



HO CHI MINH CITY FLOOD RISK MANAGEMENT PROJECT

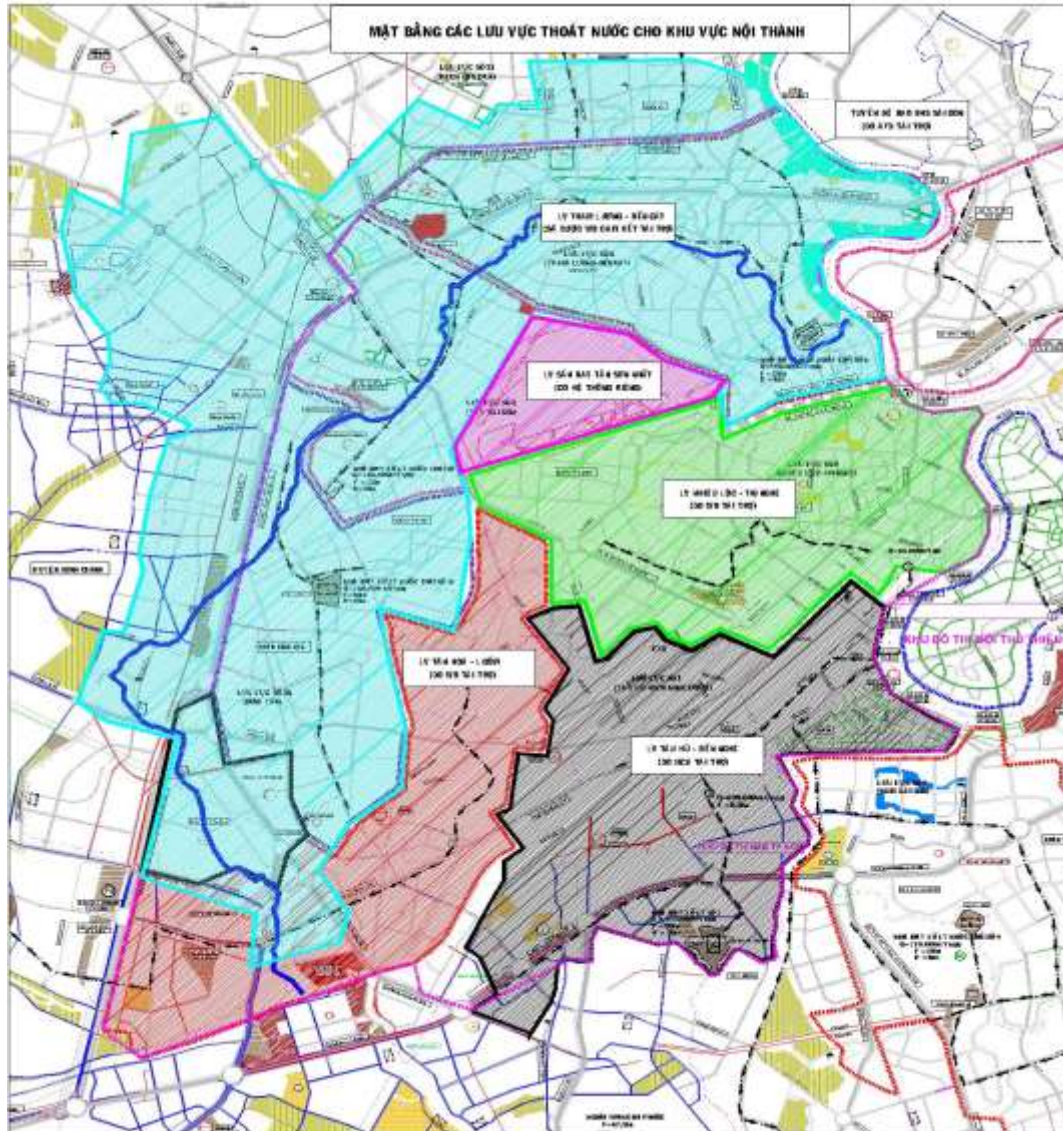
LINE AGENCY: HO CHI MINH CITY PEOPLE'S COMMITTEE

**PROJECT OWNER: HO CHI MINH CITY STEERING CENTER OF
THE URBAN FLOOD CONTROL PROGRAM**

PMU : PMU OF WORKS CONSTRUCTION

DURATION: 6 YEARS (2017 – 2023)

