

*Pursuant to the June 17, 2009 Law on Urban Planning;*

*Pursuant to the November 26, 2003 Law on Construction;*

*Pursuant to the Government's Decree No. 37/2010/ND-CP of April 7, 2010, on the formulation, appraisal, approval and management of urban planning;*

*Pursuant to the Government's Decree No. 88/2007/ND-CP of May 28, 2007, on water drainage in urban areas and industrial parks;*

*At the proposal of the chairperson of Hanoi Municipal People's Committee and the appraisal opinions of the Ministry of Construction,*

#### DECIDES:

**Article 1.** To approve Hanoi Capital's water drainage master plan through 2030 with a vision toward 2050, with the following principal contents:

##### 1. Scope of research and planning

- Scope of research: The whole water drainage system within the administrative boundary of Hanoi Capital with a total area of 3,344.47 km<sup>2</sup> and the expanded areas belonging to the provinces of Hoa Binh, Ha Nam, Bac Ninh and Hung Yen in the same river basin.

##### - Scope of planning:

+ For rainwater: The entire administrative land area of Hanoi city's urban center, satellite towns equivalent to grade-III urban centers and suburban areas with direct impacts on the rainwater drainage system.

+ For wastewater: Hanoi city's urban center and satellite towns equivalent to grade-III urban centers.

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#### THE PRIME MINISTER

### **Decision No. 725/QĐ-TTg of May 10, 2013, approving Hanoi Capital's water drainage master plan through 2030 with a vision toward 2050**

#### THE PRIME MINISTER

*Pursuant to the December 25, 2001 Law on Organization of the Government;*

## 2. Planning viewpoints

- To conform with the socio-economic development master plan; the land use master plan; the general plan on construction of Hanoi Capital through 2030 with a vision toward 2050; the water drainage master plan for three northern, central and southern key economic regions; the orientations for water drainage development in urban areas and industrial parks through 2030 with a vision toward 2050; and other relevant approved specialized master plans;

- To take into account the impacts of climate change, directing toward stable and sustainable development, based on the building of synchronous rainwater and wastewater drainage systems from collection to treatment for every urban basin to suit socio-economic development conditions.

- For rainwater drainage planning, to apply the technical model of sustainable water drainage, enhancing the rainwater absorption and storage capability, contributing to the minimization and incremental elimination of urban flooding in the central Hanoi Capital and other urban centers within the scope of planning.

- To concentrate on the concentrated wastewater drainage and treatment systems for urban centers (especially the central one): to orientate the water drainage for small urban centers, outlying and suburban areas, industrial parks and hospitals, with a view to improving hygiene and protecting the environment, meeting the socio-economic development requirements.

- To encourage various economic sectors to invest in the construction of Hanoi Capital's water drainage systems.

## 3. Planning objectives

- To concretize the orientations for development of Hanoi Capital's water drainage in the general plan on construction of Hanoi Capital through 2030 with a vision toward 2050, already approved by the Prime Minister.

- To determine water drainage zones and basins. To forecast the rainwater drainage requirements and total urban wastewater volume; to determine schemes on water drainage and wastewater treatment for each urban basin.

- To step by step address urban flooding based on rainwater volumes projected for a 10-year cycle for key works while being able to regulate floods with shorter-term cycles.

- The rate of population provided with wastewater collection and treatment services in the planning scope will reach 90% by 2030 and 100% by 2050.

- To identify the demand for investment in water drainage systems in each period, serving as a basis for formulation and implementation of water drainage projects in Hanoi Capital and meeting the requirements of state management of water drainage.

## 4. Planning contents

### a/ Flood drainage and water drainage zoning

- The drainage of floods in Hanoi must comply with the master plan on Red river-Thai Binh river flood prevention and control in the Prime Minister's Decision No. 92/2007/QĐ-TTg of June 21, 2007, and Hanoi city's detailed master plan on flood prevention and control.

- It must conform with Hanoi's irrigation master plan to ensure the drainage of urban water to rivers; at the same time water feeding facilities will be built to create continuous water flow and minimize environmental pollution for Tich, Day, Nhue and To Lich rivers.

- Water drainage zoning: Hanoi city comprises three major drainage zones: left bank of Day river, right bank of Day river and northern Hanoi.

+ The Day river left-bank zone: To drain water with pumps, covering the urban water drainage basins of To Lich, Dong My, left and right banks of Nhue river, Phu Xuyen and townships, with an area of about 47,350 ha.

