Guideline for Green City Planning
「GGCP」

(Establishment of Vietnam Green City Urban Planning Decision Support System)

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ABBREVIATION

MOC	Ministry of Construction
MPI	Ministry of Plan and Investment
PW	Public Work
SW	Solid waste
SEA	Strategic Environmental Assessment
GCP	Green city Planning
GGCP	Guideline Green City Planning
HTKT	Infrastructure
KCN	industrial area
MĐXD	Building density
NVQH	Planning tasks
NUUP	National Urban Upgrading Program
QCXDVN	Vietnam Construction Standards
QHC	General planning
QHCĐT	General urban planning
QHĐT	Urban planning
QHXD	Construction planning
QHV	Zoning
TCXDVN	Vietnam Construction Standards
TDTT	Sports
TTCN	Handicraft
VSMT	Environmental sanitation

I. INTRODUCTION

1. Background

After 30 years of renovation, the process of urbanization has been linked to the process of industrialization and modernization of the country and achieved many important results. Vietnam' s urban centers have developed rapidly in terms of quantity and quality. The rate of urbanization has increased from 24.12% in 2000 to 30.17% in 2010 and to 37.5% in 2017. The number of cities has also risen from 629 in 1999 to 813 in 2017 with 2 special cities, 1 city of grade Ⅰ, 23 cities of grade II, 45 cities of grade III, 84 cities of grade IV and 640 cities of grade V. Urbanization has increased rapidly in the key economic regions, and large urban areas have become more evenly distributed nationwide. Many new urban quarters have been built and developed. The existing urban areas have also been gradually upgraded, supplemented and expanded in terms of land size, technical infrastructure (transport, electricity supply, water supply, wastewater treatment, drainage, sanitation, environment, etc.) and social infrastructure (education, health care, culture, sports, etc.). The face of urban centers has changed in the direction of civilization and modernization. As a result, the life of residents of urban areas has been improving. Urban areas have dominated the share of GDP, industrial production value, import-export value, scientific and technological advances and spillover effects, promoting regional and nationwide socio-economic development.

However, recent years have shown the increasing impact of climate change is a high risk for urban development in the traditional way. The urban system is changing fast but not sustainable and effective in resource use with no plan to respond to climate change. The country has not yet prepared sufficient regulations on urban development to adapt to climate change, green growth cities and smart urbanization and institutions and policies to encourage the application of scientific and technological achievements to building and developing

sustainable cities.

To address this situation, in 2012 the Government issued Decision No. 1393/ QD-TTg dated 25 September 2012 of the Prime Minister on the approval of the national strategy on green growth. The goal of the national green growth strategy in accordance with the Decision is to move towards a low carbon economy, reduce emissions and increase the capacity to absorb greenhouse gases, and thereby effectively respond to climate change. In that, green economic institutions should serve such goal by encouraging efficient use of energy and resources with high added value, developing eco-friendly lifestyle and building green infrastructure. To achieve the goal of the national strategy and institutional purposes, the implementation objectives to promote green lifestyle and sustainable consumption are set as follows:

a) Development of sustainable green cities
b) Promotion of green lifestyle.

To improve the effectiveness of these implementation objectives, the following decisions are adopted: Decision No. 158/2008 / QD-TTg dated December 2, 2008 approving the National Target Program to respond to climate change; Decision No. 2139 / QD–TTg dated 05/12/2011 approving the National Strategy on Climate Change; Decision No. 1474 / QD–TTg dated 05/10/2012 approving the National Action Plan on Climate Change 2012–2020 (NAP); Decision No. 432 / QD–TTg dated 12 April 2012 on "Approval of Vietnam Sustainable Development Strategy for 2011–2020"

Government agencies of various levels are focusing on developing plans and solutions for the implementation of the Green Growth Strategy and the Action Plans to respond to climate change, and preparing green city urban planning, green city construction indicators and green growth indicators in order to ensure the implementation of such plans and solutions in urban areas throughout the country.

To adapt to climate change in Vietnam, implement relevant national,

inter-agency plans and solutions and especially elaborate the green city urban planning as an urban planning paradigm shift including the elaborated green life and sustainable consumption, the project "Technical Assistance for Green Urban Planning in Vietnam" (Decision No. 984/QD-TTg) was determined after obtaining approval of the Prime Minister in 2016. The project aims to support Vietnam in building exemplary green cities by reducing greenhouse gas emissions, responding to climate change, pursuing green growth for sustainable development and building environmentally-friendly cities. The scope and objectives of the project are as follows:

a) Scope of the project

- Green city urban planning: Establishing green city indicators and indexes
- Support for green city urban planning: Building the green city urban planning decision-making support system (GDSS)
- Capacity building for the implementation of green city urban planning: Offering suggestions for enactment and amendment of law and relevant guidelines
- Capacity building by applying the plan for pilot cities: Applying the green city master plan to new urban areas of Yen Binh city in Thai Nguyen province and Rach Gia city in Kien Giang province

b) Objectives of the project

- Supporting the implementation of the national green growth strategy, action plans and sustainable development strategies and capacity building for green city urban planning
- Elaborating concepts, indicators and indexes for green cities
- Enhancing the capacity to use and analyze data related to green city urban planning using an electronic system and improve rationality of advance response to climate change and the decision-making process and objectiveness of decisions
- Supporting revision and supplement of the current green city master plan for

the new urban areas of Yen Binh City in Thai Nguyen province and Rach Gia City in Kien Giang province

- Incorporating the results of the empirical research in the planning and establishing a legal framework for capacity building for green city urban planning

The "Guideline for Green City Urban Planning" is prepared to apply and use in the implementation process the climate change response strategy in Vietnam and the results of the empirical research related to the "Technical Assistance for Green Urban Planning in Vietnam" project aiming at elaborating and implementing the strategy.

2. Objectives of the guidelines

This guideline aims to achieve the following objectives:

(1) Assisting the state management agencies to improve the system of legal documents on green city urban planning.

(2) Providing a basic manual for application for the evaluation and approval of green city urban planning in Vietnam.

(3) Improving the capacity to analyze advance response to climate change using an electronic system in green city urban planning.

(4) Providing a training manual for capacity building for green city urban planning and development management in Vietnam.

3. Principles of the guideline

(1) In green city urban planning, it is necessary to comply with the current laws on urban planning in Vietnam and apply the principles and guidance to the development model of green cities.

(2) Centrally-run cities and provincial cities need to develop green city urban planning in line with the government's national climate change response plans, such as green growth policy objectives and greenhouse

gas emissions.

(3) In green city urban planning, centrally-run cities, provincial cities and towns need to examine urban space, transport, ecology and green environment, energy, wastes, etc. to cope with climate change and ensure sustainability by incorporating indicators for green economy, green environment, green society, etc. in the plan.

(4) In green city urban planning, centrally-run cities, provincial cities and towns need to minimize the use of limited resources such as land and fossil fuels and develop and manage measures to reduce greenhouse gases and save resources by efficiently using resources.

4. Conditions for implementation of the guidelines

In the process of preparation, evaluation and approval of green city urban planning on the basis of the government's current documents on urban planning, the following key materials designated by competent authorities need to be included:

a) Green city indicators and indexes
b) Green city urban planning decision-making support system (GDSS)

5. Definition of terms

Some basic terms under the Urban Planning Law and the additional new concepts used in this Guideline are defined as follows:

1a. Urban center is an area with a dense population mainly engaged in non-agricultural economic activities, which is a political, administrative, economic, cultural or specialized center playing the role of promoting the social and economic development of a country, a territorial region or a locality, and consists of inner city and suburbs for a city and inner town and outskirts for a town and townships.

1b. Green city is a city capable of reducing greenhouse gas emissions and

adapting to climate change by sustainably and effectively using resources.

1c. Green growth city is a city that has achieved urban development and economic growth through urban policies and activities to reduce the adverse impact on the natural environment and resources.

1d. Environmentally-friendly city is a city with a good living environment including appropriate technical infrastructure and population structure where residents can enjoy community development based on quality jobs, healthy life and well-being, social security and safety, cultural and social services and opportunities to participate in the urban management process under the approved plans.

2. New urban center is an urban center expected to be formed in the future in line with the orientation of the master plan on the national urban system of centers, which is invested and constructed to step by step criteria of reach the urban centers as prescribed by law.

3. New urban quarter is an area within an urban center which is newly built with complete technical and social infrastructure and houses.

4a. Urban planning is the organization of the space, architecture, urban landscape and system of technical and social infrastructure facilities and houses in order to create an appropriate living environment for people living in an urban center, which is expressed on an urban plan.

4b. Green city urban planning is planning of technical and social infrastructures, landscape, architecture, space, etc. to meet the requirements specified in the green city urban plan.

5. Planning tasks are requirements on study and organization of implementation approved by competent authorities as a basis for making an urban plan.

6a. Urban plan is a document reflecting the contents of urban planning, including drawings, mock-ups, explanations and regulations on management according to urban planning.

6b. Green city urban plan is a document containing the contents of the

green city urban planning, including explanations, drawings and related materials.

7. **General planning** is the organization of the space and system of technical and social infrastructure facilities and houses for an urban center suitable to its socio-economic development, ensuring defense, security and sustainable development.

8. **Zoning planning** is the division and determination of functions and norms on the use of planned urban land of land areas, networks of social and technical infrastructure facilities within an urban area in order to concretize a general plan.

9. **Detailed planning** is the division and determination of norms on the use of planned urban land, requirements on management of architecture and landscape of each lot of land and arrangement of technical and social infrastructure facilities in order to concretize a zoning plan or general plan.

10. **Urban planning period** is a specified period used as a basis for forecasting and calculating economic-technical norms for the making of an urban plan.

11. **Validity period of urban planning** is a specified period counting from the time when an urban plan is approved to the time it is adjusted or cancelled under a decision.

12. **Urban architecture** is a combination of objects in an urban center, including architectural, technical, art and advertisement works whose exterior, image and shape dominate or directly affect urban landscape.

13. **Urban space** is a space covering urban architectural objects, trees and water surface in an urban center directly affecting urban landscape.

14. **Urban landscape** is a specific space with various observation directions in an urban center, such as the space in front of an architectural complex, a square, a street, a pavement, a footpath, a park, a greenery, a tree garden, a flower garden, a hill, a mountain, a hillock, an island, an islet, a natural land slope, a coastal strip, lake surface, river surface, a canal or a trench

in an urban center and public-utility space in an urban center.

15. **Norms on the use of planned urban land** are norms for spatial and architectural development management which are specified for an area or a lot of land, including construction density, land use co-efficient and maximum and minimum construction heights of works.

16. **Planning certificate** is a document granted by a competent agency certifying the data and information relating to an area or a lot of land according to the approved urban plan.

17. **Planning license** is a document granted by a competent agency to an investor for use as a basis for making detailed planning or formulating work construction investment projects.

18. **Framework technical infrastructure** is a system of main technical infrastructure facilities of an urban center, including trunk roads, energy transmission lines, water supply lines, water drainage lines, information and telecommunications lines and key technical works.

19. **Underground space** is a space under the ground planned for the construction of urban underground works.

20. **Green city urban planning decision-making support system (GDSS)** is an electronic information processing system built and operated based on a combination of hardware, software, database, network and security elements to support or manage the preparation and evaluation of planning, analyze greenhouse gas emissions and look up green urban status and the green urban indicators, which are essential in the planning of green cities.

21. **Energy saving** is activities to improve energy efficiency and reduce energy use, including energy shift to new and renewable energy such as wind power in order to response to climate change.

22. **Climate change** is a change in average conditions of climate which lasts for an extended period of time in a certain area.

23. **Sea level rise** is an increase in a sea level from normal levels due to typhoons, etc.

24. Disaster is a natural or social phenomenon that causes damage to the life, body or property of people and to the country.

25. Abnormal climate is a phenomenon where extreme changes in temperatures (including frequent heat wave with an increase in temperatures, intense cold, tropical storms, heavy rain and drought) occur at an increasing frequency.

26. Responding to climate change is human activities to mitigate the causes of climate change and adapt to climate change.

27. Adaptation and adjustment to climate change is adjustment of natural systems or human to changing circumstances or environments, with an aim to reduce the vulnerability of climate change and take advantage of the opportunities offered by it.

28. Climate change mitigation is activities aimed at reducing the level or intensity of greenhouse gas emissions.

29. Natural disaster refers to typhoons, floods, drought, volcanic eruptions, tsunami, tornadoes, landslides, mudslide or other natural phenomena equivalent thereto.

30. Prevention and control of natural disasters is activities to minimize damage caused by natural disasters in advance or to prevent their occurrence.

31. Facility for prevention and control of natural disasters is a facility funded and constructed by the state, organization or individual to prevent and control natural disasters, including meteorological observatories, flood gates, sea gates, seismological observatories, natural disaster alarming stations, river banks, dams, reservoirs, facilities for preventing flooding, drought and erosion, shelter for ships against typhoons and refugee houses.

32. Green City Indicators (GCI) are indicators applied to formulate, appraise and approve green city urban planning to promote the implementation of policies and activities to build green cities to ensure climate change resilience of the urban center, minimize greenhouse gas emissions and improve

efficient resource use.

- Green environment indicators: Indicators to evaluate the urban space structure, land use, green building, green transportation, green ecology and environment, new and renewable energy, waste, resource recirculation (water supply and wastewater treatment).
- Green economy indicators: Indicators to evaluate the economics of energy and natural resource use in investment and development of green cities.
- Green social indicators: Indicators to evaluate the effectiveness of improving the living quality and conditions of residents in the urban center.

33. Greenhouse gas (GHG) is a gas in the atmosphere that absorbs and emits radiant energy within the thermal infrared range, the process of which is the cause of the greenhouse effect, including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride.

34. Greenhouse gas emissions are the total amount of GHGs released into the atmosphere for a specified period of time.

35. Greenhouse gas removals are the total amount of GHGs removed from the atmosphere for a specified period of time.

36. Greenhouse gas information system is a combination of various policies, processes and procedures to establish, manage and maintain GHG information

37. Greenhouse gas program is a regional, national or international system or model to voluntarily or mandatorily register, declare or manage GHG emissions, emission reduction and enhanced GHG removals (excluding GHG related organizations and projects).

38. Monitoring is continuous or periodic assessment of GHG emissions and removals or other GHG related data.

39. Energy refers to fuel, electricity or heat obtained directly from non-renewable and renewable energy sources or through processing them.

40. Non–renewable energy sources refer to coal, coal gas, petroleum, natural gas, uranium ores and other non–renewable energy sources.

41. Renewable energy sources refer to water, wind, solar, geothermal, biofuels and other renewable energy sources.

42. Fuel is various types of materials used directly or through processing as combustible matter.

43. Energy saving and efficient use is the application of management and technical measures to reduce energy losses and consumption while still ensuring the demands and targets set for production and life.

44. Energy-saving products are means and materials with high energy efficiency and insulation performance in compliance with standards and technical regulations set by competent state agencies.

45. Green building is a building highly efficient in the use of energy and materials, with minimized negative impacts on the environment. It is designed to minimize the adverse effects of construction environment on human health and the natural environment by means of the following methods:

- Efficient use of energy, water and other resources
- Protection of the health of users and improvement of productivity
- Reduction of waste, pollution and environmental damage

46. Green transportation refers to the following transport means to minimize the emission of CO^2 and other harmful gases into the environment:

- Walking, bicycles and other means using one's own energy
- Subway, electric cars, buses and other environmentally-friendly public transportation
- Other means using renewable energy sources such as solar energy and wind energy.

47. Green consumption is an act of buying environmentally-friendly products that are not harmful to or good for human health and of using products that are least harmful to the environment.

48. Green economy is an economy designed to improve human and social well–being while addressing environmental threats and resource scarcity.

49. Environment is a system of natural and man-made elements that have an impact on the survival and development of humans and organisms.

50. Environmental composition is material elements including earth, water, air, sound, light, creatures and other physical forms of matter.

51. Environmental protection activities are activities to prevent and minimize adverse impacts on the environment, to respond to environmental accidents, to overcome environmental pollution and degradation and to improve and restore the environment so as to maintain a pleasant environment, including any activities to keep the environment healthy by exploiting and using natural resources in a rational manner.

52. Sustainable development is the development that meets the needs of the present without compromising the ability to meet the needs of the future generations by closely integrating and harmonizing economic growth, social progress and environmental protection.

53a. Clean technology is a technological process or technical solution that does not pollute the environment and minimizes emissions of environmental pollutants.

54b. Environmentally friendly technology is technology that, during operation, causes less environmental damage than other similar technologies.