Overview



Drainage basins in Center HCMC

- Nhieu Loc – Thi Nghe (WB)
- Tan Hoa – Lo Gom (WB)
- Tau Hu – Ben Nghe (JICA)
- Tham Luong – Ben Cat – Nuoc Len

Overview

The existing flood situation



In Go Vap district



In District 12



In Tan Phu district

Overview

The existing situation of water pollution



Project objectives

(Approved in the Decision No. 2319/QĐ-UBND dated May 10, 2016)

- Conducting the flood prevention and drainage plan for the Ho Chi Minh core inner city, comprising: improvement of the drainage and storage capacity of Tham Luong - Ben Cat - Nuoc Len main canal and secondary canals with catchment area of 149 km²; finishing the drainage and flood prevention systems for Go Vap district.
- Building and strengthening the capability and institution for the integrated urban flood risk management in Ho Chi Minh city
- Improving the environment sanitation conditions, creating good landscape for Tham Luong - Ben Cat - Nuoc Len basin.

Project components

Component 1: Integrated urban flood risk management (*17 million USD*)

1.1. Modernization of Hydromet Equipment and Flood Forecasting (USD 10.4M)

1.2. Integrated Urban Flood Risk Management and Early Warning System (USD 5.8M)

1.3. Water quality monitoring program (USD 0.8M)

Component 2: Priority flood risk reduction interventions (*411 million USD*)

2.1. Construction of Nuoc Len tidal sluice gate and ship locks (USD 14M)

2.2. Construction of Vam Thuat tidal sluice gate and ship locks (USD 17M)

2.3. Construction of canal bank revetment in the main canal of Tham Luong – Ben Cat – Nuoc Len (USD 195M).

2.4. Construction of main interceptor in Go Vap district (USD 44M)

2.5. Construction and improvement of primary and secondary combined sewer systems and the secondary interceptor in Go Vap district (USD 106M)

2.6. Improvement of secondary canals (USD 35M)

Project components

Sub-component 1.1: Modernization of Hydromet Equipment and Flood Forecasting (USD 10.M)

- (i) Installation of 05 weather stations, 01 S-band bi-polar weather radar, 80 rainfall stations and 20 hydrological stations;
- (ii) Upgrading of the numerical weather and flood forecasting models;
- (iii) Observation and forecasting data sharing and management system;
- (iv) Implementing a flood forecasting system based upon a wide variety of meteorological data and the hydrological-hydrodynamic model developed by SCFC under sub-component 1.2.

Project components

Sub-component 1.2: Integrated Urban Flood Risk Management and Early Warning System (USD 5.8M)

- (i) Establishment of Operation Management Unit for Urban Flood Control in SCFC;
- (ii) Establishment of an Integrated Flood Information System at SCFC connecting to the office of the HCMC People's Committee and other public institutions, outreaching to flood vulnerable communities;
- (iii) Development of a reliable detailed integrated hydrological – hydrodynamic model for HCMC to be used jointly for flood forecasting, flood hazard mapping and the evaluation of flood protection measures;
- (iv) Production and updating of flood hazard and flood risk maps for HCMC.

Project components

Sub-component 1.3: Water Quality Monitoring Equipment (USD 0.8M)

- (i) Building 6 water quality monitoring stations along Tham Luong – Ben Cat – Nuoc Len canal;
- (ii) Establishing the sediment management study.