+ The Day river right-bank zone: Self drainage combined with pumping and irrigation, covering the urban water drainage basins of Son Tay, Xuan Mai, Hoa Lac, Quoc Oai, Phuc Tho, Chuc Son and townships, with an area of around 31, 310 ha.

+ Northern Hanoi zone: To partially combine self-drainage with pumping and irrigation, covering the urban water drainage basins of Long Bien, Gia Lam, Dong Anh, Me Linh and Soc Son, with an area of around 46,740 ha.

#### b/ Rainwater drainage planning

##### - Calculation norms:

Norms for calculation of the rainwater drainage system are based on relevant prescribed standards and technical regulations.

Major criteria in Hanoi Capital's rain water drainage master plan:

- Areas within the rain water drainage planning scope are divided into main basins and small sub-basins, ensuring fast and complete drainage of surface water.

- To promote to the utmost the capability of self-drainage of surface water, increasing the rainwater-absorbing areas, arranging rational water storage facilities to regulate rainwater volume, in combination with rational water drainage pumping solutions; to restrict the change of current surface water areas for other purposes.

##### - For urban areas:

+ To renovate and build systems of water drainage sluice gates, canals, rivers and pump stations, and rainwater absorption and storage facilities.

+ To improve and preserve, and minimize the environmental pollution of, existing lakes, promoting the all-purpose functions of regulating lakes and scenery lakes.

+ For old urban quarters: To improve and upgrade the existing water drainage systems, to additionally build and complete the common water drainage systems for rainwater drainage, in combination with the construction of facilities to collect and carry wastewater to treatment plants.

| No. | Planning standards                | Key regulating rivers, canals, sluices/lakes, rainwater pump stations  | Main rainwater drainage canals, sluice gates | Rainwater drainage sluice gates, branch canals |
|-----|-----------------------------------|--|--|--|
| 1   | Repeated cycle of calculated rain | 10 years, taking into account the rainfall increase according to the climate change scenario toward 2050                                   | 5-10 years                                   | 2-5 years                                      |
| 2   | Calculated rainfall volume        | 310 mm/2 days for core southern Red river towns and over 200 mm/day for each specific urban basin for rains of repeated cycle of 10 years; |  |  |

+ For new urban quarters: To build separate water drainage systems in synchronism with urban infrastructure development, comprising the rainwater drainage networks, canals, regulating lakes, pump stations and on-spot water drainage facilities (rainwater absorption

and storage facilities...). Rainwater will be drained to rivers, canals and lakes; rainwater will be treated in the future.

+ Projected construction of key rainwater drainage works for Hanoi Capital through 2030, with a vision toward 2050, as follows:

| No. | Zone/Basin               | Acreage (ha) | Regulating lake (ha) | Required pump capacity (m <sup>3</sup> /s) | Discharging source                  |
|-----|--------------------------|--------------|----------------------|--|-------------------------------------|
| A   | Day river left-bank zone | 47,350       | 2,330                | 811.50                                     |                                     |
| 1   | To Lich river basin      | 7,750        | 944                  | 90.00                                      | Red river                           |
| 2   | Dong My basin            | 2,010        | 97                   | 41.30                                      | Red river                           |
| 3   | Nhue left-bank basin     | 9,800        | 564                  | 115.00                                     | Red and Nhue rivers                 |
| 4   | Nhue right-bank basin    | 17,714       | 531                  | 464.00                                     | Red, Nhue and Day rivers            |
| 5   | Phu Xuyen basin          | 8,800        | 194                  | 101.20                                     | Red and Nhue rivers                 |
| 6   | Township basins          | 1,276        | -                    | -  |                                     |
| B   | Day right-bank zone      | 31,310       | 1,880                | 101.30                                     |                                     |
| 1   | Son Tay basin            | 6,404        | 300                  | -  | Tich river                          |
| 2   | Xuan Mai basin           | 6,243        | 270                  | 70.60                                      | Bui river                           |
| 3   | Hoa Lac basin            | 13,560       | 1,221                | -  | Tich river                          |
| 4   | Quoc Oai basin           | 1,685        | 14                   | 30.70                                      | Tich and Day rivers                 |
| 5   | Chuc Son basin           | 1,633        | 75                   | -  | Tich and Day rivers                 |
| 6   | Phuc Tho basin           | 685          | -                    | -  | Tich river                          |
| 7   | Township basins          | 1,100        | -                    | -  | Tich river                          |
| C   | Northern Hanoi zone      | 46,740       | 1,195                | 402.20                                     |                                     |
| 1   | Long Bien basin          | 3,788        | 156                  | 65.00                                      | Red and Duong rivers                |
| 2   | Gia Lam basin            | 7,804        | 240                  | 47.50                                      | Red and Duong rivers                |
| 3   | Dong Anh basin           | 18,590       | 350                  | 202.00                                     | Red, Ca Lo and Ngu Huyen Khe rivers |

