layout, be well-structured, and be well-written. They must be clear and concise with minimal formatting, spelling, grammatical or arithmetic errors, and include a summary and helpful illustrations, graphics, charts, and maps. Bearing in mind that the intended recipients of the report may not necessarily be specialists, it is important that the reports are easily understood by non-experts and will contain commonly understandable communication products, such as maps and graphical representations of the current and future risk for current and future climate and land-use scenarios.

Consultation: While the assignment will include desk research, the assignment's practical nature and urgency will require substantial engagement with stakeholders and field visits to identify priority actions and ensure that actions are feasible and practical. More specifically:

- The assignment should involve close consultation with the World Bank and key stakeholders in HCMC;
- The assignment should include field visits by the Consultant's team to Thu Duc City; it is expected that the Consultant includes at least four visits to HCMC with the project team (kick-off meetings, hazard/risk results, investment options, final workshop).

- The Consultant will prepare presentations and draft minutes of all meetings held with the RVO, World Bank and stakeholders; wherever possible, the Consultant should leverage consultative meetings for other related/linked assignments to avoid additional meetings;
- The Consultant will coordinate meetings with key stakeholders (Government, private sector, civil society, academia, and development partners); the World Bank will assist, as needed, with introductions;
- The Consultant must use a highly participatory approach to engage technical staff from key agencies in the modelling and assessment of flood hazards and risks to facilitate ownership and use of the findings.

The Consultant is expected to detail in the proposal the stakeholder consultation and define at which moments workshops and consultations will be organized and when field trips to HCMC are envisioned in the program.

Data and materials handover:

- All data to be provided to RVO and the World Bank shall be fully documented, including provenance, licensing, metadata, and cataloged on external hard drives or via a web portal;
- Models and all data files prepared for the simulation of priority actions have to be provided to RVO and the World Bank fully documented to enable reviews of the proposed actions and to enable the current or any other consultant to provide follow-up studies and the possible other use of the model;
- Data formats must follow Open Geospatial Consortium standards;
- Metadata schema must follow ISO 19115 Geographic information — Metadata standard;

Deliverables and payment schedule: The main deliverables of the project are listed in the table below, with an indicative delivery date after the start of the project. The Consultant must present a more detailed schedule of activities and milestones.

Table: Overview of deliverables, time.

Milestone Description		Delivery date: months from approval
1	Contract signing	0
2	Data collection report and Update modeling (Task 1) & Flood hazard and risk modeling for Baseline condition (Task 2)	2.5
3	Thu Duc City program (Task 3)	4
4	Phase 1 program (Task 4)	5
5	Support HCMC project proposal Phase 1 (Task 5)	6
6	Acceptance of all deliverables, including database	6