Sub-component 1.1: Modernization of Hydromet Equipment and Flood Forecasting

Installation of 5 weather stations

- Long Khanh
- Bien Hoa
- Tan Son Nhat
- Nha Be
- Vung Tau

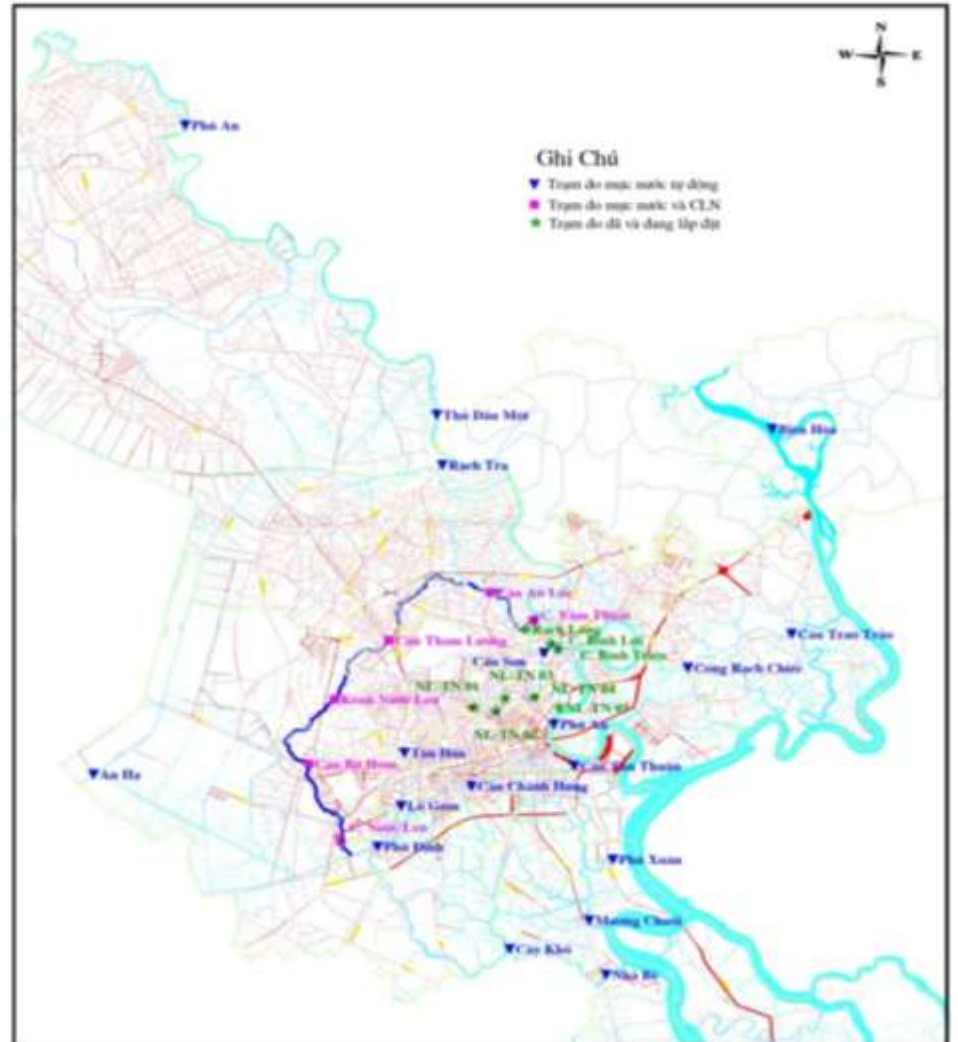