|   |               |                |              |                 |                                     |
|---|---------------|----------------|--------------|-----------------|-------------------------------------|
| 4 | Me Linh basin | 10,045         | 123          | 87.70           | Red, Ca Lo and Ngu Huyen Khe rivers |
| 5 | Soc Son basin | 6,513          | 326          |                 | Cau and Ca Lo rivers                |
|   | <b>Total</b>  | <b>125,400</b> | <b>5,405</b> | <b>1,315.00</b> |                                     |

Planning of rainwater drainage sub-basins and main water drainage pump stations for urban centers, see Appendix I for details.

+ The rainwater drainage networks include canals, lakes, major sluice gates already planned in direction and size for every water drainage basin and sub-basin, which will be specifically calculated in the stage of formulation of construction investment projects to suit the practical conditions.

- Suburban and outlying areas:

+ To select water drainage systems suitable to the irrigation systems and local conditions.

+ To improve and embank rivers and streams running through residential areas against erosions and slides.

+ For residential areas at the mountain sides, to build facilities to collect rainwater from the hill or mountain tops, preventing overflow of residential areas.

c/ Wastewater drainage and treatment planning

- Norms for calculation of wastewater drainage and treatment planning:

Norms for calculation of wastewater drainage and treatment systems are based on the prescribed standards and technical regulations.

+ Wastewater drainage norms:

| No. | Water drainage area                    | Wastewater drainage norms |                          |
|-----|--|---------------------------|--------------------------|
|     |  | By 2030                   | By 2050                  |
| 1   | Urban centers                          | (254-321) l/ person/ day  | (312-379) l/ person/ day |
| 2   | Satellite towns, Quoc Oai urban center | (239-274) l/ person/ day  | (312-350) l/ person/ day |

+ Post-treatment wastewater quality will reach the prescribed environmental standards and technical regulations.

- Forecasts of total volume of wastewater collected and treated for the central urban center of Hanoi Capital and satellite towns (Son Tay, Hoa Lac, Xuan Mai, Phu Xuyen and Soc Son) and Quoc Oai eco-urban center are as follows:

| No. | Urban area                             | Number of basins | Generated wastewater volume (m <sup>3</sup> /day) |                  |
|-----|--|------------------|---|------------------|
|     |  |                  | By 2030   | By 2050          |
| 1   | Urban center                           | 29               | 1,439,300   | 1,883,000        |
| 2   | Satellite towns, Quoc Oai urban center | 10               | 369,000   | 599,000          |
|     | <b>Total</b>                           | <b>39</b>        | <b>1,808,300</b>                                  | <b>2,482,300</b> |

- Wastewater drainage and treatment planning:

+ For urban centers:

· The central urban area to the south of Red river (in To Lich river basin and part of the Nhue river left-bank basin), which is divided into 5 main wastewater collection and treatment basins: To develop mixed water drainage systems on the basis of the existing common water drainage networks and build new wastewater collection networks to carry wastewater to concentrated treatment plants of different zones.

· The central urban center to the south of Red river (in the area from the Nhue river right bank to Day river and the remaining part of the Nhue river left-bank basin), which is divided into 11 basins; the urban area to the north of Red river is divided into 13 basins; the satellite towns and Quoc Oai urban center are divided into 10 wastewater collection and treatment basins: To incrementally complete separate drainage systems for rainwater and wastewater. To improve the wastewater collection systems for old mingled urban centers; to incrementally

develop separate wastewater collection networks. Wastewater will be carried to concentrated wastewater treatment plants for treatment up to the prescribed standards and technical regulations before being discharged into the environment.

· The wastewater collection networks comprise graded pump stations, surrounding culverts and wastewater-separating wells, separate wastewater collection culverts, which have been planned in direction and scale, and will be specifically calculated in the stage of formulation of construction investment projects, meeting the requirement of carrying all wastewater to wastewater treatment plants.

+ Industrial parks and health establishments: To build separate water drainage systems for rainwater and wastewater; wastewater will be locally collected and treated up to prescribed standards and technical regulations before being discharged into the urban water drainage systems or the environment.