55. Waste treatment is the process of using technical and technological solutions (other than preliminary processing) to reduce, eliminate, isolate, quarantine, incinerate, destroy and bury wastes and harmful elements contained in wastes.

56. Waste treatment facilities are facilities including hazardous waste treatment facilities, domestic waste treatment facilities and general waste treatment facilities.

57. Environmentally friendly facilities are facilities that meet the criteria for energy efficiency, water saving and minimization, reuse and recycling of

wastes.

58. Environmentally friendly products are products that meet eco-label criteria and are granted eco-label certification.

59. Environmental pollution is a change in environmental components, which does not conform to environmental technological standards and environmental standards and adversely affects humans and organisms.

60. Environmental degradation is a decline in the quality and quantity of environmental components, which adversely affects humans and organisms.

61a. Waste is a material that is discharged during production, business, services, living or other activities.

62b. Hazardous waste is a waste with toxic, radioactive, infectious, flammable, explosive, corrosive, poisonous or other hazardous properties.

63. Waste management is the process of prevention, reduction, monitoring, classification, collection, transport, reuse, recycling and treatment of wastes.

64. Environmental protection planning is zoning the environment for its preservation and development and preservation, development and establishment of a system of environmental protection technical infrastructure in association with the system of environmental protection solutions in close relation with the master plan for social and economic development to ensure sustainable development.

65. Strategic environment assessment is the analysis and forecast of the environmental impact of the development strategy, planning and plans to provide solutions to mitigate adverse impacts on the environment and to integrate them in the strategy, planning and plans to ensure sustainable development.

66. Environmental impact assessment is the analysis and forecast of environmental impacts of specific investment projects in order to propose environmental protection measures when implementing such projects.

II. CONTENT OF GUIDELINES

1. GOALS OF GREEN CITY URBAN PLANNING

In green city urban planning, the following matters should be considered as goals to achieve, considering the outcomes of comprehensive research on paradigm change of cities, suggestions by international organizations, global trends on green city urban planning, and the current state of Vietnam:

a) Reduction of greenhouse gas emissions
b) Ensuring urban resilience to climate change
c) Strategic use.

It also should identify the following matters that should be addressed in green development of Vietnam:

a) Efforts to reduce greenhouse gas emissions and to ensure the uptake of emissions
b) Methods to ensure the resilience of urban area, to minimize the impacts of climate change, and to effectively cope with natural disasters
c) Possibility to ensure the efficiency of sustainable resources, reduction of use of fossil fuel, use of new energy, waste management, and water resources management.

2. SCOPE OF PROVISIONS AND OBJECTS OF GREEN CITY URBAN PLANNING

1) Scope of Provisions

This Guideline prescribes matters necessary for green city urban planning, etc. and provides for the use of GDSS (Green city urban planning Decision-making Support System) to enhance the capability to proactively cope with climate change through analysis of current status of green house gas (GHG) emission by applying the major Green City Indicators (GCI) to the cities for

green city urban planning.

2) Objects of Application

This Guideline applies to the institutions, organizations, and individuals that formulate, approve, examine the green city urban planning and participate in the use of GDSS.

3. GREEN CITY URBAN PLANNING TASKS

1) Requirements for Green City Planning Tasks

(1) The green city urban planning tasks need to determine development perspectives and objectives in compliance with each city's planning and needs of each planning area, which shall serve as a basis for the formulation of green city urban plans.

(2) Green city urban planning tasks need to set key targets according to short-term and long-term green city index and indicators.

(3) The green city planning tasks need to specify the requirements for a research methodology with a support of GDSS based on the indicators and index appropriate for city development conditions.

(4) Green city urban planning tasks need to be approved by the competent authority.

2) Contents of Green City Planning Tasks

(1) General city planning tasks are to ensure the achievement of target value of green city index and indicators in each stage of planning, considering the nature and role of urban centers, development of urban potential, driving force of urban development, orientations for urban development, basic requirements for research activities for expansion and layout, and social and technical infrastructure in the inner city and suburban areas, and to confirm the requirements of strategic environmentalassessment.

(2) The zoning planning tasks are to determine the boundaries, area, nature, population, land use of the planning area, indicators of expected social and technical infrastructures, compatibility with architectural space, approved general plan, needs for functional zones compatible with perimeter zones, basic principles, requirements for strategic environmental assessment.

(3) The detailed planning tasks are to determine architectural space of the planning area, requirements for the establishment of social and technical infrastructures, principles and requirements for strategic environmental assessment, in accordance with the plan formulated to be compatiable with the limits on land use and population indicators, approved general plan, regional plan, and surrounding area.

(4) In case of planning for urban renewal and improvement, the planning tasks shall ensure that the urban or regional development planning is balanced and stable and preserves the architectural space and characteristics of the city, and improves the living conditions of citizens.

(5) In case of planning new city centers and new urban areas, planning tasks shall be determined considering the uniformity and supplementation of social and technical infrastructures, connectivity with technical facility in the outer city, modern architectural space and living conditions.

4. DEMONSTRATION OF GREEN CITY URBAN PLANNING

1) Bases for Green City Urban Planning

Green city urban planning shall be based on the following matters:

(1) Strategies and master plans for socio-economic development, national defense and security, master plans for national urban systems, regional plans, approval of direction-setting of superior city plans;

(2) Approval of green growth strategies or plans for each level of city ac-

cording to the city level;

(3) Whether plans for relevant areas have been approved;

(4) Whether green city urban planning tasks (or city planning tasks with development objectives according to the green urban model) have been approved;

(5) Standards of urban planning and criteria for each industrial sector;

(6) Green City Planning Indicators and Index approved by the competent authority;

(7) Topographic maps reviewed or surveyed and drawn by specialized agencies;

(8) Socio-economic data of related regions and sectors.

2) General Requirements

(1) Green city urban planning should present the results of comprehensive research and analysis of the current status and characteristics of the planning area, details of related plans, opinions of citizens.

(2) It is necessary to analyze the relation between the main indicators such as population, economy, living conditions, production activities and the current status of greenhouse gas emission as well as analyze key factors to reduce greenhouse gas emissions, and reflect the results in green city planning.

(3) When establishing the main indicators, it is necessary to study the relations between indicators related to population structure, economic structure, living environment and greenhouse gas emission, to link the relations with the emission projections in the future.

(4) When a development project is planned, it is necessary to analyze the current status of greenhouse gas emissions for each development project based on the location and development direction.

(5) Urban space should be built in the compact, and public transport-oriented manner to minimize greenhouse gas emissions and to maintain

a sustainable form of a city.

(6) It is important to raise public awareness of severity of climate change in line with quality of life of citizens, and consider and assess the importance of energy savings.

3) Criteria of Application

(1) Criteria for General Application

- The natural environment, landscape, ecosystem, green space, etc. for reduction of greenhouse gas emissions should be preserved.
- Key indexes related to population, economy, life, production activities, greenery and environment should be determined using appropriate techniques. The calculation of index shall use various techniques and go through validation process, and the method and contents of index shall be kept and managed.
- Planning goals and strategies shall be set in compliance with the regional characteristics and long-term development direction of the relevant city.
- Green city urban planning should reflect details such as urban spatial structure, land use, transportation plan, green ecology and environment, renewable energy, waste, resource circulation.
- Analysis of vulnerability to disasters should be used to identify various disaster risks, which should be reflected in the green city urban planning to minimize disaster damage.
- In principle, the area where coastal erosion is ongoing or worrisome should be excluded from the development target area, but if it inevitably needs to be designated as a development site, factors such as the effects of sea level rise and coastal erosion should be considered comprehensively and reflected in the planning.

(2) Criteria for Basic Application (According to the Code)

Reference should be made to the national technical standard system of Vietnam for environment, trees, energy saving and green city indicators and index such as QCXDVN 01:2008/BXD, QCVN 09:2013/BXD, QCVN 40:2011/BTNMT, QCVN 14: 2008/BTNMT, QCVN 07:2009/BTNMT, QCVN 05:2013/BTNMT

(3) Green City Indicators & index

○ Indicators should be applied in consideration of the following matters selected in light of the concept of green city and direction-setting of green city in Vietnam (applicability, policy connectivity).

- Key indicators shall be uniformly applied to every city
- Sub-indicators are to supplement key indicators, which shall be applied depending on characteristics of cities.

○ Key indicators and sub-indicators are short-term indicators which shall be applied shortly in the stage of formulating a green city urban planning, and long-term indicators shall be developed and applied in the long term. Among these, the indicator of final selection is an indicator that is selected based on current status of cities and others, which must apply in establishing a green city urban planning.

<Table 1> Green City Index and Indicators

Green City Policies		Green City Urban Planning	Green City Indicators		Indicators of Final Selection	Indicators of Short-term Application		Indicators for Long-term Development
Field	Goal	Planning Elements	35 Indicators	Unit		Key Indicator	Sub-Indicator	
Green environment	Reduction of GHG emissions and use of renewable energy	Urban space structure (4)	Building density	%	◎		☆	
			Urbanization rate	%	◎	★		
			Ratio of urban green area	%				◎
			Population density	person / m^2 or ha				◎
		Land use (3)	Green area per capita	m^2 / person	◎	★		
			Urban area per	m^2 / person				◎

Green City Policies		Green City Urban Planning	Green City Indicators		Indicators of Final Selection	Indicators of Short-term Application		Indicators for Long-term Development
Field	Goal	Planning Elements	35 Indicators	Unit		Key Indicator	Sub-Indicator	
			capita					
			Rate of land area for public transportation	%				◎
		Green buildings (2)	Energy consumption of residential buildings	Toe				◎
			Number of buildings certified as green buildings	Number	◎		☆	
		Green transportation (3)	Number of motorcycles per capita	Number / person	◎		☆	
			Public transport usage rate	%	◎	★		
			Rate of public transport using clean energy	%				◎
		Green ecology and environment (2)	GHG emissions per capita	ton / person	◎	★		
			GHG uptake of urban forest	Ton eq				◎
		Renewable energy (3)	Final consumptions of energy per capita	toe / person	◎	★		
			Share of renewable energy	%	◎		☆	
			Households using renewable energy	%				◎
		Waste (2)	Waste generation per capita	kg / person * day	◎		☆	
			Waste recycling rate	%				◎
		Recycling of resource (2)	Water consumption per capita	liter / person				◎
			wastewater treatment rate	%	◎		☆	

Green City Policies		Green City Urban Planning	Green City Indicators		Indicators of Final Selection	Indicators of Short-term Application		Indicators for Long-term Development
Field	Goal	Planning Elements	35 Indicators	Unit		Key Indicator	Sub-Indicator	
Green economy	Greening of production way and promotion of stable consumption	Green production and technology (3)	Green industry investment ratio	%	◎		☆	
			Green jobs ratio	%				◎
			Rate of investment projects to cope with climate change	%				◎
		Green consumption (2)	GHG emissions on GRDP	ton eq / GRDP	◎	★		
			Consumption rate of coal and petroleum products	%				◎
		Green cooperation (1)	Financial independence	%	◎		☆	
Green society	Greening of lifestyle	Green governance (3)	Is there a policy to cope with climate change?	establishment or not	◎	★		
			Are there ordinances of regulating greenhouse gas emissions?	establishment or not				◎
			Rate of managers trained in green growth	%				◎
		Green life (3)	Whether green action plans have been formulated	establishment or not	◎		☆	
			Private participation in green policy	%				◎
			Poverty rate	%				◎
		Green safety (2)	Casualties and economic losses from natural disasters	VN Dong, person	◎		☆	
			Resident population in disaster-prone area	%				◎

(4) How to Calculate Green City Indicators

○ Green City indicators shall be calculated by the methods in the following table, and the evaluation shall be conducted in quantitative and qualitative manners. In such cases, the green city indicators and evaluation methods that should be applied currently among the above-mentioned green city indicators shall be as follows:

a) Architectural space planning:

- Building density: Quantitative (Short-term application)
- Urbanization rate: Quantitative(Short-term application)
- Urban greening rate: Quantitative
- Population density: Quantitative
- Number of trees per capita: Quantitative (Short-term application)
- Number of projects certified as green buildings: Quantitative

b) Infrastructure plan:

- Number of motorcycles per capita: Quantitative (Short-term application)
- Land ratio for public transport: Quantitative
- Public transport usage rate: Quantitative (Short-term application)
- Waste recycling rate: Quantitative
- Waste generations per capita: Quantitative (Short-term application)
- Water consumptions per capita: Quantitative (Short-term application)

c) Industrial district planning:

- Green Industry Investment ratio: Quantitative (Short-term application)

d) Environmental Impact Assessment:

- Greenhouse gas emissions per capita: Quantitative
- Greenhouse gas uptake by urban forest: Quantitative
- Resident population in disaster-prone area : Quantitative

e) Policy-making for implementation of plans and management regulations:

- Whether policies have been formulated to cope with climate change: Qualitative (Short-term application)
- Whether Greening plans have been implemented: Qualitative (Short-term

application)

- Whether regulations on greenhouse gas emissions exist : Qualitative

<Table 2> Calculation of Green City Indicator

Green City Index	Green City Indicator	Calculation Method	Description	Relations with Green City	Evaluation Methods
Green Environment	Building density	(Building land area / whole urban area) * 100	Ratio of building land area to the entire city area	Higher land area of buildings impacts on the increase of carbon sinks	Quantitative
	Urbanization rate	(Urban populations / total Populations) * 100	Ratio of populations living in urban areas to the entire populations	Concentration of population and resources in urban area impacts on emissions	Quantitative
	Urban green area ratio	(Park and green area within a city / total area) * 100	Ratio of green area created for preservation of urban natural environment and improvement of urban landscape to the total area	Higher proportion of urban green area secures carbon sinks	Quantitative
	Population density	(Populations / land area)	Number of people per unit area (m^2 or ha)	Higher population density has bigger impacts on emissions in proportion to increase in production, consumption	Quantitative
	Green area per capita	(Total green area / populations)	Green area per capita	Higher ratio of total green area ensures carbon sinks	Quantitative
	Urban area per capita	(Urban land area / populations)	Urban land area per capita	Higher urban land areas increase emissions in proportion to residential, commercial, industrial land use	Quantitative
	Share of public transport area	(Public transport land area / transport land area) * 100	Ratio of land area for public transport to land area of urban transport	Higher ratio of public transport land area reduces emissions through reduced individual traffic	Quantitative
	Energy consumptions of residential building	Total energy consumptions of residential buildings such as power, coal, oil, gas, etc.	Energy consumptions of residential buildings	Energy consumptions in residential buildings impact on GHG emissions	Quantitative
	Number of	Number of	Number of	Green buildings reduce	Quantitative

Green City Index	Green City Indicator	Calculation Method	Description	Relations with Green City	Evaluation Methods
	certification of green buildings	certification of green buildings	buildings certified by Green Architecture Associations	GHG emissions in buildings section	
	Motorcycles per capita	(Number of registered cars / number of population)	Number of cars per capita	Vehicles using fossil fuel increase emissions in transport sector	Quantitative
	Public transportation usage rate	(Usage of public transportation such as bus, rail / total transportation usage) * 100	Transport share of bus, rail, etc.	Public transport share reduces emissions through decrease of individual transport means	Quantitative
	Ratio of public transportation using clean energy	(Public transportation means using clean energy such as natural gas, electricity / entire transportation means) * 100	Share of public transportation such as buses using clean energy	Increase of public transport means using clean energy reduces emissions	Quantitative
	Per capita GHG emissions	(Total GHG emissions / populations)	Per capita GHG emissions	Determination of absolute GHG emissions	Quantitative
	GHG uptake by urban forest	(Forest GHG uptake)	Uptake in LULUCF (Land Use, Land Use Change and Forestry)	GHG uptake in the forest	Quantitative
	Final energy consumptions per capita	(Electricity, coal, oil and gas energy consumptions / populations)	Total energy consumptions per capita	Increased emissions by energy consumption	Quantitative
	Ratio of renewable energy	(Total renewable energy productions/ total energy productions) * 100	Share of renewable energy in total energy usage	Reduction of GHG emissions with increased use of renewable energy	Quantitative
	Households using renewable energy	(Households using renewable energy / total number of households) * 100	Percentage of households using renewable energy to total households	Reduction of GHG emissions by increased proportion of households using renewable energy	Quantitative
	Per capita waste generations	(Total waste generations / populations)	Total volume of waste generated per capita	Increase of emissions for treatment of waste generated	Quantitative
	Waste	(Recycled waste	Percentage of	Reduction of emissions	Quantitative