Sub-component 1.1: Modernization of Hydromet Equipment and Flood Forecasting

Installation of 80 rainfall stations

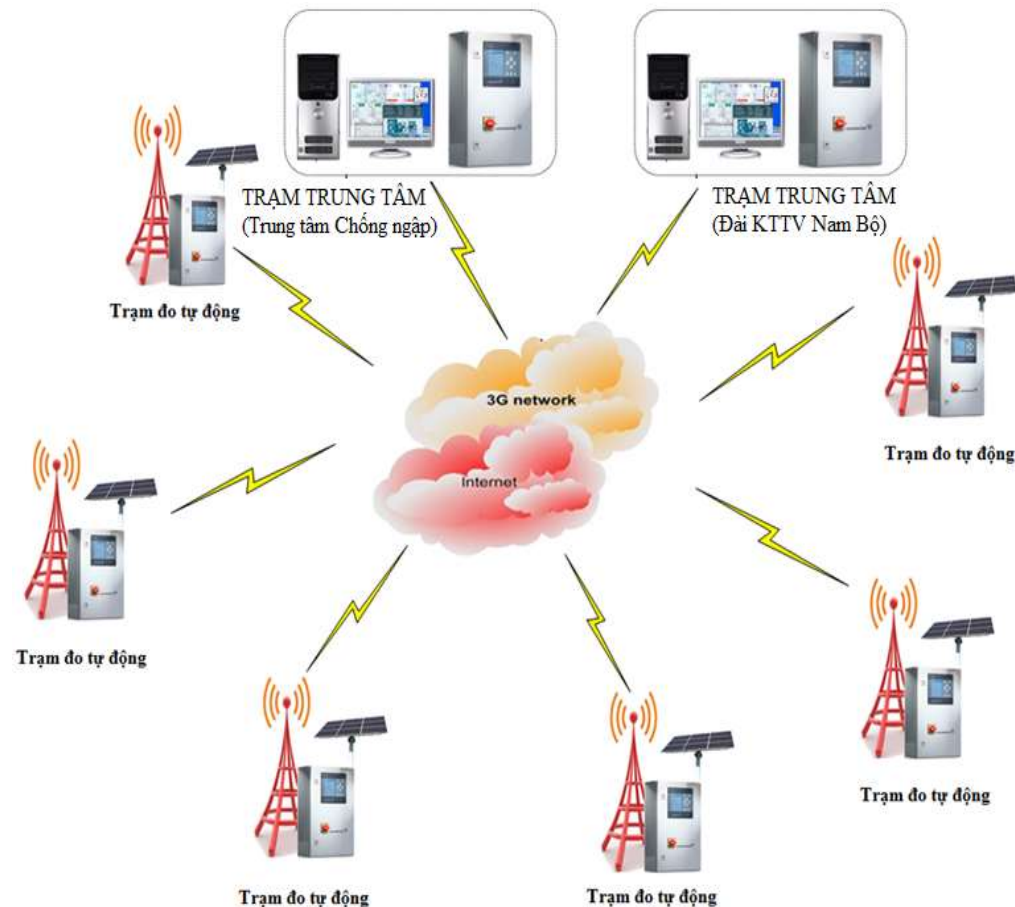
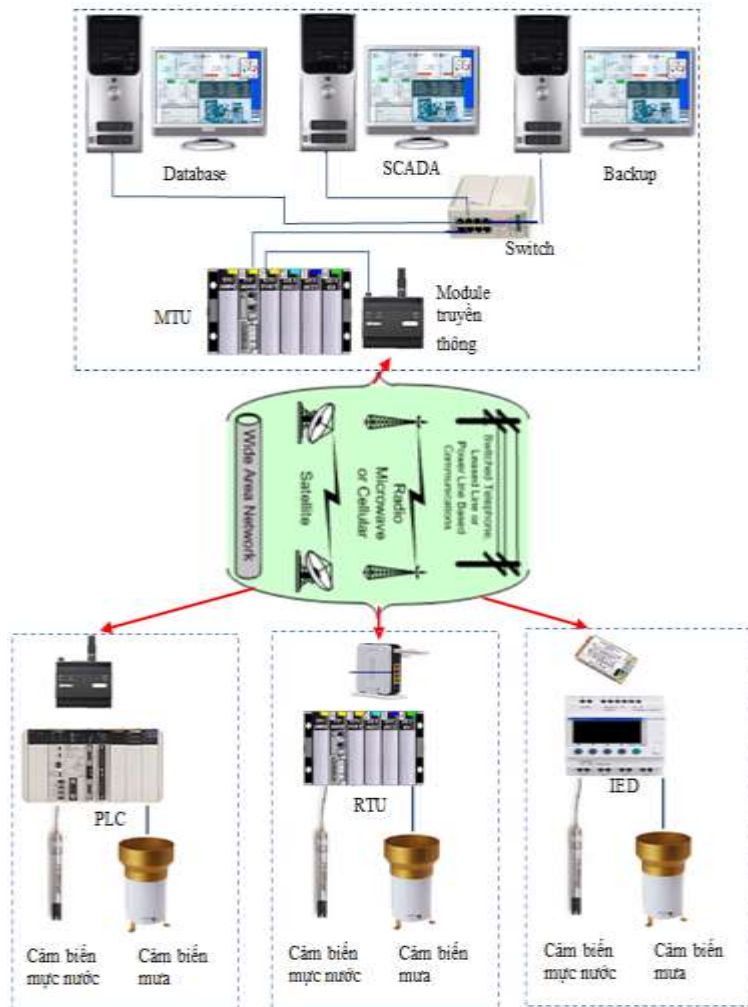