+ Main concentrated wastewater treatment plants expected to be constructed for urban centers:

| No. | Urban area  | Number of concentrated wastewater treatment plants | Combined capacity of wastewater treatment plants (m <sup>3</sup> /day) |         | Type of water drainage system  |
|-----|---|--|--|---------|--------------------------------|
|     |   |  | By 2030  | By 2050 |                                |
| I   | Urban centers   |  |  |         |                                |
| 1   | To the south of Red river (in To Lich river basin and part of Nhue river left-bank basin)               | 5  | 588,300  | 588,300 | Mixed water drainage system    |
| 2   | To the south of Red river (in Nhue river right-bank area to Day river and part of Nhue left-bank basin) | 11   | 406,000  | 675,000 | Separate water drainage system |

|    |                             |           |                  |                  |                                |
|----|-----------------------------|-----------|------------------|------------------|--------------------------------|
| 3  | To the north of Red river   | 13        | 445,000          | 620,000          | Separate water drainage system |
| II | Satellite towns             |           |                  |                  |                                |
| 1  | Son Tay                     | 1         | 50,000           | 75,000           | Separate water drainage system |
| 2  | Hoa Lac                     | 2         | 149,000          | 238,000          | Separate water drainage system |
| 3  | Xuan Mai                    | 1         | 58,000           | 100,000          | Separate water drainage system |
| 4  | Phu Xuyen                   | 1         | 33,000           | 52,000           | Separate water drainage system |
| 5  | Soc Son                     | 3         | 66,000           | 116,000          | Separate water drainage system |
| 6  | Quoc Oai (eco-urban center) | 2         | 13,000           | 18,000           | Separate water drainage system |
|    | <b>Total</b>                | <b>39</b> | <b>1,808,300</b> | <b>2,482,300</b> |                                |

The planning on wastewater drainage basins and main concentrated wastewater treatment plants for urban centers, see Appendix II for details.

+ Orientations for water drainage for small urban centers and suburban areas: For thinly populated areas, scattered wastewater treatment facilities will be built.

+ Orientations for craft village wastewater drainage: Wastewater from craft villages will be locally treated before being discharged into the environment or urban water drainage systems.

d/ Wastewater treatment and mud treatment technologies

The technologies and equipment used for wastewater treatment and mud treatment meet the wastewater treatment requirements, standards and technical regulations and suit the socio-economic conditions, prioritizing the use of environment-friendly technologies, modern

and energy-saving equipment, taking into account the possible upgrading in the future.

- Wastewater treatment technologies:

+ For concentrated wastewater treatment plants: To apply wastewater biological treatment technology to ensure the post-treatment water quality up to the prescribed environmental standards and technical regulations; for long-term orientations, to apply more advanced and environment-friendly technologies.

+ For scattered wastewater treatment stations: To make the fullest use of natural biological treatment technology.

+ For industrial and medical wastewater treatment: To apply advanced wastewater treatment technology for local treatment stations.

+ For disinfection: To apply chlorine disinfection and then more environment-

friendly alternative technologies, such as ultra-violet ray or ozone treatment technologies, in the future.

- Waste mud treatment technologies: For mud discharged from wastewater treatment plants, septic tanks, mud generated from dredging activities or maintenance of water drainage networks will be collected and treated up to the prescribed standards and technical regulations. To prioritize the application of environment-friendly treatment solutions, creating reusable products, renewal energy or building materials.

5. Investment fund estimation, funding sources and investment phasing

a/ Investment fund estimation:

The fund for implementation of Hanoi Capital's water drainage master plan through 2030 is estimated at around VND 116,500 billion (calculated according to 2012 prices), including about VND 53,350 billion for the period through 2020, with VND 21,550 billion for the construction and renovation of rainwater drainage systems and about VND 31,800 billion for wastewater collection and treatment systems and environmental improvement.

b/ Funding sources

- State budget capital;
- ODA loans and foreign donations;
- Investment credit loans;
- Domestic commercial loans;
- Loans from domestic and foreign investors;
- Other lawful sources.