Green City Index	Green City Indicator	Calculation Method	Description	Relations with Green City	Evaluation Methods
	recycling rate	volumes / total waste volumes) * 100	recycled waste to total waste	by recycle of waste	
	Per capita water consumptions	(Total water usage / populations)	Total water usage per capita	Increase of emissions in other processes required to secure water used	Quantitative
	wastewater treatment rate	(The amount of treated wastewater / total amount of discharged wastewater) * 100	Percentage of treated wastew ater to total wastewater	Reduction of emissions from discharge of treated wastewater	Quantitative
Green Economy	Green industry Investment ratio	(Green industrial investments / total industrial investments) * 100	Percentage of investments in green technology-related industries to total industrial investments	Sustainable economic growth through increased green industry	Quantitative
	Rate of green jobs	(Number of green industry-related jobs / total number of jobs) * 100	Percentage of jobs created in relation to green industry to total number of jobs	Sustainable economic growth through increased green jobs	Quantitative
	Rate of investment projects coping with climate change	(Number of investment business coping with climate change / total number of business) * 100	Percentage of investment business to address climate change out of the total number of business	Maintaining sustainability by coping with climate change	Quantitative
	GHG emissions per GRDP	(GHG emissions / GRDP)	GHG emissions per GRDP	Impact on regional GHG emission through GRDP emissions	Quantitative
	Share of consumption of coal and petroleum products	(Coal, petroleum product consumptions / total product consump-tions) * 100	Percentage of consumptions of products made of coal, oil in total product consumptions	Increased emissions in the manufacturing process due to use of coal, petroleum products	Quantitative
	Financial independence	((Local tax + non-tax revenue) / general accounting revenue) * 100	The proportion of independent revenues to the entire revenues	Maintaining soundness through efficient use of resources	Quantitative
Green	Existence of	(Whether various	Whether policies	Maintaining sustainability	Qualitative

Green City Index	Green City Indicator	Calculation Method	Description	Relations with Green City	Evaluation Methods
society	policies coping with climate change	policies coping with climate change have been formulated)	related to climate change mitigation and adaptation have been formulated	through formulation of climate change policies	
	Existence of low-carbon, green growth ordinance	(Whether ordinances related to low-carbon green growth have been formulated)	Whether a local ordinance relating to green growth has been formulated	Inducing sustainable actions through enactment of related ordinances	Qualitative
	Rate of managers trained in green growth	(Number of managers trained in green growth/ total number of managers) * 100	A percentage of managers trained in green growth to the total number of managers	Enabling administrative enforcement through the understanding of green growth	Quantitative
	Formulation of Green Action Plan	(Whether green growth action plans have been formulated)	Whether an action plan for green growth has been formulated	Improving the quality of life through the practice of green growth	Qualitative
	Private participation in green policy	(Number of green policies with private participation / total number of green policies) * 100	Participation rate of the private sector in green policy	Promoting a healthy life through increased participation of private sector in green policy	Quantitative
	Poverty rate	(Poverty populations / populations) * 100	Ratio of populations that lack physical resources necessary for survival to the total populations	Increase of social costs to address rising poverty population	Quantitative
	Casualties and economic losses from natural disasters	(Number of casualties and economic losses from disasters such as typhoon, flood, heavy rain, drought, earthquake, fire, epidemic, etc.)	Casualties from natural disasters	Undermining quality of life due to increased risk caused by natural disasters	Quantitative
	Rate of population living in disaster-prone area	(Populations living in disaster-prone area / total populations) * 100	Percentage of population living in disaster-prone areas such as typhoons, floods to the total population	Undermining quality of life due to risk of disaster	Quantitative

(5) Criteria of Calculation of Green City Indicator

○ Criteria of calculation of Green City Indicator shall be determined according to the following matters:

- Representativeness : How does it well represent the Green City?
- Orientation: Does it present a direction for moving forward to Green City?
- Simplicity: How easy is it to calculate and explain the indicators?
- Rationale: Were the indicators reflected in the case of previous review?
- Accessibility to data: How feasible is it to acquire data at the current level, and can evaluation be conducted based on the review of acquired data?

4) Contents of Green City Urban Plans

○ A green city urban plan shall contain the following matters:

- Analysis and evaluation of existing natural, socio-economical conditions;
- Characteristics, goals and development motivation of a city;
- Population size, labor, city area, norms on land use, social infrastructure, technological infrastructure;
- Prospect of urban land use according to development needs in each planning period;
- Direction of development of urban space;
- Direction of development of urban technological infrastructure;
- Strategic environmental assessment;
- Investment programs with development priority and proposal of resources for their implementation;
- Phased development of whole urban space and directions for technological infrastructure.

○ Related detailed matters are as follows:

(1) Analysis and assessment of natural and socio-economic conditions

— Population, labor, land use, and the current status of a city's technical, social, and environmental infrastructure

— Analysis of the history of urban development to examine urban structures as well as the use and transformation of urban natural environment

— Key issues to be analyzed: Location of a city in the region, population, social conditions, premise of economic development, environment, spatial structures, land use, transportation, technical infrastructure, social infrastructure, living conditions, housing, parks, green areas, landscapes, urban finance, state management

<Table 3> Criteria for analysis and assessment of natural and socio-economic conditions

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
1. History of urban development	**History of urban development** (i) Process of migration and urban structure transformation (ii) Process of migration and transformation of urban natural environments and conditions	
2. Location of a city in the region	**1) Geographical location of a city in the province/region** (i) Administrative location (ii) Connectivity with other transport hubs and gateways **2) Socio-economic location of a city in the province/region** (i) Hierarchical relations with other cities in the region (ii) Urban growth (population increase/decrease) (iii) Economic level (GDP, GDP per capita)	Socio-economic indicators (population, GDP, poverty rate) and comparison with indicators of other provinces Indicators related to green trees, water surface and the environment of the whole region Distance to international gateways (seaports, airports)

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
	(iv) Regional connection with technical infrastructure (electricity, waterworks, drainage, solid waste management) (v) Regional connection with green infrastructure (vi) Investment competitiveness **3) Environmental impact** (i) Impact of urbanization on the regional environment (ii) Impact of urbanization on land use (iii) Natural ecosystem of the whole region **4) Conformity with higher level regional development planning** (i) National development planning/policy (ii) Provincial SEDP, national green growth strategy, directions, green growth projects, and other plans (iii) National green growth strategy	Provincial competitiveness index (PCI) Foreign direct investment (FDI) Carbon footprint
3. Demography	**1) Population** (i) Population (rising trend, distribution) (ii) Immigrants (iii) Population structure (by age group and sex) **2) Households** (i) Household structure (size and composition) (ii) Poor households	Population growth (city and ward level) Population distribution Population pyramid Population trends Place of settlement of populations
4. Society	**1) Health care** (i) Availability of and access to primary medical care (ii) Infant mortality (iii) Availability of and access to professional health care services **2) Education** (i) Availability of and access to primary/ secondary education (ii) Availability of and access to higher education (iii) Availability of and access to vocational training **3) Culture** (i) Monuments and historical remains	Accessibility to hospitals, School penetration rate Infant mortality rate Malnutrition rate Literacy rate Poverty rate Labor structure Unemployment rate Access to social conditions of the people

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
	(ii) Traditional intangible heritage (festivals, legends, customs) (iii) Villages, traditional villages (relics, lifestyle, and traditional values) **4) Other social services (administration, religion, etc.)** **5) Poverty** (i) Distribution and percentage of the poor (ii) Unemployment rate, underemployment rate **6) Employment** (i) Employment by economic sector (ii) Employment by age group and sex (iii) Employment by training level **7) Citizens' assessment and satisfaction regarding social services** (i) Accessibility (ii) Scope of services (iii) Quality of services **8) Directions of government policy in the social sector** (i) Directions of the current policies (ii) Projects underway or planned	
5. Economy	**1) Economic level and growth** (i) GDP and previous trends in economic growth (ii) GDP per capita (iii) The share of GDP in the relevant province **2) Economic structure and competitiveness** (i) GDP by sector (industry and service) (ii) Economic output by sector **3) Agriculture and forestry** (i) Output by crop type (ii) Cultivated area by crop type (iii) Current issues and future prospects, as assessed by stakeholders in the agriculture and forestry sector **4) Industrial sector** (i) Production by industrial sector, green industries (ii) Characteristics of public facilities (iii) Characteristics of polluting industries (location, type and level of pollution, etc.)	Economic growth (productivity, growth rate, productivity/labor) Economic structure (by sector) Labor productivity Provincial competitive index (PCI) Foreign direct investment (FDI)

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
	(iv) Current issues and future prospects, as assessed by stakeholders in the industrial sector **5) Service sector** (i) Production by service sector (ii) Characteristics of the service sector (type, size, location) (iii) Current issues and future prospects, as assessed by stakeholders in the service sector **6) Investment environment** (i) Investment (FDI, domestic investment) by business type (ii) PCI (Provincial Competitiveness Index) (iii) Current regulations and investment-induced mechanisms **7) Directions of government's economic policy** (i) Directions of policies for projects underway or planned	
6. Environment	**1) Conservation of ecosystem** (i) Ecosystems that need to be conserved (animals, plants, forests, etc.), location, scale, scope (ii) Current protection measures **2) Pollution control** (i) Pollution (air, water quality, soil, noise, garbage, etc): source, level (ii) Current measures **3) Disaster Prevention** (i) Risks (flood, landslides, subsidence, riverbank erosion, etc.): location, level, frequency (ii) Current measures **4) Responding to climate change** (i) Impact of climate change (ii) Current measures **5) Institutional adjustments** (i) Current legal framework (ii) Capacity for environmental management (iii) National policy **6) Citizens' assessment of current**	Animals and plants to be protected Pollution levels (air, water quality, soil, etc.) Frequency of disasters Damage caused by natural disasters Carbon footprint

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
	environmental conditions (i) Assessment of conservation of the natural environment (ii) Assessment of the current status of pollution (iii) Assessment of the damage caused by natural disasters (iv) Assessment of response to climate change impacts	
7. Spatial structure and land use	**1) Geographical conditions** (i) Topography and geology (ii) Soil conditions: soil composition, loading intensity (iii) Plumbing (surface water, groundwater) (iv) Plants: indigenous plants, biodiversity **2) Current status of land use** (i) Land use classification (ii) Change in area of land use by type (iii) Expansion of urban areas (iv) Decrease in agricultural land (v) Current land use issues (vi) Greenhouse gas emissions by functional areas using land **3) Soil environment assessment** (i) Protected areas (ii) Areas suitable for development **4) Facilities connecting urban and regional areas** (i) Connecting urban transport networks to regional transport networks (railways, roads, inland waterways, buses, access to international border gates) (ii) Connecting with urban areas through appropriate transport networks (mainly by roads) (iii) Inter-city cooperation in the fields of water resources management, coastal environment, forests, landscapes, etc. **5) Assessment of existing urban planning** (i) Socio-economic development planning (ii) Planning by sector (iii) Review of ongoing planning and projects	Conversion of land use purpose Distance to/from regional centers Distance between the city center and the communes/wards Population density by region

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
8. Transportation	**1) Regional transportation** (i) Connecting urban transport networks with regional transport networks (railways, roads, inland waterways, buses, access to international border gates) (ii) National transport projects underway or planned **2) Urban transportation** (i) Quantity and quality of infrastructure (railways, roads, inland waterways, buses) (ii) Public transportation services (routes, frequency, fares, accessibility, convenience, safety, transit conditions, etc.) **3) Characteristics of demand** (i) Travel demand and travel factors (ii) Increasing travel demand and attracting tourists (iii) Sharing of methods (iv) Travel time (v) Travel distribution model **4) Evaluation of transportation services** (i) Traffic congestion (ii) Safety (iii) Convenience (iv) Comfort	Distance to/from international gateways (seaports, airports) Road density Average speed of means of transportation Frequency of accidents Utilization of public transport Works for pedestrians
9. Technical infrastructure	**1) Scope** (i) Power supply (ii) Water supply (iii) Telecommunications (iv) Drainage (v) Solid waste collection (vi) Cemetery **2) Consumption** (i) Power supply (ii) Water supply (iii) Telecommunications (iv) Drainage (v) Solid waste collection (vi) Cemetery **3) Ability to pay costs** (i) Unit price for services	The scope of key urban facilities to be provided Unit price for using key urban facilities Citizens' willingness to pay for better services

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
	(ii) Willingness to pay costs **4) Assessment of technical infrastructure services** (i) Quantity (ii) Quality (iii) Price	
10. Social infrastructure	**1) Scope and level of use:** (i) Administration (city halls, police stations, fire stations, etc.) (ii) Health care (hospitals, clinics, public toilets, etc.) (iii) Education (schools, universities and colleges, research institutes, etc.) (iv) Culture (heritage and historical buildings, libraries, museums, etc.) (v) Religion (pagodas, temples, churches, etc.) **2) Evaluation of services** (i) Accessibility (ii) Quality	The scope of basic social infrastructure Accessibility to basic social infrastructure Accessibility to green parks
11. Living condition	**1) Housing** **2) Safety and security** **3) Tranquility** **4) Natural Disasters** **5) Pollution** **6) Cleaning** **7) Landscape** **8) Trees**	Citizens' evaluation of living conditions
12. Housing	**1) Housing Fund** **2) Land price** **3) Ability to pay** **4) Assessment of housing services** (i) Space (ii) Price (iii) Structure and design (iv) Ventilation and air (v) Maintenance issues (vi) Accessibility to key urban services	Housing prices Land prices Rents Conversion of land use purposes (its impact on land prices) Average floor area per capita Housing types (urban dwellings, mixed-use housing, villas, apartments, etc.)

Issues to be Checked	Details of Specific Analysis and Assessment	Key Criteria
13. Parks and green areas	**1) Location and area** **2) Functions and facilities of available parks and green areas** **3) Accessibility from residential areas** **4) Assessment of parks and green areas** (size, distribution of parks, trees, accessibility, linkages, undeveloped parks, etc.) to be used as basic data for establishing public targets	The number of parks and green areas Average distance from residential areas to parks/green areas
14. Landscape	**1) Water** **2) Green trees** **3) Cultural heritage** **4) Street view**	Citizens' evaluation of the landscape
15. Finance and urban management	**1) Urban finance** (i) Values and details of the city's revenues and expenditures (ii) Revenue sources (iii) Dependence on upper level administrative agencies **2) Administrative capacity** (i) Capacity of government officials (ii) Intersectoral and inter-city cooperation (province)	Balanced budget revenues and expenditures Budget per capita Increased revenues The rate of revenue collection from taxes and fees Proportion of tax and fees out of revenues

(2) Features of city, targets, and motives for development

a) Features of city

○ In order to reflect the features of a city, scientific analysis of the following factors needs to be conducted.

– Directions of national economic development

○ In order to develop the national economy in a harmonized and balanced manner and to utilize the potentials of the state, territory and each region to the maximum extent, directions for national economic development should be set in consideration of requirements and criteria by region based on national reference data and data regarding socio-economic development. In

particular, characteristics, scope, and directions of urban development in the relevant region have to be reviewed and predicted.

– Location of urban areas in national land planning

○ Relations between cities and their neighbouring areas are determined based on national land planning; Roles among cities in the region are defined by their economies, productivity, and cultural and social relations.

○ If any regional planning is not prepared, the features of a city are identified based on basic surveys of resources and other conditions of the relevant region and its neighboring areas. In addition, the features of a city are determined based on the size and functions of the city in the region in consideration of development tasks related to other political and economic hubs in the region.

– Natural conditions

○ Optimal conditions that can affect activities conducted in a city's all fields need to be verified on the basis of natural resources, geography, landscape, and topographic conditions.

b) Targets

○ Targets to be achieved in the future and expectations are identified and reflected in action plans. The objectives of urban development that facilitate participation have to be set so that links between sectors can be established in a feasible, clear, detailed, and persuasive manner.

c) Motives for development

○ Urban resources, geographic advantages, and natural and human conditions are included. Strengths of urban areas are verified based on relations within and between regions in terms of production lines, land development fund, mineral resources which determine motives for development.

(3) Determination regarding population size, urban areas, norms for land use, social and technical infrastructure, etc.

○ Whether development requirements by each stage and green city standards are suitable is identified in the short term (10 years) and the long term (20-25 years). In the case of centrally-run cities, the period is 50 years.

(4) Prospects of urban land use for each planning period

— Considerations need to be given to: An agreed future development scheme, land use planning, detailed development directions by function, urban areas, rural areas, areas planned for development

— Land use planning for the whole city needs to be made in the short term (10-15 years) and the long term (15-20 years).