Installation of 20 water level stations



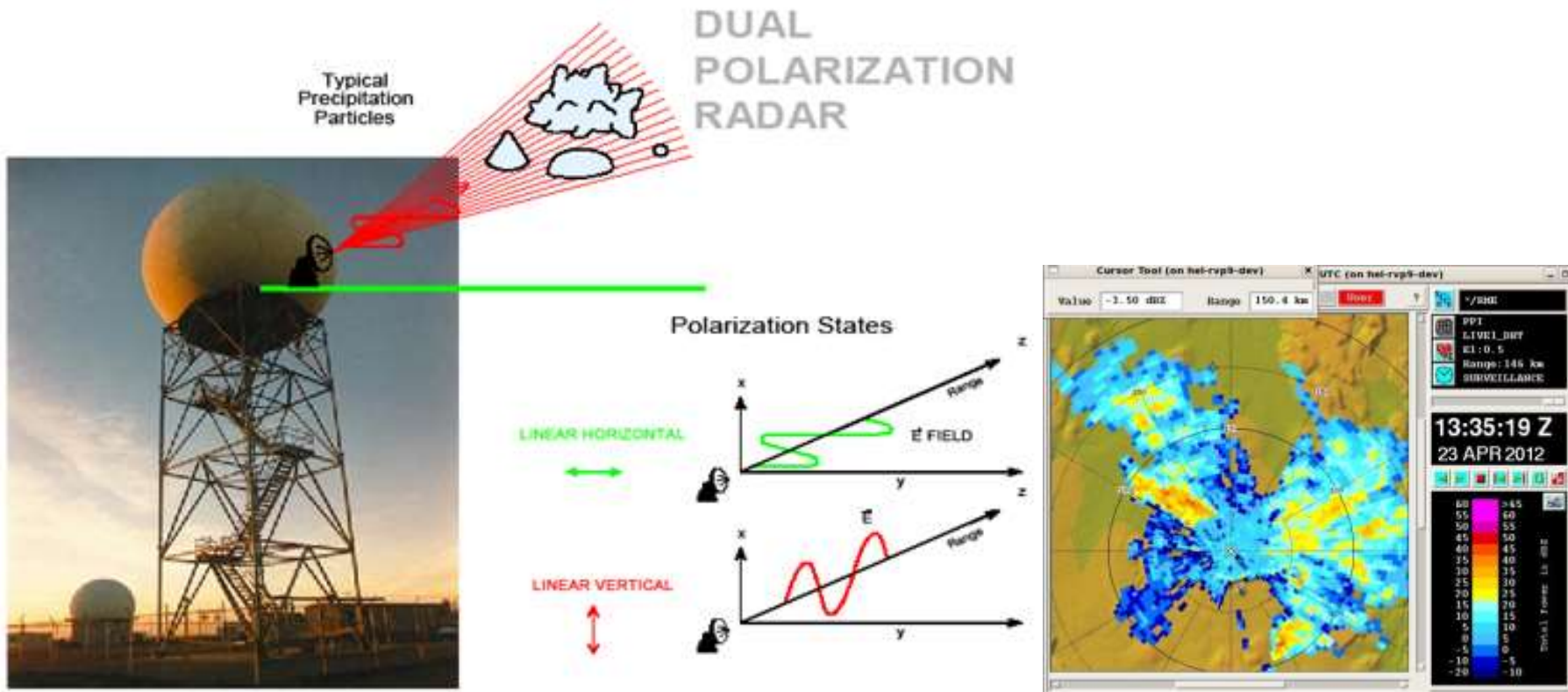
Sub-component 1.1: Modernization of Hydromet Equipment and Flood Forecasting

Telemetry system configuration



Sub-component 1.1: Modernization of Hydromet Equipment and Flood Forecasting

Installation of S-band dual polarization radar



Sub-component 1.1: Modernization of Hydromet Equipment and Flood Forecasting

Upgrading of the numerical weather and flood forecasting models

- Upgrading of the numerical weather models, based upon the weather modeling systems Weather Research and Forecast (WRF) and High Resolution Regional Model (HRM).
- The model grid size will be reduced to 2km from existing 16km.

Sub-component 1.1: Modernization of Hydromet Equipment and Flood Forecasting

Data sharing and management system

- Building the Hydromet database system included server, PC, database software, data storage system...
- The data sharing and management system will be developed and installed in SCFC and SCHMF. The observed and forecasted hydromet data will be automatically and continuously transferred to the SCFC so that SCFC can give the operation decision. In the opposite way, the information of the hydraulic works operation in HCMC will be transferred from SCFC to the SCHMF.