6. Priority investment projects in the period up to 2020

- Rain water drainage system:

+ Water drainage project to improve Hanoi environment - Project II, water drainage for To Lich river basin (ongoing project and additional project);

+ Investment project to construct the Nhue river basin rainwater drainage system;

+ Project to construct and renovate 3 water drainage pump stations of Co Nhue, Dong Bong 1 and Dong Bong 2, in the western area of Hanoi;

+ Investment project to construct water drainage systems for Ha Dong urban district;

+ Projects to construct key grade-I works (main canals, regulating lakes and rainwater pump stations) in Long Bien urban district;

+ Projects on water drainage against local flooding in urban centers, satellite and eco-urban centers.

- Wastewater collection and treatment and waste mud treatment systems:

+ Project to build Yen So wastewater treatment plant;

+ Project to construct systems for collection of S1 basin wastewater for Yen So wastewater treatment plant;

+ Project to build Bay Mau wastewater treatment plant;

+ Project to build Ho Tay wastewater treatment plant;

+ Project to construct wastewater collection systems and wastewater treatment plant of Yen Xa;

+ Project to construct wastewater collection systems and wastewater treatment plant of Phu Do;

+ Project to construct wastewater collection systems and wastewater treatment plant of Tay Song Nhue (western Nhue river);

+ Project to construct wastewater collection and treatment systems for Ha Dong and Son Tay areas;

+ Project to construct wastewater collection systems and wastewater treatment plant of An Lac.

+ Project to construct a plant for treatment of waste mud discharged from wastewater treatment plants at Yen So dump site;

+ Projects to improve inner-city lakes against pollution.

#### 7. Strategic environmental assessment

##### a/ Positive environmental impacts

- To ensure the urban flood and rainwater drainage management suitable to current hydrological and topographical characteristics and conformable with other master plans in Hanoi Capital;

- To minimize pollution caused by wastewater through wastewater collection and treatment for central and satellite urban centers; to improve the water quality of rivers and lakes and create flow currents for increasing the self-cleaning capability;

- To contribute to creating urban environment and landscape; to minimize diseases and epidemics caused by polluted water sources and improve people's health;

- To contribute to the building and sustainable development of a green, clean and beautiful Hanoi Capital.

b/ Forecasts of environmental impacts during the implementation of the master plan

- The construction of rainwater drainage and wastewater collection and treatment systems will cause impacts on the natural and social environment in the area such as air, noise, vibration and surface water pollution, urban traffic, land recovery for ground clearance,...;

- Poor water drainage management will affect the environmental and water source quality.

c/ Solutions for minimizing environmental impacts

- Applying designing and technological solutions toward re-use for the protection of the eco-environment and water resources and the utmost restriction of ground clearance and resettlement;

- Applying advanced construction technologies and proper measures to minimize the impacts on the environment and areas of cultural value;

- Formulating and implementing environment management and supervision plans in accordance with regulations;

- Building early warning systems to serve the management and operation of water drainage systems in case of heavy rains;

- Developing an environment observation process to prevent, detect and handle incidents of wastewater or waste mud treatment facilities;

- Building capacity for management and operation of water drainage, wastewater treatment and mud treatment systems;

- Other supporting measures.

#### **Article 2. Organization of implementation**

1. The Hanoi Municipal People's Committee shall:

- Organize the implementation of Hanoi Capital's water drainage master plan through 2030 with a vision toward 2050;

- Assume the prime responsibility for, and coordinate with ministries and sectors in, the effective implementation of investment projects under Hanoi Capital's water drainage master plan through 2030 with a vision toward 2050;

- Draw up financial plans suitable to investment plans for development of water drainage systems in each period; formulate mechanisms and policies to mobilize resources for the implementation of this master plan, encouraging various economic sectors to invest in the construction and management of water drainage systems in the locality;

- Review and draw up plans on use of land for water drainage facilities (pump stations, regulating lakes, wastewater and waste mud treatment plants,...);

- Direct the synchronous implementation of projects on development of wastewater collection networks for investment projects on construction of wastewater and waste mud treatment plants;

- Formulate and promulgate regulations on management of urban water drainage systems; and intensify the inspection and supervision of their implementation under the master plan;

- Strengthen the water drainage organization and management; build appropriate models of water drainage enterprise in Hanoi city.

2. Related ministries and sectors shall, depending on their respective functions and tasks assigned by the Government, coordinate with the Hanoi Municipal People's Committee in implementing Hanoi Capital's water drainage master plan through 2030 with a vision toward 2050.

**Article 3.** This Decision takes effect on the date of its signing.

Ministers, heads of related agencies and the chairperson of Hanoi Municipal People's Committee shall implement this Decision.-

*For the Prime Minister*  
Deputy Prime Minister  
HOANG TRUNG HAI