— Land use planning should be made in accordance with selected calculation criteria, and it should suggest detailed criteria for characteristics, functions and areas of sites, heights and density of buildings, frequencies of land use, etc. Land use planning is used as a basis for carrying out and managing ban construction planning.

— Expected land use rate is determined based on land for urban development, land to be preserved, other types of land, and greenhouse gas emissions by region.

— Regulations to reduce the consumption of resources and energy for each site is suggested.

(5) Directions for development of urban spaces

a) Determination on development structures and directions for the development of urban centers and cities

Planning for future urban structures is made based on the following factors:

i) Regional context clarifying the roles of a city in the region

ii) Environment department to be in charge of regulating develop-

ment areas for environmental protection

iii) Need for land use to secure space for urban activities.

– The following factors are analyzed based on the matters listed above:

i) Scenarios for urban growth to implement visions

ii) Discussion between stakeholders before a scenario is determined (part of the process of strategic impact analysis)

iii) Urban planning based on the determined scenario.

b) Determination on the scope and size of functional zones in the urban center:

Embellishment zones, improvement zones, conservation zones, new development zones, construction restriction zones, and development restriction zones

c) Criteria for population density, criteria for planning for urban land use, directions for development of each functional zones

d) Determination on administrative centers, commercial centers, public service centers, and parks and vacant lots in cities

e) Spaces in urban functional zones, basic directions for building, landscapes, etc. (urban centers, suburbs, or other concentrated urban areas), and center axis

– Structures and compositions of urban spaces are determined for the following purposes:

. Saving land, water and energy resources

. Establishing transport system to reduce traffic demand and to facilitate the use of public transport

. Improving living conditions and quality of lives for citizens

. Designating spaces for preserving trees and the environment.

– Identifying the axis of urban space

. Growth axis: Connecting a traffic axis to be built, ensuring main functions of each growth axis, reducing energy demand in the transport sector, reducing greenhouse gas emissions by

disposing of such emissions, and saving resources

. Green space axis: Examining urban greenery systems and systematizing such systems in accordance with the existing principles for preserving topography, water surface, and green areas.

(6) Orientations for urban technical infrastructure development:

a) Orientations for the development of technical infrastructure throughout the city

– General evaluation and selection of land for urban development

– Assessment of topography, geological risks, areas with natural disaster risks, identification of construction banned or restricted areas, identification of basins, main divisions and drainage directions, location and scale of drainage works, identification of construction sites for urban centers and other functional areas in the city

– Identification of urban transport networks aimed at green transport, including roads, railways, waterways and airways, location and size of airports, seaports, river ports, railway stations, roads and urban railway (elevated, on ground, underground), determination of the location and scale of the external car terminals

– Reserves, demand and supply of water and energy, the total amount of wastewater and wastes, the location, scale and capacity of treatment works, cemetery and other works for city and other functional areas of the city

b) Orientations for the development of technical infrastructure in centrally-run cities

○ The following matters need to be specified in the orientations for the development of technical infrastructure for the central area in centrally-run cities:

- Green transportation

• Determining the principle of arranging and determining the size of roads by type and function of transport to reduce energy consumption and greenhouse gas emissions in the transport sector

• For urban transport, establishing a public-transport-oriented transport system linked to the existing transport system to minimize the generation of unnecessary traffic and reduce greenhouse gas emissions

• Aiming to reduce energy consumption and converting to a green transportation system through the development of public transport, parking facilities, transit facilities and bus stops

• Using multipurpose buildings providing various utilities as traffic hubs. Reducing energy consumption and greenhouse gas emissions

- Environment, green ecology

• Forming a green area system with green areas in parks and development-restricted areas and a waterside green axis with coastlines, rivers and tributaries in the existing central area

• Proposing conservation and management measures for the ecosystem and natural environment to secure and maintain carbon sinks

• Controlling the water quality of major lakes, rivers and other water resources and using them in an environmentally friendly manner

• Constructing wind paths to mitigate the urban heat island phenomenon

• Green infrastructure planning.

– New and renewable energy

• Minimizing consumption of oil, coal and other fossil fuels

• Determining the ratio of new and renewable energy to the total energy supply

• Analyzing and demonstrating the potential for securing new and renewable energy sources such as solar and wind power

- Waste

• Forecasting the amount of wastes generated in urban areas and planning for reduction of waste generation and for reuse and recycling of wastes

(7) Strategic environmental assessment

○ A strategic environmental assessment shall be implemented in accordance with the provisions of Article 15 (7) of Decree No. 37-2010/ND-CP, taking into consideration the following matters:

– The overall objective of a strategic environmental assessment is to identify and assess the environmental consequences of planning at an early stage. This will ensure that the appropriate measures to address the negative impact are fully incorporated in the planning. This process requires environmental issues to be incorporated into the contents in a variety of ways.

– As the process of implementing a strategic environmental assessment, it may be flexibly adjusted according to the procedures of different types of planning, green city urban planning and a strategic environmental assessment needs to be executed in accordance with the logic and steps of the planning process.

• In executing a strategic environmental assessment, strategic environmental assessment specialists need to review and assess individual outputs of the green city urban planning and identify any modifications to protect the environment and minimize any risks and to achieve the objective of sustainable development.

• Where an assessment is implemented in parallel with green city urban planning, strategic environmental assessment consultants need to work in harmony with development consultants through discussion processes, taking a comprehensive consideration of major projects, necessary levels of assessment, micro-space and human resources required to implement the assessment.

(8) Priority investment projects and selection criteria

○ Based on the initial planning, proposal of a list of priority investment projects.

Criteria for selection are as follows:

- The projects are a major growth engine for economic development of the city.
- The projects are highly related to daily lives of the citizens (improvement of quality of life for a large number of residents, improvement and protection of the environment, preservation and promotion of urban heritage).
- The projects must be in line with the approved planning, in line with the provincial guidelines and directions.
- The projects must be in line with the city's financial capacity in each stage.

(9) Directions for development of urban space and technical infrastructure

○ Appropriate proportions must be applied to the map by stage.

In the first stage, priority should be given to green areas and open space suitable for population in each stage.

5) Green City Urban Planning Methodologies

○ Green city urban planing is based on an empirical, comparative and comparative approach to strategic objectives considering the followings:

- Using GDSS software in the process of examining and selecting alternatives;
- How to use indexes on software;
- Investigation, analysis and processing of input data by applying appropriate indicators of RI from among indicators already approved by the competent authorities;
- From the start of designing to the appraisal and approval phase, the standardized development indicators as well as the Green Urban Index

have been established by using the GDSS software for the selection before choosing the optimal solution.

6) Green City Urban Planning Process

○ Green city urban planning process consists of 4 phases as follows:

– Phase 1 (part I): Establishing planning tasks and planning steps of green city urban planning

– Phase 2(part II): Analysis and assessment of the current status and design of green city urban planning:

· Analysis and assessment of the current status of orientation for green city

· Establishment of visions of green city and design of predictable city development.

– Phase 3(part III): Planning

· Planning for spatial development, social infrastructure, technology infrastructure, strategic environment assessment, major urban facilities, identification of special areas, priority investment projects and determination of financial resources.

– Phase 4(part IV): Development and operation of GDSS

· laying out and setting details of urban management in compliance with general planning

· Responsibility of related parties

· Using and monitoring GDSS.

<Table 4> Green Urban Planning Process

Content		Tasks
Part I Planning tasks and organization of green	1.1 Planning tasks	1.1 Review existing planning to determine the need for green city urban planning 1.2 Planning tasks (setting goals and indicators for green city urban

Content		Tasks
planning management		planning)
	1.2 Tasks to implement and monitor general planning	1.2.1 Set up the planning steps 1.2.2 Prepare detailed task plan
Part II Assessment of current status and orientation of urban development	2.1 Analysis of the current status and problem finding regarding green cities (environment, society, urban economy, population· labor, land use, status of construction of technical and social infrastructure, city environment)	2.1.1 Data collection 2.1.2 Database building 2.1.3 Situational analysis 2.1.4 Problem finding
	2.2 Establish a vision and development plan for green city urban planning using GDSS	2.2.1 Set vision and common goals 2.2.2 Framing development 2.2.3 Establish basic strategies and directions for development 2.2.4 Establish urban planning indicators in accordance with QCXDVN 01:2008 / BXD, establish green city indicators, and set up functional zones in line with planning goals and green city indicators
Part III Planning	3.1 Spatial development	3.1.1 Regional links 3.1.2 Partitioning environment 3.1.3 Urban growth scenarios 3.1.4 Community consultation 3.1.5 Architecture concept of urban 3.1.6 structure 3.1.7 Land use planning General development orientation + Orientations for urban development + Orientation for green urban development 3.1.8 Establishment and appraisal of planning options 3.1.9 General planning orientation 3.1.10 General orientation of green city urban planning (Land use planning, social and technical infrastructure)

Content		Tasks
	3.2 Develop a social infrastructure planning in the direction of green cities	3.2.1 Housing 3.2.2 Educational facilities 3.2.3 Medical facilities 3.2.4 Sports facilities 3.2.5 Commercial buildings 3.2.6 Public service facilities 3.2.7 Park and green area
	3.3 Planning for technical infrastructure in the direction of green cities	3.3.1 Evaluation of land conditions related to urban technical infrastructure 3.3.2 Urban technical infrastructure planning + Green transport network + Water supply + Rainwater + wastewater + Electricity supply and urban lighting + Information and communications + New and renewable energy + Solid waste + Cemetery + Prevention of disasters, response to climate change
	3.4 Strategic Environmental Assessment (SEA)	3.4.1 Investigate, survey, gather information, define scope 3.4.2 Identify key environmental objectives and issues involved 3.4.3 Situation analysis before and after planning 3.4.5 Proposed solutions
	3.5 Major Urban Facilities	3.5.1 Analyze the difference between supply-demand 3.5.2 Select the system 3.5.3 Plan major urban facilities
	3.6 Identify the special areas	3.6.1 Identify special areas 3.6.2 Detailed study of identified areas 3.6.3 Define the boundaries of special areas
	3.7 Identify priority investment projects, financial resources for implementation	3.7.1 Make a list of projects / actions 3.7.2 Prioritize projects / actions 3.7.3 Group projects / actions into strategic programs 3.7.4 Organizational and institutional arrange-

Content		Tasks
		ments needed to implement
Part IV Develop and operate a green urban planning decision support system	4.1 Synthesize and set urban planning-based content management general	4.1.1 Database of GDSS: + Urban space information + Land use information + Green building information + Traffic information + Ecological and environmental information + New, renewable energy information + Waste information + Water supply information + Drainage information + Information on green production, green technology + Green Consumption Information + Green governance information + Information about green life + Information on green safety
	4.2 Responsibilities of related parties	4.2.1 Ministry of Construction 4.2.2 Local government 4.2.3 Officer in charge of the system 4.2.4 Working staff
	4.3 GDSS Management	4.3.1 Employer management 4.3.2 Program management 4.3.3 User management
	4.4 Implement and monitor the planning using the GDSS software	4.4.1 Develop monitoring / appraisal frame-work 4.4.2 Perform monitoring activities 4.4.3 Collect and explore community opinions 4.4.4 Reflect on policies, general planning and investment projects / programs

5. EXAMINATION AND APPRAISAL OF GREEN CITY URBAN PLANNING

1) General Requirements

- The contents, order and procedures for appraisal of green city urban planning tasks and plans should comply with the provisions of Urban Planning Law No. 30/2009/QH12; Decree on Planning, Appraisal, Approval

and Management of Urban Planning No. 37/2010/ND-CP and other relevant legal documents on urban planning.

- The contents of appraisal of green city urban planning tasks and plans must correspond to the direction in green city urban development in Vietnam.
- Efforts are needed to reduce greenhouse gas emissions and to ensure that emissions are absorbed. It is important to ensure the resilience of the urban center, mitigate the effects of climate change, and deal effectively with natural disasters.
- Sustainable resource efficiency, reduced fossil fuel use, new energy use, waste management, and water resources management need to be continuously ensured.
- Compliance with indicators directly related to urban planning process and green city urban planning from among Green City Indicators approved by the government needs to be ensured for green city urban planning.
- Green city urban planning should be formulated based on analysis of GDSS to ensure legitimacy, objectivity and efficiency for the process of appraisal.

2) Appraisal of Green City Urban Planning Tasks and Plans

(1) The agency submitting the evaluation of green urban planning tasks and plans

a) The Ministry of Construction shall appraise green city urban planning tasks and plans and submit them to the Prime Minister for approval.

b) Provincial People's Committees shall submit to the Ministry of Construction for appraisal of green city urban planning tasks and plans which the Prime Minister has the authority to approve, except for green city urban planning under the jurisdiction of the committees or the Prime Minister. The Ministry of Construction shall appraise the green city urban planning.

c) The organizer of green city urban planning stipulated in clauses 3, 4, 5

and 6 of Article 19 of the Urban Planning Law (After People's Committees of provincial cities and towns shall formulate a general planning and organize subdivision, and district-level People's Committees shall formulate a general planning; the People's Committees shall submit them to the management agencies) shall appraise green city urban planning tasks and plans which provincial People's Committees have the authority to approve.

d) The provincial urban planning management agency shall appraise the green city urban planning tasks and plans formulated by the provincial People's Committees and submit them to the provincial People's Committee for approval.

e) The district-level urban planning management agencies shall appraise green city urban planning tasks and plans formulated by district-level People's Committees and submit them to the district-level People's Committees for approval.

(2) Adoption of the Committee

Before being appraised by the competent agency, the green city urban planning must be approved by the task appraisal committee.

(3) Appraisal

The Appraisal Agency of green city urban planning shall be responsible for completing appraisal of green city urban planning tasks and plans, based on the opinions of the relevant agencies, the Appraisal Committee and the content of the green city urban planning.

3) Appraisal committee of green city urban planning tasks and plans

a) The Ministry of Construction shall decide to set up appraisal committees in the following cases:

– Green city urban planning subject to the approval of the Prime Minister

- Green city urban planning is of great political, socio-economic, cultural and historical importance and is assigned to the Ministry of Construction by the Prime Minister.

b) The People's Committees having the authority to approve the green city urban planning shall decide to set up the appraisal committees, except for the cases the Prime Minister has the authority to approve and the Prime Minister assigns the planning to the Ministry of Construction.

c) The appraisal committee is composed of representatives of the concerned State management agencies and social organizations.

4) The agency appraising green city urban planning tasks and plans

a) The Ministry of Construction shall evaluate the green city urban planning tasks and plans which the Prime Minister has the authority to approve.

b) The provincial-level urban planning management agency shall evaluate the green city urban planning tasks and plans which the People's Committees of the same level has the authority to approve.

c) The district-level urban planning management agency shall evaluate the green city urban planning tasks and plans which the People's Committees of the same level has the authority to approve.

5) Dossier for green city urban planning task appraisal

a) A dossier of application for the appraisal of green city urban planning tasks consists of:

A written request for appraisal; the explanation of the task; draft of decision to approve the task; small color prints; and relevant legal documents.

b) A dossier of application for appraisal of a plan of green city urban planning is as follows:

A written proposal for appraisal of the plan; explanation of the plan

including small color prints; draft of regulation on management according to the green city urban planning plan; attached appendices; draft of decision to approve the project; color drawing printed by the prescribed scale; and the relevant legal documents.