Sub-component 1.2: Integrated Urban Flood Risk Management and Early Warning System

Building the office of Operation Management Unit for Urban Flood Control in SCFC;

No.	Criteria	Unit	Quantity
1	Land area	m2	450
2	Floor area	m2	1.977
	New 9-storey office building	m2	1.485
	Old 4-storey office building	m2	492
3	Construction area	m2	288
	New 9-storey office building	m2	165
	Old 4-storey office building	m2	123
4	Construction density	%	64
5	Land use factor		4,6
6	Average height	Storey	6,5
7	Number of storeys of the new building	Storey	9
8	Height of the new building	m	39



Sub-component 1.2: Integrated Urban Flood Risk Management and Early Warning System

Setting up a central management program

The central management program has the main functions as follow:

- + Data storage and data query.
- + Connecting with the SCADA program.
- + Connecting and transferring data with SCHMF.
- + Connecting and controlling the hydrologic and hydraulic models
- + Synthesis of information for the operation decision.
- + Connecting information with community
- + Reporting functions

Sub-component 1.2: Integrated Urban Flood Risk Management and Early Warning System

Developing the hydrological – hydrodynamic models

- + The coastal model uses the 2D/3D hydraulic model to simulate the tide forecasting and sea water level rising due to typhoon in East Sea.
- + 1D Hydraulic model simulates downstream of Dong Nai river, particularly, it is required for the detail at the of secondary canals and drainage networks in HCMC.
- + An urban flooding model is developed for each basin of the city. The model simulates the detailed drainage canal and sewer networks. flooding model combined with the DEM data can be quickly build flood risk maps.

Sub-component 1.2: Integrated Urban Flood Risk Management and Early Warning System

Developing the operational procedure for the flood control system

Developing the operational procedure for the flood control system and drainage system for the Tham Luong - Ben Cat – Nuoc Len basin:

- + This procedure must clarify three important factors (tide, heavy rainfall and flooding discharge from upstream) in the operation and management of the flood control system.
- + The procedure must propose the scenarios and situations that may occur during the operation process.
- + In addition for the flooding reduction factors, the operation procedure need to consider the water quality improvement in the canals.

Sub-component 1.2: Integrated Urban Flood Risk Management and Early Warning System

Building the flood risk warning information system

- + The flood risk warning information system provides to the local people the forecasting information such as: the highest water level in rivers, canals; rainfall, potential flood area and flood depth; operation time of tidal control structure, etc.
- + These information will be spread out through the media such as internet, television, radio, bulletin board, sms, etc.
- + Setting up the web portal and hotline to receive feedbacks of the local people about the flooding situation.

Sub-component 1.3: Water Quality Monitoring Equipment

Installation of 6 water level and water quality stations



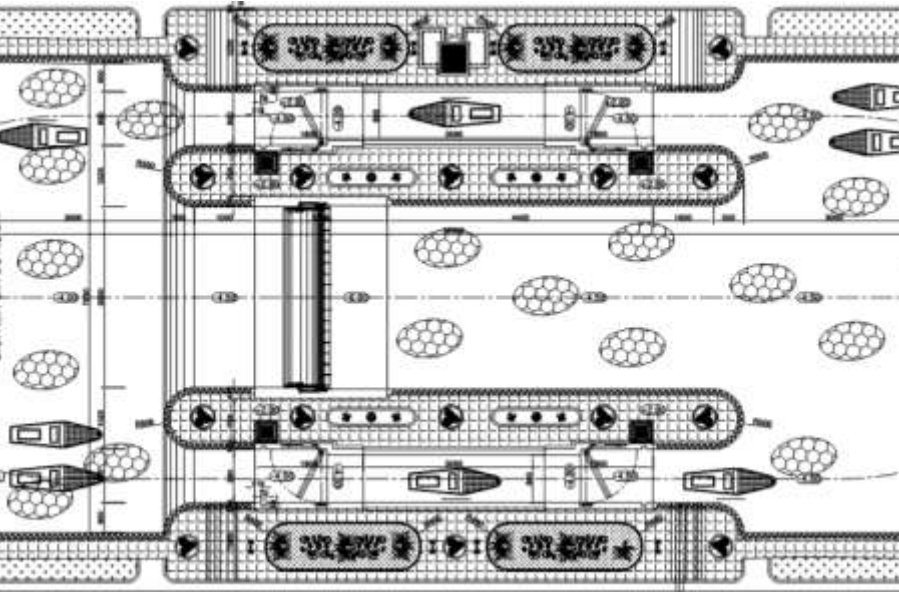
Sub-component 1.3: Water Quality Monitoring Equipment

Sediment management study

- + Establishing the sediment management study in detail and planning related to the sludge and sediment pollution management that are based on the existing flood risk management research and the relevant master plans of solid waste in the basin.
- + The sediment management study should demonstrate the annual volume of sediment deposition, pollution level, suggestion of the sediment treatment technology, the cost of regular dredging, treatment costs, disposal sites, etc.

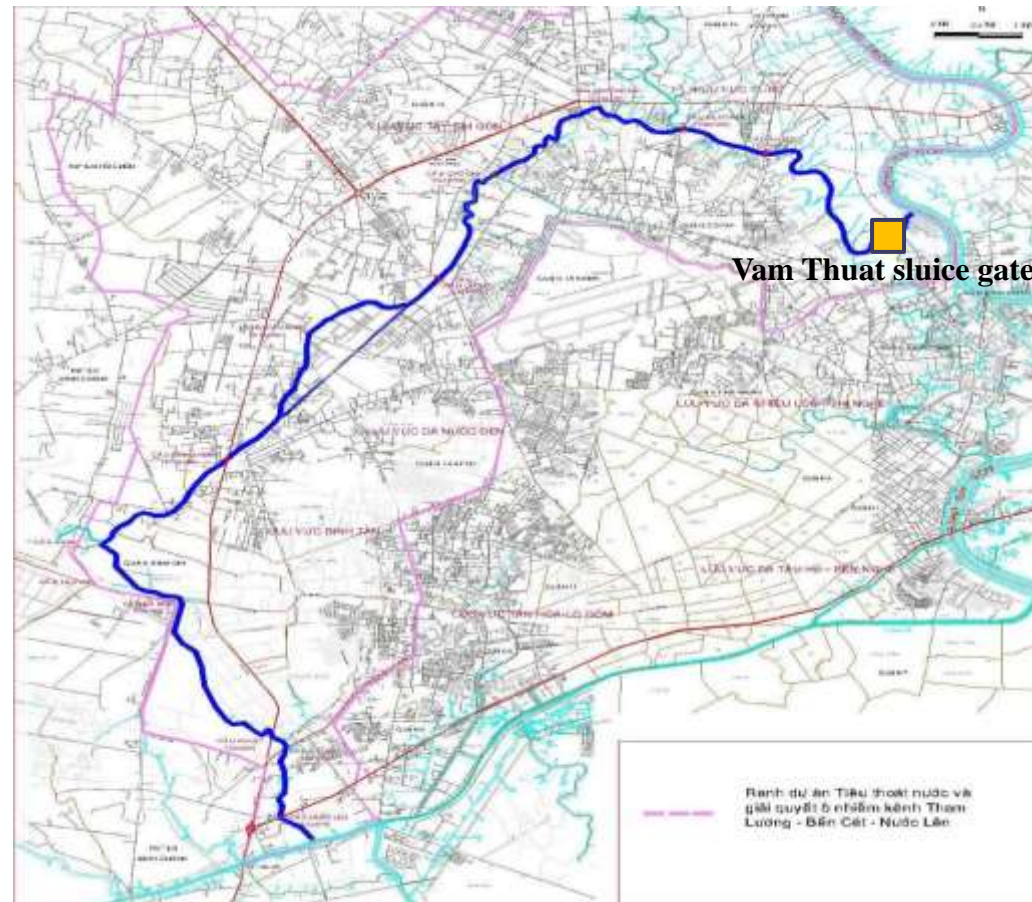
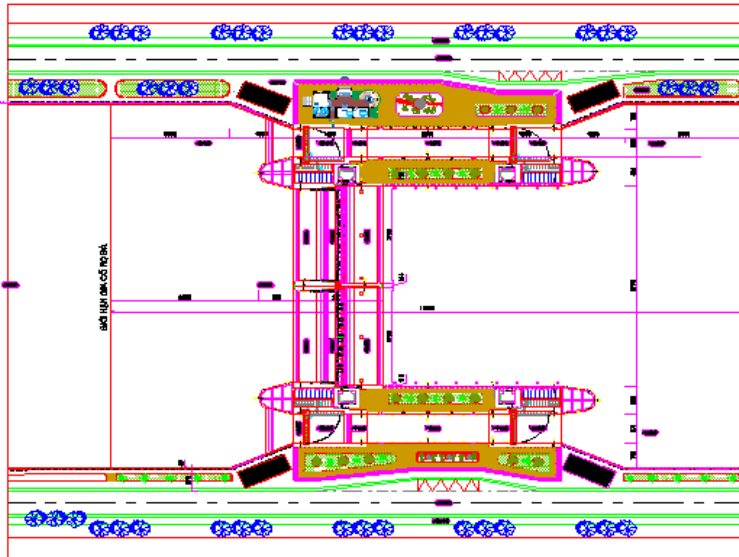
Component 2: Priority Flood Risk Reduction Interventions