6) Contents of appraisal of green city urban planning tasks and plans

a) Contents of appraisal of green city urban planning tasks are as follows:

- Whether green city urban planning tasks meet the requirements for socio-economic development, national defense and security, and improvement of urban planning.
- Green city urban planning task shall include the requirement of the following:
  - Green city urban planning tasks prescribe the nature and role of urban centers, the basic requirements for research on the potential for urban development along the direction of green city urban development and request for strategic environmental assessment to develop and expand urban centers, to arrange social and technical infrastructure systems in urban centers and suburban areas;
- Depending on the specific conditions and characteristics of a green city, the basic requirements to build social and technical infrastructure in the area must be in line with Green City Indicators as follows:
  - Construction density: Quantitative
  - Percentage of urbanization: Quantitative
  - Area of green trees per capita: Quantitative
  - The number of motorcycles per capita: Quantitative
  - Public transport use: Quantitative
  - The amount of waste per capita: Quantitative
  - Water consumption per capita: Quantitative

. Share of green industry investment: Quantitative
. Whether response measures to climate change are: Qualitative
. Whether green city urban planning is implemented: Qualitative

- In order to achieve goals of green city urban planning, the basic requirements for establishing social and technical infrastructure and creating spaces should be clearly defined in the planning tasks.
- The planning task of the green city urban area must determine the boundary, area and nature of the planning area, as well as expected norms on population, land use, and social and technical infrastructure. In addition, requirements and basic principles for functional sub-zones to ensure the appropriate architectural space and technical infrastructure in accordance with the approved master plan of green city and conditions of surrounding areas, and in such cases, request for strategic environmental assessment should be included. In cases where there is no approved master plans for green city, the criteria for land use, social and technical infrastructure and basic principles for functional sub-zones must satisfy requirements for achieving green city urban planning.

b) The contents of appraisal of plans of green city urban planning include:

- Whether to satisfy the conditions of green city urban planning consultancy organizations under Article 10 of Urban Planning Law No.30 /2009/QH12;
- Grounds for plans of green city urban planning should meet the requirements of the following:

. The strategy and approved master plan for socio-economic development, national defense and security, orientations for overall planning of the national urban system, regional construction planning and improvement of urban planning

. The approved detailed planning
. Approved green city urban planning task
. Regulations on urban planning and industry standards

. Topographic maps prepared by surveying and measuring agencies
. Documents or data on socio-economic conditions of neighboring areas of the relevant city
. Green city urban planning Decision-making Support System(GDSS)

– Whether green city urban planning is in line with the tasks and requirements of green city urban planning (especially, clear statement of general directions of national urban systems and related regional planning; strategies for socio-economic development and goals of master plan in line with national defense and security; consistency with the development planning of areas within urban centers, publicness and transparency; and harmony between national interests, communities and individuals

. Scientific forecast, meeting the practical requirements, and applying development trend of green cities; effective use of GDSS; and compliance with the regulations on urban planning and other related standards

. Environmental protection, hazard prevention affecting the community, improvement of the landscape, protection of cultural relics, conservation of historic and regional characteristics through strategic environmental assessment in the process of green city urban planning

. Restriction on use of farm land to efficiently exploit natural resources in the direction of green urban development; economic and efficient use of urban farm land, in order to create resources for urban development and growth, economic and social security, national defense and security and sustainable development

. Ensuring of synchronizing building area including green architectural space, social infrastructure system, and underground space; encouraging of harmony among areas of green cities

. Satisfaction with the demand for the use of housings, medical ser-

vices, education, culture, sports, commerce, parks, trees, water supply and other social infrastructure projects

. Satisfaction with the demand for use of technical infrastructure including traffic systems, energy supply, public lighting, water supply and drainage, waste treatment, communications technical infrastructure projects, link with and consistency of technical infrastructures of urban centers, and the interconnection with regional, national and international technical infrastructures

– Whether to meet the requirements of each project of green city urban planning:

. Contents of green city urban planning including goal-setting, goals of green growth, motivation for development, and population

. Social and technical infrastructure, development model, spatial structure of urban and suburban area, orientation for building technical infrastructure, strategic environment assessment, priority investment projects, and use of resources

6. APPRAISAL AND EVALUATION OF GCP BLUEPRINTS

1) Appraisal and Approval of Affairs and Blueprints of Green City Urban Planning

a) The Prime Minister shall approve the following affairs and blueprints of green urban planning:

– The master plan for green cities in cases of centrally-run cities; the general plan for green cities in cases of the cities under the province equivalent to grade I; basic plan for urban green areas; forecasts for cities of grade III or higher and new urban centers with the planning scope related to the administrative boundaries of two or more provinces

– The general plan for green cities, the plan for urban green areas and areas of special significance in terms of the country's political,

socio-economic, cultural, and historical aspects as prescribed by the Prime Minister

- The general plan for green cities and green city plans for other areas designated by the Prime Minister and the Ministry of Construction

b) The People's Committees of the local People' s Committees and centrally-run cities shall approve the following affairs and blueprints of green city urban planning:

- General urban greenery includes a city of a province or town, town, or new urban area, except for green city urban planning area which is subject to approval by the Prime Minister. For urban blueprints of grade II, III, IV urban centers and new urban centers, the Ministry of Construction's written approval must be obtained before approval.
- The planning of green urban centers for urban centers of special grade or grade I, green urban planning for areas related to the administrative boundaries of two or more districts except for district division plan, areas of important significance, and areas in new urban centers shall be designated and assigned by the Prime Minister to the Ministry of Construction.

c) The provincial or municipal People's Committees, and People's Committees of the urban areas and the rural areas of centrally-run cities shall approve affairs and blueprints for green city urban planning within their administrative boundaries. They shall manage, except for plans on urban green areas of cities under other cities that are subject to approval of the Prime Minister or the People Committees of provinces or centrally-run cities, urban planing of provinces, referring to the written comments of the relevant institutions.

d) The People's Committees of the provinces, cities, and towns shall submit to the People's Councils of the same level the general plans for green city before they are approved by the competent State bodies. The institutions formulating blueprints for green city shall consult with and

report to the People's Committees of the relevant provinces, cities, and towns.

2) Procedures for approval of affairs and blueprints for green city urban planning

a) The agency submitting for approval the affairs and blueprints for the green city urban planning

- The Ministry of Construction shall submit for approval the affairs and blueprints for green city urban planning to the Prime Minister who supervises the formulation of green city urban planning and the planning assignments and policy schemes shall be assigned by the Prime Minister.
- The People's Committees of provincial cities shall submit for approval the affairs and blueprints for green city urban planning under their jurisdictions to the Prime Minister or to the Ministry of Construction in cases the Prime Minister assigned the authority for approval to the said ministry, except for the green city urban planning for which the Prime Minister has the authority to approve.
- The agencies in charge of formulating green city urban planning as stipulated in Article (3) through (6) of the Urban Planning Law shall formulate general plans and determine the details thereof, and the district-level People's Committees shall formulate general plans and submit them to provincial-level People's Committees and obtain approval of the provincial-level People's Committees for the affairs and blueprints for green city urban planning.
- The province-level planning management agencies shall submit to province-level People's Committees for approval the green urban planning tasks and blueprints which have been formulated by provincial-level People's Committees.
- Where the province-level People's Committees formulate the affairs

and blueprints for green city urban planning, the province-level urban planning management agencies shall appraise them and submit them to the province-level People's Committees for approval.

- Where the district-level People's Committees formulate the affairs and blueprints for green city urban planning, the district-level urban planning management agencies shall appraise them and submit them to the district-level People's Committees for approval.

b) The agencies in charge of appraising, in receipt of the total affairs and blueprints for green city urban planning, shall submit the details of appraisal to the relevant institutions for approval and determine after reviewing the details of appraisal.

c) For green city urban planning of grade IV or higher, the province-level People's Committees shall gather the written opinions of the Ministry of Construction before approval.

d) For green city urban planning projects subject to approval of district-level People's Committees, district-level People's Committees shall gather written comments of province-level urban planning agencies before approval.

3) Documents to be submitted for approval of affairs and blueprints for green city urban planning

a) The documents to be submitted for appraisal and approval of affairs for green city urban planning include a written request for appraisal and approval, exposition of the content of the affairs, draft of a written decision for approving the affairs, small color prints, and relevant legal documents.

b) Documents to be submitted for appraisal and approval of blueprint for green city urban planning include a written request for appraisal and approval, exposition of the contents of the blueprint, small color prints, draft of management regulations following the blueprint for green city

urban planning, draft of a written decision for approving the blueprint, attached appendices, color-printed drawings according to the prescribed percentage, and relevant legal documents.

4) The contents of approval of affairs and blueprint for green city urban planning

(1) The competent agencies are responsible for approving in writing the affairs and blueprints for green city urban planning, and the details of approval shall be as follows:

a) Green city urban planning:

- The contents of the decision approving the green city urban planning shall cover the scope and boundaries of the planning; characteristics of the city; basic indicators regarding population, land, and technical infrastructure; major research requirements for green city urban development; spatial organization; plans for the organization of social and technical infrastructure systems; list of documents of blueprints.
- The contents of decisions approving the affairs for green city urban planning shall clearly state the requirements including spatial organization and social and technical infrastructures.
- The contents of decisions approving the blueprint for green city urban planning shall clearly state the requirements including the boundaries, size, characteristics, population, land use of the green city urban planning areas; plans for constructing social and technical infrastructure systems; indicators regarding land use; requirements and principles for spatial organization; connection of building and technical infrastructures for green city urban development; and list of documents of blueprints.
- The contents of decisions approving the blueprint for green city urban planning shall clearly state that the land use, spatial organization, and social and technical infrastructures meeting the standards of green

city indicators.

(2) Methods of approving the affairs and blueprints for green city urban planning

The drawing and regulations for green city urban planning accompanying the written decision for approval of green city urban planning shall be verified and sealed by the agency in charge of appraising the green city urban planning.

7. GREEN CITY DECISION SUPPORT SYSTEM

1) Building and operation

(1) In order to effectively implement national policies and reach targets for reducing greenhouse gas emission and responding to climate change as well as to support the planning and implementation of the green city urban planning in centrally-run cities and provincial cities, it is necessary to build and operate an integrated system for making decisions regarding green city urban planing that allows the standardization and systematic management of information on green city urban planning.

(2) In formulating green city urban planning, the People's Committees of centrally-run cities and provincial cities are required to build a system for supporting decision-making on green city planing (hereinafter referred to as "Green City Decision Support System, GDSS) in order to assess the suitability and effectiveness of reduction of greenhouse gas emissions and climate change response and ensure the feasibility and objectiveness of the green city urban planning.

(3) The Ministry of Construction (BXD) and People's Committees of centrally-run cities and provincial cities that intend to build an integrated system for supporting decision-making may install relevant facilities including online servers in the department in charge of urban planning (hereinafter referred to as "the department in charge") or in a separate place equipped with security system where it is necessary for effective

management of the decision support system.

(4) The Ministry of Construction shall provide centrally-run cities and provincial cities with standard software programs to help their operation of the GDSS.

2) Database of the GDSS

(1) Urban space information

- Urban space: Percentage of public green area, access to the greenery, ratio of green area to urban development area, urbanization rate, and population density
- Land use: The area of green trees per capita, urban land per capita, density of construction, percentage of land area for traffic, percentage of green space, percentage of land area for public transportation, percentage of land area for the construction of urban infrastructure, percentage of land area for environmentally friendly agriculture, percentage of households granted land use right certificates in the total number of households owning houses
- Green building: Percentage of state agencies and public facilities certified as green buildings, percentage of households having permanent or semi-permanent houses in urban areas, and average house area within a city
- Traffic: The length of roads used for bicycles per capita, rate of public transport use, percentage of roads using energy-saving lighting equipment or new and renewable energy, percentage of public transport using clean energy, etc.
- Green ecology and environment: The proportion of natural space and landscape in an urban area accessible by the citizens, the area of public green trees outside the house area per capita
- New and renewable Energy: The amount of electricity consumption relative to per capita income, percentage of households using renewable

energy, etc.

– Waste: The rate of wastewater meeting the technical standards, the amount of waste collected and proper treatment thereof, percentage of households with septic tank toilets in a city, rate of water loss, rate of excessive air pollutants, degree of water source pollution, rate of wastewater treatment, rate drainage system, etc.

– Others: Resource recycling, green production and green technology, etc.

3) Affairs regarding the GDSS

(1) The department in charge of the integrated GDSS at the Ministry of Construction shall perform the following affairs:

- Building a database related to the GDSS;
- Monitoring the management of documents using the GDSS and controlling the quality thereof;
- Connecting the GDSS with other systems;
- Providing and managing standard software for the use of the GDSS;
- Sharing of data through the GDSS;
- Developing and providing system security software programs.

(2) The department in charge of the GDSS of centrally-run cities, provincial cities, and towns shall perform the following affairs:

- Supervising the use and management of input data and controlling the quality thereof;
- Updating the system in accordance with the regulations for management of attribute data;
- Checking the system security.

(3) The departments in charge of the GDSS shall input data into the GDSS and cooperate with the department in charge of the Ministry of Construction for its affairs.

(4) The heads of the departments in charge of the GDSS shall have system managers and the electronic data management staff to effectively

perform the assigned affairs.

4) User of the GDSS and Management of the GDSS

(1) The department in charge of the GDSS shall designate a user to use the GDSS among those responsible for the green city urban planning.

(2) None other than the GDSS user shall perform affairs such as importing, editing, extracting electronic data through the GDSS.

(3) The department in charge of the GDSS must immediately change the GDSS user if any change occurs to the relevant work due to changes in the duties, replacement, retirement, etc. of the user.

(4) The department in charge of the GDSS may allow other users to handle the relevant affairs in case the user encounters difficulties in handling affairs regarding the GDSS due to accidents, business trips, etc.

(5) The department in charge of the GDSS must keep records of changes in the GDSS user.

5) Management of the Integrated GDSS

(1) The department in charge shall manage the Integrated GDSS software.

(2) The department in charge of the GDSS of a centrally-run city or a provincial city shall request the department in charge of the Integrated GDSS of the Ministry of Construction to improve functions of the GDSS where necessary.

6) Opening and Use of Electronic Data

The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns may open and distribute electronic data relating to green city urban planning to domestic organizations and individuals as stipulated in Decree 36a / NQ-CP on E-Government.

7) User Management and Recording User History

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall regularly check the user history and take necessary measures such as denying the access by inappropriate users.

(2) Users accessing the GDSS shall not provide others with the information necessary to identify the user and manage such information in a safe manner.

(3) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall record and manage the history of data use, stating the following:

- User's access history and usage time;
- Details of the data that users viewed or deleted, and the reasons thereof;
- Details of the data that the system administrator created, edited, viewed, or deleted and the reasons thereof;
- Other matters deemed necessary to verify the misuse, abuse, or leakage of data.

(4) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities and provincial cities shall keep in electronic storage media the history of use of the GDSS or related data.

(5) The department in charge of the GDSS of the Ministry of Construction and in that of the centrally-run cities, provincial cities, and towns shall ensure that the history of data use is not changed or deleted.

8) Backup

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall regularly back up the relevant data in preparation for any possible loss of electronic data or breakdown of software.

(2) The data backed up in accordance with the regulations must be stored in a safe space in order not to be stolen, destroyed, or lost.

9) Dealing with system failure and recovery

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall prepare a log book on failures of the GDSS and make records if any failure occurs.

(2) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall immediately take measures necessary to deal with the causes of failures in the event of any failure that the system can not handle by itself.

(3) When any problem is detected in the software or data of the GDSS, the relevant software or data shall be immediately recovered after inspection.

10) Training system users

The Ministry of Construction shall train the GDSS users for the use and dissemination of the GDSS.

11) Monitoring of the Integrated GDSS

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall regularly monitor the status of the green city urban planning and the use of the GDSS.

(2) The monitoring should consider the following matters as well as whether the technological standards regarding the green city urban planning and the GDSS are appropriate to cope with climate change or technological changes in software programs:

- Whether the details of the green city urban planning comply with the

national objectives and policies to reduce greenhouse gas emission and respond to climate change;

- Whether the GDSS is effectively utilized to minimize or mitigate the effects of greenhouse gas-emission and climate change.

12) Reflecting the results of monitoring and review

The department in charge of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall reflect in the GDSS the results of the monitoring and review.

III. CONCLUSIONS AND PROPOSAL

1. Conclusion

City paradigm in Vietnam is on the verge of change toward green city, which means policies for and action plans of green growth in Vietnam are implemented in line with environment protection and sustainable city development by solving problems caused by urbanization. Based on this change, the GDSS of Vietnam has been studied, and the result of the study suggests green city urban planning methods which use the electronic system for decision-making process of the planning.

In order to apply the policies and change of city paradigm in practice, it is necessary to reform the system by revising legal documents to legislate green city urban planning and development in Vietnam. And it is essential to modify legislation from law to directional documents for their consistency to prepare legal documents to support green city urban planning. But these changes are not always be completed because changes are just steps toward the end and influenced by reality as well as a legislative system of national assembly and government.

This guideline shows system reform for green city urban planning and decision-making process to suggest directions to which a manager who will produce documents of law and system related to green city urban planning refers.

2. Proposal

This guideline must be applied to managers and working staff related to green city urban planning of Vietnam and its decision-making. And for this, Vietnamese capability to implement policies has to be paid attention to and sustainable applicability of the system nationwide has to be enhanced.

In addition, this guideline is connected with Green City Indicator and

establishment and operation of GDSS so that newly developed GCI and upgraded GDSS need to be further reflected on this. When using this guideline as reference materials for implementing green city urban planning, legal education and publicity for managers and workers are necessary to improve effectiveness of the guideline.