2.1. Construction of Nuoc Len tidal sluice gate and ship locks (USD 14M)



Component 2: Priority Flood Risk Reduction Interventions

2.2. Construction of Vam Thuat tidal sluice gate and ship locks (USD 17M)



Component 2: Priority Flood Risk Reduction Interventions

2.3. Construction of canal bank revetment in the main canal of Tham Luong – Ben Cat – Nuoc Len (USD 195M)

- Total length: 32.714km
- Bottom level: - 4.0m to -5.0m
- Width: 30m to 70m
- Type:
 - + Vertical pre-stressed reinforced concrete piles revetment
 - + Combined vertical wall type and sloping revetment



Component 2: Priority Flood Risk Reduction Interventions

2.4. Construction of main interceptor in Go Vap district (USD 44M)

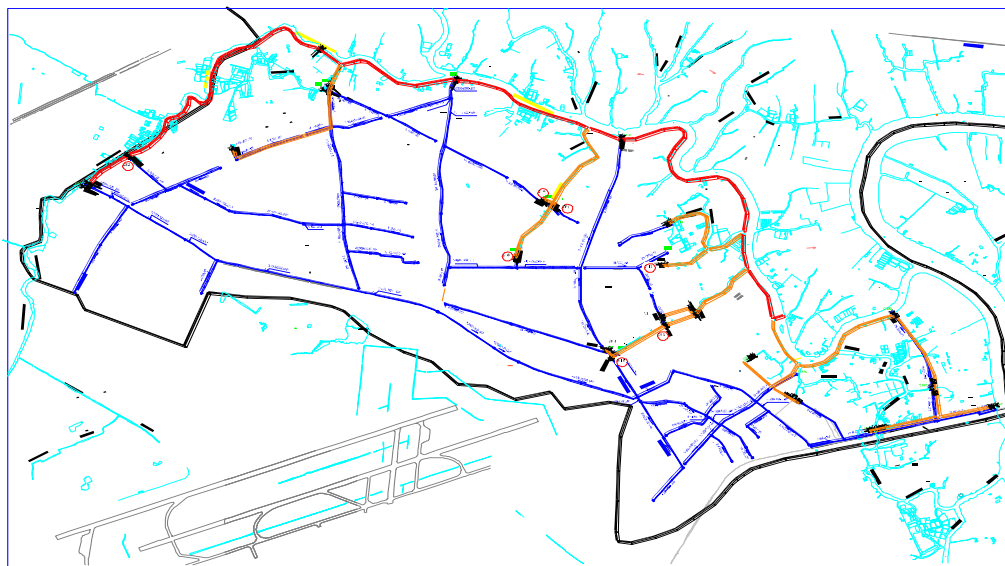
- Total length: 9 073 m
- Diameter: D1000mm to D2300mm



Component 2: Priority Flood Risk Reduction Interventions

2.5. Construction and improvement of primary and secondary combined sewer systems and the secondary interceptor in Go Vap district (USD 106M)

- Total length: 48 366 m
- Secondary interceptors: 11 120 m
- Combined sewers:
 - + Combined pipe culverts: 13 275 m
 - + Combined box culverts: 23 971 m



Project output

- 14,900 ha land area protected from a 10- year return period flood event as a result of project interventions;
- 2 million people (in 2020) living in the sub-catchment provided with access to improved sanitation facilities under the project;
- The situation of flooding and pollution is limited and solved, the conditions of public sanitation is improved;
- Management capacity, skills, and modern scientific technical facilities are strengthened to develop the human resources.



**THANK YOU VERY MUCH FOR
YOUR KIND ATTENTION!**