In terms of the legal system, it is important to suggest how to make laws for data management, information processing, information use of e-government, and rationalization of land use relating to green city urban planning.

1. General Matters of Guideline

1.1 Objectives of the guidelines

This guideline aims to achieve the following objectives:

(1) Assisting the state management agencies to improve the system of legal documents on green city urban planning;

(2) Providing a basic manual for application for the evaluation and approval of green city urban planning in Vietnam;

(3) Improving the capacity to analyze advance response to climate change using an electronic system in green city urban planning;

(4) Providing a training manual for capacity building for green city urban planning and development management in Vietnam.

1.2 Principles of the guideline

(1) In green city urban planning, it is necessary to comply with the current laws on urban planning in Vietnam and apply the principles and guidance to the development model of green cities.

(2) Centrally-run cities and provincial cities need to develop green city urban planning in line with the government's national climate change response plans, such as green growth policy objectives and greenhouse gas emissions.

(3) In green city urban planning, centrally-run cities, provincial cities and towns need to examine urban space, transport, ecology and green environment, energy, wastes, etc. to cope with climate change and ensure sustainability by incorporating indicators for green economy, green environment, green society, etc. in the plan.

(4) In green city urban planning for centrally-run cities, provincial cities and towns need to minimize the use of limited resources such as land and fossil fuels and develop and manage measures toreduce greenhouse gases and save resources by efficiently using resources.

1.3 Conditions for implementation of the guidelines

In the process of preparation, evaluation and approval of green city urban planning on the basis of the government's current documents on urban planning, the following key materials designated by competent authorities need to be included:

a) Green city indicators and indexes
b) Green city urban planning decision-making support system (GDSS)

1.4 Definition of terms

Some basic terms under the Urban Planning Law and the additional new concepts used in this Guideline are defined as follows:

1a. Urban center is an area with a dense population mainly engaged in non-agricultural economic activities, which is a political, administrative, economic, cultural or specialized center playing the role of promoting the social and economic development of a country, a territorial region or a locality, and consists of inner city and suburbs for a city and inner town and outskirts for a town and townships.

1b. Green city is a city capable of reducing greenhouse gas emissions and adapting to climate change by sustainably and effectively using resources.

1c. Green growth city is a city that has achieved urban development and economic growth through urban policies and activities to reduce the adverse impact on the natural environment and resources.

1d. Environmentally friendly city is a city with a good living environment including appropriate technical infrastructure and population structure where

residents can enjoy community development based on quality jobs, healthy life and well–being, social security and safety, cultural and social services and opportunities to participate in the urban management process under the approved plans.

2. New urban center is an urban center expected to be formed in the future in line with the orientation of the master plan on the national system of urban centers, which is invested and constructed to step by step reach the criteria of urban centers as prescribed by law.

3. New urban quarter is an area within an urban center which is newly built with complete technical and social infrastructure and houses.

4a. Urban planning is the organization of the space, architecture, urban landscape and system of technical and social infrastructure facilities and houses in order to create an appropriate living environment for people living in an urban center, which is expressed on an urban plan.

4b. Green city urban planning is planning of technical and social infrastructures, landscape, architecture, space, etc. to meet the requirements specified in the green city urban plan.

5. Planning tasks are requirements on study and organization of implementation approved by competent authorities as a basis for making an urban plan.

6a. Urban plan is a document reflecting the contents of urban planning, including drawings, mock-ups, explanations and regulations on management according to urban planning.

6b. Green city urban plan is a document containing the contents of the green city urban planning, including explanations, drawings and related materials.

7. General planning is the organization of the space and system of technical and social infrastructure facilities and houses for an urban center suitable to its socio-economic development, ensuring defense, security and sustainable development.

8. Zoning planning is the division and determination of functions and norms on the use of planned urban land of land areas, networks of social and technical infrastructure facilities within an urban area in order to concretize a general plan.

9. Detailed planning is the division and determination of norms on the use of planned urban land, requirements on management of architecture and landscape of each lot of land and arrangement of technical and social infrastructure facilities in order to concretize a zoning plan or general plan.

10. Urban planning period is a specified period used as a basis for forecasting and calculating economic-technical norms for the making of an urban plan.

11. Validity period of urban planning is a specified period counting from the time when an urban plan is approved to the time it is adjusted or cancelled under a decision.

12. Urban architecture is a combination of objects in an urban center, including architectural, technical, art and advertisement works whose exterior, image and shape dominate or directly affect urban landscape.

13. Urban space is a space covering urban architectural objects, trees and water surface in an urban center directly affecting urban landscape.

14. Urban landscape is a specific space with various observation directions in an urban center, such as the space in front of an architectural complex, a square, a street, a pavement, a footpath, a park, a greenery, a tree garden, a flower garden, a hill, a mountain, a hillock, an island, an islet, a natural land slope, a coastal strip, lake surface, river surface, a canal or a trench in an urban center and public-utility space in an urban center.

15. Norms on the use of planned urban land are norms for spatial and architectural development management which are specified for an area or a lot of land, including construction density, land use co-efficient and maximum and minimum construction heights of works.

16. Planning certificate is a document granted by a competent agency

certifying the data and information relating to an area or a lot of land according to the approved urban plan.

17. **Planning license** is a document granted by a competent agency to an investor for use as a basis for making detailed planning or formulating work construction investment projects.

18. **Framework technical infrastructure** is a system of main technical infrastructure facilities of an urban center, including trunk roads, energy transmission lines, water supply lines, water drainage lines, information and telecommunications lines and key technical works.

19. **Underground space** is a space under the ground planned for the construction of urban underground works.

20. **Green city urban planning decision-making support system (GDSS)** is an electronic information processing system built and operated based on a combination of hardware, software, database, network and security elements to support or manage the preparation and evaluation of planning, analyze greenhouse gas emissions and look up green urban status and the green urban indicators, which are essential in the planning of green cities.

21. **Energy saving** is activities to improve energy efficiency and reduce energy use, including energy shift to new and renewable energy such as wind power in order to response to climate change.

22. **Climate change** is a change in average conditions of climate which lasts for an extended period of time in a certain area.

23. **Sea level rise** is an increase in a sea level from normal levels due to typhoons, etc.

24. **Disaster** is a natural or social phenomenon that causes damage to the life, body or property of people and to the country.

25. **Abnormal climate** is a phenomenon where extreme changes in temperatures (including frequent heat wave with an increase in temperatures, intense cold, tropical storms, heavy rain and drought) occur at an increasing frequency.

26. Responding to climate change is human activities to mitigate the causes of climate change and adapt to climate change.

27. Adaptation and adjustment to climate change is adjustment of natural systems or humans to changing circumstances or environments, with an aim to reduce the vulnerability of climate change and take advantage of the opportunities offered by it.

28. Climate change mitigation is activities aimed at reducing the level or intensity of greenhouse gas emissions.

29. Natural disaster refers to typhoons, floods, drought, volcanic eruptions, tsunami, tornadoes, landslides, mudslide or other natural phenomena equivalent thereto.

30. Prevention and control of natural disasters is activities to minimize damage caused by natural disasters in advance or to prevent their occurrence.

31. Facility for prevention and control of natural disasters is a facility funded and constructed by the state, organization or individual to prevent and control natural disasters, including meteorological observatories, flood gates, sea gates, seismological observatories, natural disaster alarming stations, river banks, dams, reservoirs, facilities for preventing flooding, drought and erosion, shelter for ships against typhoons and refugee houses.

32. Green City Indicators (GCI) are indicators applied to formulate, appraise and approve green city urban planning to promote the implementation of policies and activities to build green cities to ensure climate change resilience of the urban center, minimize greenhouse gas emissions and improve efficient resource use.

- Green environment indicators: Indicators to evaluate the urban space structure, land use, green building, green transportation, green ecology and environment, new and renewable energy, waste, resource recirculation (water supply and wastewater treatment).
- Green economy indicators: Indicators to evaluate the economics of

energy and natural resource use in investment and development of green cities.

– Green social indicators: Indicators to evaluate the effectiveness of improving the living quality and conditions of residents in the urban center.

33. Greenhouse gas (GHG) is a gas in the atmosphere that absorbs and emits radiant energy within the thermal infrared range, the process of which is the cause of the greenhouse effect, including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride.

34. Greenhouse gas emissions are the total amount of GHGs released into the atmosphere for a specified period of time.

35. Greenhouse gas removals are the total amount of GHGs removed from the atmosphere for a specified period of time.

36. Greenhouse gas information system is a combination of various policies, processes and procedures to establish, manage and maintain GHG information.

37. Greenhouse gas program is a regional, national or international system or model to voluntarily or mandatorily register, declare or manage GHG emissions, emission reduction and enhanced GHG removals (excluding GHG related organizations and projects).

38. Monitoring is continuous or periodic assessment of GHG emissions and removals or other GHG related data.

39. Energy refers to fuel, electricity or heat obtained directly from non-renewable and renewable energy sources or through processing them.

40. Non-renewable energy sources refer to coal, coal gas, petroleum, natural gas, uranium ores and other non-renewable energy sources.

41. Renewable energy sources refer to water, wind, solar, geothermal, biofuels and other renewable energy sources.

42. Fuel is various types of materials used directly or through processing as combustible matter.

43. Energy saving and efficient use is the application of management and

technical measures to reduce energy losses and consumption while still ensuring the demands and targets set for production and life.

44. Energy-saving products are means and materials with high energy efficiency and insulation performance in compliance with standards and technical regulations set by competent state agencies.

45. Green building is a building highly efficient in the use of energy and materials, with minimized negative impacts on the environment. It is designed to minimize the adverse effects of construction environment on human health and the natural environment by means of the following methods:

- Efficient use of energy, water and other resources
- Protection of the health of users and improvement of productivity
- Reduction of waste, pollution and environmental damage

46. Green transportation refers to the following transport means to minimize the emission of CO^2 and other harmful gases into the environment:

- Walking, bicycles and other means using one' s own energy;
- Subway, electric cars, buses and other environmentally-friendly public transportation;
- Other means using renewable energy sources such as solar energy and wind energy.

47. Green consumption is an act of buying environmentally-friendly products that are not harmful to or good for human health and of using products that are least harmful to the environment.

48. Green economy is an economy designed to improve human and social well-being while addressing environmental threats and resource scarcity.

49. Environment is a system of natural and man-made elements that have an impact on the survival and development of humans and organisms.

50. Environmental composition is material elements including earth, water, air, sound, light, creatures and other physical forms of matter.

51. Environmental protection activities are activities to prevent and mini-

mize adverse impacts on the environment, to respond to environmental accidents, to overcome environmental pollution and degradation and to improve and restore the environment so as to maintain a pleasant environment, including any activities to keep the environment healthy by exploiting and using natural resources in a rational manner.

52. Sustainable development is the development that meets the needs of the present without compromising the ability to meet the needs of the future generations by closely integrating and harmonizing economic growth, social progress and environmental protection.

53a. Clean technology is a technological process or technical solution that does not pollute the environment and minimizes emissions of environmental pollutants.

54b. Environmentally friendly technology is technology that, during operation, causes less environmental damage than other similar technologies.

55. Waste treatment is the process of using technical and technological solutions (other than preliminary processing) to reduce, eliminate, isolate, quarantine, incinerate, destroy and bury wastes and harmful elements contained in wastes.

56. Waste treatment facilities are facilities including hazardous waste treatment facilities, domestic waste treatment facilities and general waste treatment facilities.

57. Environmentally friendly facilities are facilities that meet the criteria for energy efficiency, water saving and minimization, reuse and recycling of wastes.

58. Environmentally friendly products are products that meet eco-label criteria and are granted eco-label certification.

59. Environmental pollution is a change in environmental components, which does not conform to environmental technological standards and environmental standards and adversely affects humans and organisms.

60. Environmental degradation is a decline in the quality and quantity of

environmental components, which adversely affect humans and organisms.

61a. Waste is a material that is discharged during production, business, services, living or other activities.

62b. Hazardous waste is a waste with toxic, radioactive, infectious, flammable, explosive, corrosive, poisonous or other hazardous properties.

63. Waste management is the process of prevention, reduction, monitoring, classification, collection, transport, reuse, recycling and treatment of wastes.

64. Environmental protection planning is zoning the environment for its preservation and development and preservation, development and establishment of a system of environmental protection of technical infrastructure in association with the system of environmental protection solutions in close relation with the master plan for social and economic development to ensure sustainable development.

65. Strategic environment assessment is the analysis and forecast of the environmental impact of the development strategy, planning and plans to provide solutions to mitigate adverse impacts on the environment and to integrate them in the strategy, planning and plans to ensure sustainable development.

66. Environmental impact assessment is the analysis and forecast of environmental impacts of specific investment projects in order to propose environmental protection measures when implementing such projects.

2. Establishment, etc. of Green City Urban Planning

2.1 GOALS OF GREEN CITY URBAN PLANNING

In green city urban planning, the following matters should be considered as goals to achieve, considering the outcomes of comprehensive research on paradigm change of cities, suggestions by international organizations, global trends on green city urban planning, and the current state of Vietnam:

a) Reduction of greenhouse gas emissions;
b) Ensuring urban resilience to climate change;
c) Strategic use.

It also should identify the following matters that should be addressed in green development of Vietnam:

a) Efforts to reduce greenhouse gas emissions and to ensure the uptake of emissions;
b) Methods to ensure the resilience of urban area, to minimize the impacts of climate change, and to effectively cope with natural disasters;
c) Possibility to ensure the efficiency of sustainable resources, reduction of use of fossil fuel, use of new energy, waste management, and water resources management.

2.2 SCOPE OF PROVISIONS AND OBJECTS OF GREEN CITY URBAN PLANNING

1) Scope of Provisions

This Guideline prescribes matters necessary for green city urban planning, etc. and provides for the use of GDSS (Green city urban planning Decision-making Support System) to enhance the capability to proactively cope with

climate change through analysis of current status of greenhouse gas (GHG) emission by applying the major Green City Indicators (GCI) to the cities for green city urban planning.

2) Objects of Application

This Guideline applies to the institutions, organizations, and individuals that formulate, approve, examine the green city urban planning and participate in the use of GDSS.

2.3 GREEN CITY URBAN PLANNING TASKS

1) Requirements for Green City Planning Tasks

(1) The green city urban planning tasks need to determine development perspectives and objectives in compliance with each city's planning and needs of each planning area, which shall serve as a basis for the formulation of green city urban plans.

(2) Green city urban planning tasks need to set key targets according to short-term and long-term green city index and indicators.

(3) The green city planning tasks need to specify the requirements for a research methodology with a support of GDSS based on the indicators and index appropriate for city development conditions.

(4) Green city urban planning tasks need to be approved by the competent authority.

2) Contents of Green City Planning Tasks

(1) General city planning tasks are to ensure the achievement of target value of green city index and indicators in each stage of planning, considering the nature and role of urban centers, development of urban potential, driving force of urban development, orientations for urban development, basic requirements for research activities for expansion and layout, and social and technical infrastructure in the

inner city and suburban areas, and to confirm the requirements of strategic environmental assessment.

(2) The zoning planning tasks are to determine the boundaries, area, nature, population, land use of the planning area, indicators of expected social and technical infrastructures, compatibility with architectural space, approved general plan, needs for functional zones compatible with perimeter zones, basic principles, requirements for strategic environmental assessment.

(3) The detailed planning tasks are to determine architectural space of the planning area, requirements for the establishment of social and technical infrastructures, principles and requirements for strategic environmental assessment, in accordance with the plan formulated to be compatiable with the limits on land use and population indicators, approved general plan, regional plan, and surrounding area.

(4) In case of planning for urban renewal and improvement, the planning tasks shall ensure that the urban or regional development planning is balanced and stable and preserves the architectural space and characteristics of the city, and improves the living conditions of citizens.

(5) In case of planning new city centers and new urban areas, planning tasks shall be determined considering the uniformity and supplementation of social and technical infrastructures, connectivity with technical facility in the outer city, modern architectural space and living conditions.

2.4 DEMONSTRATION OF GREEN CITY URBAN PLANNING

1) Bases for Green City Urban Planning

Green city urban planning shall be based on the following matters:

(1) Strategies and master plans for socio-economic development, national defense and security, master plans for national urban systems, regional

plans, approval of direction-setting of superior city plans;

(2) Approval of green growth strategies or plans for each level of city according to the city level;

(3) Whether plans for relevant areas have been approved;

(4) Whether green city urban planning tasks (or city planning tasks with development objectives according to the green urban model) have been approved;

(5) Standards of urban planning and criteria for each industrial sector;

(6) Green City Planning Indicators and Index approved by the competent authority;

(7) Topographic maps reviewed or surveyed and drawn by specialized agencies;

(8) Socio-economic data of related regions and sectors.

2) General Requirements

(1) Green city urban planning should present the results of comprehensive research and analysis of the current status and characteristics of the planning area, details of related plans, opinions of citizens.

(2) It is necessary to analyze the relation between the main indicators such as population, economy, living conditions, production activities and the current status of greenhouse gas emission as well as analyze key factors to reduce greenhouse gas emissions, and reflect the results in green city planning.

(3) When establishing the main indicators, it is necessary to study the relations between indicators related to population structure, economic structure, living environment and greenhouse gas emission, to link the relations with the emission projections in the future.

(4) When a development project is planned, it is necessary to analyze the current status of greenhouse gas emissions for each development project based on the location and development direction.

(5) Urban space should be built in the compact, and public transport-oriented manner to minimize greenhouse gas emissions and to maintain a sustainable form of a city.

(6) It is important to raise public awareness of severity of climate change in line with quality of life of citizens, and consider and assess the importance of energy savings.

3) Criteria of Application

(1) Criteria for General Application

- The natural environment, landscape, ecosystem, green space, etc. for reduction of greenhouse gas emissions should be preserved.
- Key indexes related to population, economy, life, production activities, greenery and environment should be determined using appropriate techniques. The calculation of index shall use various techniques and go through validation process, and the method and contents of index shall be kept and managed.
- Planning goals and strategies shall be set in compliance with the regional characteristics and long-term development direction of the relevant city.
- Green city urban planning should reflect details such as urban spatial structure, land use, transportation plan, green ecology and environment, renewable energy, waste, resource circulation.
- Analysis of vulnerability to disasters should be used to identify various disaster risks, which should be reflected in the green city urban planning to minimize disaster damage.
- In principle, the area where coastal erosion is ongoing or worrisome should be excluded from the development target area, but if it inevitably needs to be designated as a development site, factors such as the effects of sea level rise and coastal erosion should be considered comprehensively and reflected in the planning.

(2) Criteria for Basic Application (According to the Code)

Reference should be made to the national technical standard system of Vietnam for environment, trees, energy saving and green city indicators and index such as QCXDVN 01:2008/BXD, QCVN 09:2013/BXD, QCVN 40:2011/BTNMT, QCVN 14: 2008/BTNMT, QCVN 07:2009/BTNMT, QCVN 05:2013/BTNMT.

(3) Green City Indicators & Index

○ Indicators should be applied in consideration of the following matters selected in light of the concept of green city and direction-setting of green city in Vietnam (applicability, policy connectivity):

– Key indicators shall be uniformly applied to every city;

– Sub-indicators are to supplement key indicators, which shall be applied depending on characteristics of cities.

○ Key indicators and sub-indicators are short-term indicators which shall be applied shortly in the stage of formulating a green city urban planning, and long-term indicators shall be developed and applied in the long term. Among these, the indicator of final selection is an indicator that is selected based on current status of cities and others, which must apply in establishing a green city urban planning.

<Table 1> Green City Index and Indicators

Green City Policies		Green City Urban Planning	Green City Indicators		Indicators of Final Selection	Indicators of Short-term Application		Indicators for Long-term Development
Field	Goal	Planning Elements	35 Indicators	Unit		Key Indicator	Sub-in dicator	
Green environ-ment	Reduction of GHG emissions and use of renewable energy	Urban space structure (4)	Building density	%	◎		☆	
			Urbanization rate	%	◎	★		
			Ratio of urban green area	%				◎
			Population density	person / m^2 or ha				◎
		Land use (3)	Green area per capita	m^2 / person	◎	★		

Green City Policies		Green City Urban Planning	Green City Indicators		Indicators of Final Selection	Indicators of Short-term Application		Indicators for Long-term Development
Field	Goal	Planning Elements	35 Indicators	Unit		Key Indicator	Sub-in dicator	
			Urban area per capita	m^2 / person				◎
			Rate of land area for public transportation	%				◎
		Green buildings (2)	Energy consumption of residential buildings	Toe				◎
			Number of buildings certified as green buildings	Number	◎		☆	
		Green transportation (3)	Number of motorcycles per capita	Number / person	◎		☆	
			Public transport usage rate	%	◎	★		
			Rate of public transport using clean energy	%				◎
		Green ecology and environment (2)	GHG emissions per capita	ton / person	◎	★		
			GHG uptake of urban forest	Ton eq				◎
		Renewable energy (3)	Final consump-tions of energy per capita	toe / person	◎	★		
			Share of renewable energy	%	◎		☆	
			Households using renewable energy	%				◎
		Waste (2)	Waste genera-tions per capita	kg / person * day	◎		☆	
			Waste recycling rate	%				◎
		Recycling of resource (2)	Water consump-tions per capita	liter / person				◎
			wastewater treatment rate	%	◎		☆	

Green City Policies		Green City Urban Planning	Green City Indicators		Indicators of Final Selection	Indicators of Short-term Application		Indicators for Long-term Development
Field	Goal	Planning Elements	35 Indicators	Unit		Key Indicator	Sub-in dicator	
Green economy	Greening of production way and promotion of stable consumption	Green production and technology (3)	Green industry investment ratio	%	◎		☆	
			Green jobs ratio	%				◎
			Rate of investment projects to cope with climate change	%				◎
		Green consumption (2)	GHG emissions on GRDP	ton eq / GRDP	◎	★		
			Consumption rate of coal and petroleum products	%				◎
		Green cooperation (1)	Financial independence	%	◎		☆	
Green society	Greening of lifestyle	Green governance (3)	Is there a policy to cope with climate change?	establishment or not	◎	★		
			Are there ordinances of regulating greenhouse gas emissions?	establishment or not				◎
			Rate of managers trained in green growth	%				◎
		Green life (3)	Whether green action plans have been formulated	establishment or not	◎		☆	
			Private participation in green policy	%				◎
			Poverty rate	%				◎
		Green safety (2)	Casualties and economic losses from natural disasters	VN Dong, person	◎		☆	
			Resident population in disaster-prone area	%				◎

(4) How to Calculate Green City Indicators

○ Green City indicators shall be calculated by the methods in the following table, and the evaluation shall be conducted in quantitative and qualitative manners. In such cases, the green city indicators and evaluation methods that should be applied currently among the above-mentioned green city indicators shall be as follows:

a) Architectural space planning:
- Building density: Quantitative (Short-term application)
- Urbanization rate: Quantitative(Short-term application)
- Urban greening rate: Quantitative
- Population density: Quantitative
- Number of trees per capita: Quantitative (Short-term application)
- Number of projects certified as green buildings: Quantitative

b) Infrastructure plan:
- Number of motorcycles per capita: Quantitative (Short-term application)
- Land ratio for public transport: Quantitative
- Public transport usage rate: Quantitative (Short-term application)
- Waste recycling rate: Quantitative
- Waste generations per capita: Quantitative (Short-term application)
- Water consumptions per capita: Quantitative (Short-term application)

c) Industrial district planning:
- Green industry investment ratio: Quantitative (Short-term application)

d) Environmental Impact Assessment:
- Greenhouse gas emissions per capita: Quantitative
- Greenhouse gas uptake by urban forest: Quantitative
- Resident population in disaster-prone area : Quantitative

e) Policy-making for implementation of plans and management regulations:
- Whether policies have been formulated to cope with climate change: Qualitative (Short-term application)
- Whether greening plans have been implemented: Qualitative (Short-term

application)

- Whether regulations on greenhouse gas emissions exist : Qualitative

<Table 2> Calculation of Green City Indicator

Green City Index	Green City Indicator	Calculation method	Description	Relations with Green City	Evaluation Methods
Green Environment	Building density	(Building land area / whole urban area) * 100	Ratio of building land area to the entire city area	Higher land area of buildings impacts on the increase of carbon sinks	Quantitative
	Urbanization rate	(Urban populations / total Populations) * 100	Ratio of populations living in urban areas to the entire populations	Concentration of population and resources in urban areas impacts on emissions	Quantitative
	Urban green area ratio	(Park and green area within a city / total area) * 100	Ratio of green area created for preservation of urban natural environment and improvement of urban landscape to the total area	Higher proportion of urban green area secures carbon sinks	Quantitative
	Population density	(Populations / land area)	Number of people per unit area (m^2 or ha)	Higher population density has bigger impacts on emissions in proportion to increase in production, consumption	Quantitative
	Green area per capita	(Total green area / populations)	Green area per capita	Higher ratio of total green area ensures carbon sinks	Quantitative
	Urban area per capita	(Urban land area / populations)	Urban land area per capita	Higher urban land areas increase emissions in proportion to residential, commercial, industrial land use	Quantitative
	Share of public transport area	(Public transport land area / transport land area) * 100	Ratio of land area for public transport to land area of urban transport	Higher ratio of public transport land area reduces emissions through reduced individual traffic	Quantitative
	Energy consumptions of residential building	Total energy consumptions of residential buildings such as power, coal, oil, gas, etc.	Energy consumptions of residential buildings	Energy consumptions in residential buildings impact on GHG emissions	Quantitative
	Number of	Number of	Number of	Green buildings reduce	Quantitative

Green City Index	Green City Indicator	Calculation method	Description	Relations with Green City	Evaluation Methods
	certification of green buildings	certification of green buildings	buildings certified by Green Architecture Associations	GHG emissions in buildings section	
	Motorcycles per capita	(Number of registered cars / number of population)	Number of cars per capita	Vehicles using fossil fuel increase emissions in transport sector	Quantitative
	Public transportation usage rate	(Usage of public transportation such as bus, rail / total transportation usage) * 100	Transport share of bus, rail, etc.	Public transport share reduces emissions through decrease of individual transport means	Quantitative
	Ratio of public transportation using clean energy	(Public transportation means using clean energy such as natural gas, electricity / entire transportation means) * 100	Share of public transportation such as buses using clean energy	Increase of public transport means using clean energy reduces emissions	Quantitative
	Per capita GHG emissions	(Total GHG emissions / populations)	Per capita GHG emissions	Determination of absolute GHG emissions	Quantitative
	GHG uptake by urban forest	(Forest GHG uptake)	Uptake in LULUCF (Land Use, Land Use Change and Forestry)	GHG uptake in the forest	Quantitative
	Final energy consumptions per capita	(Electricity, coal, oil and gas energy consumptions / populations)	Total energy consumptions per capita	Increased emissions by energy consumption	Quantitative
	Ratio of renewable energy	(Total renewable energy productions/ total energy productions) * 100	Share of renewable energy in total energy usage	Reduction of GHG emissions with increased use of renewable energy	Quantitative
	Households using renewable energy	(Households using renewable energy / total number of households) * 100	Percentage of households using renewable energy to total households	Reduction of GHG emissions by increased proportion of households using renewable energy	Quantitative
	Per capita waste generations	(Total waste generations / populations)	Total volume of waste generated per capita	Increase of emissions for treatment of waste generated	Quantitative
	Waste	(Recycled waste	Percentage of	Reduction of emissions	Quantitative

Green City Index	Green City Indicator	Calculation method	Description	Relations with Green City	Evaluation Methods
	recycling rate	volumes / total waste volumes) * 100	recycled waste to total waste	by recycle of waste	
	Per capita water consumptions	(Total water usage / populations)	Total water usage per capita	Increase of emissions in other processes required to secure water used	Quantitative
	wastewater treatment rate	(The amount of treated wastewater / total amount of discharged wastewater) * 100	Percentage of treated wastew ater to total wastewater	Reduction of emissions from discharge of treated wastewater	Quantitative
Green Economy	Green industry Investment ratio	(Green industrial investments / total industrial investments) * 100	Percentage of investments in green technology-related industries to total industrial investments	Sustainable economic growth through increased green industry	Quantitative
	Rate of green jobs	(Number of green industry-related jobs / total number of jobs) * 100	Percentage of jobs created in relation to green industry to total number of jobs	Sustainable economic growth through increased green jobs	Quantitative
	Rate of investment projects coping with climate change	(Number of investment business coping with climate change / total number of business) * 100	Percentage of investment business to address climate change out of the total number of business	Maintain sustainability by coping with climate change	Quantitative
	GHG emissions per GRDP	(GHG emissions / GRDP)	GHG emissions per GRDP	Impact on regional GHG emission through GRDP emissions	Quantitative
	Share of consumption of coal and petroleum products	(Coal, petroleum product consumptions / total product consump-tions) * 100	Percentage of consumptions of products made of coal, oil in total product consumptions	Increased emissions in the manufacturing process due to use of coal, petroleum products	Quantitative
	Financial independence	((Local tax + non-tax revenue) / general accounting revenue) * 100	The proportion of independent revenues to the entire revenues	Maintaining soundness through efficient use of resources	Quantitative
Green	Existence of	(Whether various	Whether policies	Maintaining sustainability	Qualitative

Green City Index	Green City Indicator	Calculation method	Description	Relations with Green City	Evaluation Methods
society	policies coping with climate change	policies coping with climate change have been formulated)	related to climate change mitigation and adaptation have been formulated	through formulation of climate change policies	
	Existence of low-carbon, green growth ordinance	(Whether ordinances related to low-carbon green growth have been formulated)	Whether a local ordinance relating to green growth has been formulated	Induce sustainable actions through enactment of related ordinances	Qualitative
	Rate of managers trained in green growth	(Number of managers trained in green growth/ total number of managers) * 100	A percentage of managers trained in green growth to the total number of managers	Enabling administrative enforcement through the understanding of green growth	Quantitative
	Formulation of Green Action Plan	(Whether green growth action plans have been formulated)	Whether an action plan for green growth has been formulated	Improving the quality of life through the practice of green growth	Qualitative
	Private participation in green policy	(Number of green policies with private participation / total number of green policies) * 100	Participation rate of the private sector in green policy	Promotes a healthy life through increased participation of private sector in green policy	Quantitative
	Poverty rate	(Poverty populations / populations) * 100	Ratio of populations that lack physical resources necessary for survival to the total populations	Increase of social costs to address rising poverty population	Quantitative
	Casualties and economic losses from natural disasters	(Number of casualties and economic losses from disasters such as typhoon, flood, heavy rain, drought, earthquake, fire, epidemic, etc.)	Casualties from natural disasters	Undermining quality of life due to increased risk caused by natural disasters	Quantitative
	Rate of population living in disaster-prone area	(Populations living in disaster-prone area / total populations) * 100	Percentage of population living in disaster-prone areas such as typhoons, floods to the total population	Undermining quality of life due to risk of disaster	Quantitative

(5) Criteria of Calculation of Green City Indicator

○ Criteria of calculation of Green City Indicator shall be determined according to the following matters:

- Representativeness : How does it well represent the green city?
- Orientation : Does it present a direction for moving forward to the green city?
- Simplicity : How easy is it to calculate and explain the indicators?
- Rationale : Were the indicators reflected in the case of previous review?
- Accessibility to data : How feasible is it to acquire data at the current level, and can evaluation be conducted based on the review of acquired data?

4) Contents of Green City Urban Plans

○ A green city urban plan shall contain the following matters:

- Analysis and evaluation of existing natural, socio-economical conditions;
- Characteristics, goals and development motivation of a city;
- Population size, labor, city area, norms on land use, social infrastructure, technological infrastructure;
- Prospect of urban land use according to development needs in each planning period;
- Direction of development of urban space;
- Direction of development of urban technological infrastructure;
- Strategic environmental assessment;
- Investment programs with development priority and proposal of resources for their implementation;
- Phased development of whole urban space and directions for technological infrastructure.

○ Related detailed matters are as follows:

(1) Analysis and assessment of natural and socio-economic conditions

— Population, labor, land use, and the current status of a city's technical, social, and environmental infrastructure;

— Analysis of the history of urban development to examine urban structures as well as the use and transformation of urban natural environment;

— Key issues to be analyzed: Location of a city in the region, population, social conditions, premise of economic development, environment, spatial structures, land use, transportation, technical infrastructure, social infrastructure, living conditions, housing, parks, green areas, landscapes, urban finance, state management.

<Table 3> Criteria for analysis and assessment of natural and socio-economic conditions

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
1. History of urban development	**History of urban development** (i) Process of migration and urban structure transformation (ii) Process of migration and transformation of urban natural environments and conditions	
2. Location of a city in the region	**1) Geographical location of a city in the province/region** (i) Administrative location (ii) Connectivity with other transport hubs and gateways **2) Socio-economic location of a city in the province/region** (i) Hierarchical relations with other cities in the region (ii) Urban growth (population increase/decrease) (iii) Economic level (GDP, GDP per capita)	Socio-economic indicators (population, GDP, poverty rate) and comparison with indicators of other provinces Indicators related to green trees, water surface and the environment of the whole region Distance to international gateways (seaports, airports)

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
	(iv) Regional connection with technical infrastructure (electricity, waterworks, drainage, solid waste management) (v) Regional connection with green infrastructure (vi) Investment competitiveness **3) Environmental impact** (i) Impact of urbanization on the regional environment (ii) Impact of urbanization on land use (iii) Natural ecosystem of the whole region **4) Conformity with higher level regional development planning** (i) National development planning/policy (ii) Provincial SEDP, national green growth strategy, directions, green growth projects, and other plans (iii) National green growth strategy	Provincial competitiveness index (PCI) Foreign direct investment (FDI) Carbon footprint
3. Demography	**1) Population** (i) Population (rising trend, distribution) (ii) Immigrants (iii) Population structure (by age group and sex) **2) Households** (i) Household structure (size and composition) (ii) Poor households	Population growth (city and ward level) Population distribution Population pyramid Population trends Place of settlement of populations
4. Society	**1) Health care** (i) Availability of and access to primary medical care (ii) Infant mortality (iii) Availability of and access to professional health care services **2) Education** (i) Availability of and access to primary/ secondary education (ii) Availability of and access to higher education (iii) Availability of and access to vocational training **3) Culture** (i) Monuments and historical remains	Accessibility to hospitals, School penetration rate Infant mortality rate Malnutrition rate Literacy rate Poverty rate Labor structure Unemployment rate Access to social conditions of the people

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
	(ii) Traditional intangible heritage (festivals, legends, customs) (iii) Villages, traditional villages (relics, lifestyle, and traditional values) **4) Other social services (administration, religion, etc.)** **5) Poverty** (i) Distribution and percentage of the poor (ii) Unemployment rate, underemployment rate **6) Employment** (i) Employment by economic sector (ii) Employment by age group and sex (iii) Employment by training level **7) Citizens' assessment and satisfaction regarding social services** (i) Accessibility (ii) Scope of services (iii) Quality of services **8) Directions of government policy in the social sector** (i) Directions of the current policies (ii) Projects underway or planned	
5. Economy	**1) Economic level and growth** (i) GDP and previous trends in economic growth (ii) GDP per capita (iii) The share of GDP in the relevant province **2) Economic structure and competitiveness** (i) GDP by sector (industry and service) (ii) Economic output by sector **3) Agriculture and forestry** (i) Output by crop type (ii) Cultivated area by crop type (iii) Current issues and future prospects, as assessed by stakeholders in the agriculture and forestry sector **4) Industrial sector** (i) Production by industrial sector, green industries (ii) Characteristics of public facilities (iii) Characteristics of polluting industries (location, type and level of pollution, etc.)	Economic growth (productivity, growth rate, productivity/labor) Economic structure (by sector) Labor productivity Provincial competitive index (PCI) Foreign direct investment (FDI)

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
	(iv) Current issues and future prospects, as assessed by stakeholders in the industrial sector **5) Service sector** (i) Production by service sector (ii) Characteristics of the service sector (type, size, location) (iii) Current issues and future prospects, as assessed by stakeholders in the service sector **6) Investment environment** (i) Investment (FDI, domestic investment) by business type (ii) PCI (Provincial Competitiveness Index) (iii) Current regulations and investment-induced mechanisms **7) Directions of government's economic policy** (i) Directions of policies for projects underway or planned	
6. Environment	**1) Conservation of ecosystem** (i) Ecosystems that need to be conserved (animals, plants, forests, etc.), location, scale, scope (ii) Current protection measures **2) Pollution control** (i) Pollution (air, water quality, soil, noise, garbage, etc): source, level (ii) Current measures **3) Disaster Prevention** (i) Risks (flood, landslides, subsidence, riverbank erosion, etc.): location, level, frequency (ii) Current measures **4) Responding to climate change** (i) Impact of climate change (ii) Current measures **5) Institutional adjustments** (i) Current legal framework (ii) Capacity for environmental management (iii) National policy	Animals and plants to be protected Pollution levels (air, water quality, soil, etc.) Frequency of disasters Damage caused by natural disasters Carbon footprint

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
	6) Citizens' assessment of current environmental conditions (i) Assessment of conservation of the natural environment (ii) Assessment of the current status of pollution (iii) Assessment of the damage caused by natural disasters (iv) Assessment of response to climate change impacts	
7. Spatial structure and land use	**1) Geographical conditions** (i) Topography and geology (ii) Soil conditions: soil composition, loading intensity (iii) Plumbing (surface water, groundwater) (iv) Plants: indigenous plants, biodiversity **2) Current status of land use** (i) Land use classification (ii) Change in area of land use by type (iii) Expansion of urban areas (iv) Decrease in agricultural land (v) Current land use issues (vi) Greenhouse gas emissions by functional areas using land **3) Soil environment assessment** (i) Protected areas (ii) Areas suitable for development **4) Facilities connecting urban and regional areas** (i) Connecting urban transport networks to regional transport networks (railways, roads, inland waterways, buses, access to international border gates) (ii) Connecting with urban areas through appropriate transport networks (mainly by roads) (iii) Inter-city cooperation in the fields of water resources management, coastal environment, forests, landscapes, etc. **5) Assessment of existing urban planning** (i) Socio-economic development planning (ii) Planning by sector (iii) Review of ongoing planning and projects	Conversion of land use purpose Distance to/from regional centers Distance between the city center and the communes/wards Population density by region

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
8. Transportation	**1) Regional transportation** (i) Connecting urban transport networks with regional transport networks (railways, roads, inland waterways, buses, access to international border gates) (ii) National transport projects underway or planned **2) Urban transportation** (i) Quantity and quality of infrastructure (railways, roads, inland waterways, buses) (ii) Public transportation services (routes, frequency, fares, accessibility, convenience, safety, transit conditions, etc.) **3) Characteristics of demand** (i) Travel demand and travel factors (ii) Increasing travel demand and attracting tourists (iii) Sharing of methods (iv) Travel time (v) Travel distribution model **4) Evaluation of transportation services** (i) Traffic congestion (ii) Safety (iii) Convenience (iv) Comfort	Distance to/from international gateways (seaports, airports) Road density Average speed of means of transportation Frequency of accidents Utilization of public transport Works for pedestrians
9. Technical infrastructure	**1) Scope** (i) Power supply (ii) Water supply (iii) Telecommunications (iv) Drainage (v) Solid waste collection (vi) Cemetery **2) Consumption** (i) Power supply (ii) Water supply (iii) Telecommunications (iv) Drainage (v) Solid waste collection (vi) Cemetery **3) Ability to pay costs** (i) Unit price for services	The scope of key urban facilities to be provided Unit price for using key urban facilities Citizens' willingness to pay for better services

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
	(ii) Willingness to pay costs **4) Assessment of technical infrastructure services** (i) Quantity (ii) Quality (iii) Price	
10. Social infrastructure	**1) Scope and level of use:** (i) Administration (city halls, police stations, fire stations, etc.) (ii) Health care (hospitals, clinics, public toilets, etc.) (iii) Education (schools, universities and colleges, research institutes, etc.) (iv) Culture (heritage and historical buildings, libraries, museums, etc.) (v) Religion (pagodas, temples, churches, etc.) **2) Evaluation of services** (i) Accessibility (ii) Quality	The scope of basic social infrastructure Accessibility to basic social infrastructure Accessibility to green parks
11. Living condition	**1) Housing** **2) Safety and security** **3) Tranquility** **4) Natural Disasters** **5) Pollution** **6) Cleaning** **7) Landscape** **8) Trees**	Citizens' evaluation of living conditions
12. Housing	**1) Housing Fund** **2) Land price** **3) Ability to pay** **4) Assessment of housing services** (i) Space (ii) Price (iii) Structure and design (iv) Ventilation and air (v) Maintenance issues (vi) Accessibility to key urban services	Housing prices Land prices Rents Conversion of land use purposes (its impact on land prices) Average floor area per capita Housing types (urban dwellings, mixed-use housing, villas, apartments, etc.)

Issues to be checked	Details of Specific Analysis and Assessment	Key Criteria
13. Parks and green areas	**1) Location and area** **2) Functions and facilities of available parks and green areas** **3) Accessibility from residential areas** **4) Assessment of parks and green areas** (size, distribution of parks, trees, accessibility, linkages, undeveloped parks, etc.) to be used as basic data for establishing public targets	The number of parks and green areas Average distance from residential areas to parks/green areas
14. Landscape	**1) Water** **2) Green trees** **3) Cultural heritage** **4) Street view**	Citizens' evaluation of the landscape
15. Finance and urban management	**1) Urban finance** (i) Values and details of the city's revenues and expenditures (ii) Revenue sources (iii) Dependence on upper level administrative agencies **2) Administrative capacity** (i) Capacity of government officials (ii) Intersectoral and inter-city cooperation (province)	Balanced budget revenues and expenditures Budget per capita Increased revenues The rate of revenue collection from taxes and fees Proportion of tax and fees out of revenues

(2) Features of city, targets, and motives for development

a) Features of city

○ In order to reflect the features of a city, scientific analysis of the following factors needs to be conducted:

– Directions of national economic development

○ In order to develop the national economy in a harmonized and balanced manner and to utilize the potentials of the state, territory and each region to the maximum extent, directions for national economic development should be set in consideration of requirements and criteria by region based on national reference data and data regarding socio-economic development. In

particular, characteristics, scope, and directions of urban development in the relevant region have to be reviewed and predicted.

– Location of urban areas in national land planning

○ Relations between cities and their neighbouring areas are determined based on national land planning. Roles among cities in the region are defined by their economies, productivity, and cultural and social relations.

○ If any regional planning is not prepared, the features of a city are identified based on basic surveys of resources and other conditions of the relevant region and its neighboring areas. In addition, the features of a city are determined based on the size and functions of the city in the region in consideration of development tasks related to other political and economic hubs in the region.

– Natural conditions

○ Optimal conditions that can affect activities conducted in a city's all fields need to be verified on the basis of natural resources, geography, landscape, and topographic conditions.

b) Targets

○ Targets to be achieved in the future and expectations are identified and reflected in action plans. The objectives of urban development that facilitate participation have to be set so that links between sectors can be established in a feasible, clear, detailed, and persuasive manner.

c) Motives for development

○ Urban resources, geographic advantages, and natural and human conditions are included. Strengths of urban areas are verified based on relations within and between regions in terms of production lines, land development fund, mineral resources which determine motives for development.

(3) Determination regarding population size, urban areas, norms for land use, social and technical infrastructure, etc.

○ Whether development requirements by each stage and green city standards are suitable is identified in the short term (10 years) and the long term (20-25 years). In the case of centrally-run cities, the period is 50 years.

(4) Prospects of urban land use for each planning period

— Considerations need to be given to: An agreed future development scheme, land use planning, detailed development directions by function, urban areas, rural areas, areas planned for development.

— Land use planning for the whole city needs to be made in the short term (10-15 years) and the long term (15-20 years).

— Land use planning should be made in accordance with selected calculation criteria, and it should suggest detailed criteria for characteristics, functions and areas of sites, heights and density of buildings, frequencies of land use, etc. Land use planning is used as a basis for carrying out and managing urban construction planning.

— Expected land use rate is determined based on land for urban development, land to be preserved, other types of land, and greenhouse gas emissions by region.

— Regulations to reduce the consumption of resources and energy for each site are suggested.

(5) Directions for development of urban spaces

a) Determination on development structures and directions for the development of urban centers and cities

Planning for future urban structures is made based on the following factors:

i) Regional context clarifying the roles of a city in the region;

ii) Environment department to be in charge of regulating development areas for environmental protection;

iii) Need for land use to secure space for urban activities.

— The following factors are analyzed based on the matters listed above:

i) Scenarios for urban growth to implement visions;

ii) Discussion between stakeholders before a scenario is determined (part of the process of strategic impact analysis);

iii) Urban planning based on the determined scenario.

b) Determination on the scope and size of functional zones in the urban center:

Embellishment zones, improvement zones, conservation zones, new development zones, construction restriction zones, and development restriction zones

c) Criteria for population density, criteria for planning for urban land use, directions for development of each functional zone;

d) Determination on administrative centers, commercial centers, public service centers, and parks and vacant lots in cities;

e) Spaces in urban functional zones, basic directions for building, landscapes, etc. (urban centers, suburbs, or other concentrated urban areas), and center axis

— Structures and compositions of urban spaces are determined for the following purposes:

. Saving land, water and energy resources;

. Establishing transport system to reduce traffic demand and to facilitate the use of public transport;

. Improving living conditions and quality of lives for citizens;

. Designating spaces for preserving trees and the environment.

— Identifying the axis of urban space

. Growth axis: Connecting a traffic axis to be built, ensuring main functions of each growth axis, reducing energy demand in the transport sector, reducing greenhouse gas emissions by disposing of such emissions, and saving resources;

. Green space axis: Examining urban greenery systems and systematizing such systems in accordance with the existing principles for preserving topography, water surface, and green areas.

(6) Orientations for urban technical infrastructure development:

a) Orientations for the development of technical infrastructure throughout the city

– General evaluation and selection of land for urban development;

– Assessment of topography, geological risks, areas with natural disaster risks, identification of construction banned or restricted areas, identification of basins, main divisions and drainage directions, location and scale of drainage works, identification of construction sites for urban centers and other functional areas in the city;

– Identification of urban transport networks aimed at green transport, including roads, railways, waterways and airways, location and size of airports, seaports, river ports, railway stations, roads and urban railway (elevated, on ground, underground), determination of the location and scale of the external car terminals;

– Reserves, demand and supply of water and energy, the total amount of wastewater and wastes, the location, scale and capacity of treatment works, cemetery and other works for city and other functional areas of the city.

b) Orientations for the development of technical infrastructure in centrally-run cities

○ The following matters need to be specified in the orientations for the development of technical infrastructure for the central area in centrally-run cities:

- Green transportation

• Determining the principle of arranging and determining the size

of roads by type and function of transport to reduce energy consumption and greenhouse gas emissions in the transport sector;

- For urban transport, establishing a public-transport-oriented transport system linked to the existing transport system to minimize the generation of unnecessary traffic and reduce greenhouse gas emissions;
- Aiming to reduce energy consumption and converting to a green transportation system through the development of public transport, parking facilities, transit facilities and bus stops;
- Using multipurpose buildings providing various utilities as traffic hubs; reducing energy consumption and greenhouse gas emissions.

- Environment, green ecology

- Forming a green area system with green areas in parks and development-restricted areas and a waterside green axis with coastlines, rivers and tributaries in the existing central area;
- Proposing conservation and management measures for the ecosystem and natural environment to secure and maintain carbon sinks;
- Controlling the water quality of major lakes, rivers and other water resources and using them in an environmentally friendly manner;
- Constructing wind paths to mitigate the urban heat island phenomenon;
- Green infrastructure planning.

– New and renewable energy

- Minimizing consumption of oil, coal and other fossil fuels;
- Determining the ratio of new and renewable energy to the total energy supply;
- Analyzing and demonstrating the potential for securing new and renewable energy sources such as solar and wind power.

- Waste

• Forecasting the amount of wastes generated in urban areas and planning for reduction of waste generation and for reuse and recycling of wastes.

(7) Strategic environmental assessment

○ A strategic environmental assessment shall be implemented in accordance with the provisions of Article 15 (7) of Decree No. 37-2010/ND-CP, taking into consideration the following matters:

– The overall objective of a strategic environmental assessment is to identify and assess the environmental consequences of planning at an early stage. This will ensure that the appropriate measures to address the negative impact are fully incorporated in the planning. This process requires environmental issues to be incorporated into the contents in a variety of ways.

– As the process of implementing a strategic environmental assessment, it may be flexibly adjusted according to the procedures of different types of planning, green city urban planning and a strategic environmental assessment needs to be executed in accordance with the logic and steps of the planning process.

• In executing a strategic environmental assessment, strategic environmental assessment specialists need to review and assess individual outputs of the green city urban planning and identify any modifications to protect the environment and minimize any risks and to achieve the objective of sustainable development.

• Where an assessment is implemented in parallel with green city urban planning, strategic environmental assessment consultants need to work in harmony with development consultants through discussion processes, taking a comprehensive consideration of major projects, necessary levels of assessment, micro-space and human resources required to implement the assessment.

(8) Priority investment projects and selection criteria

○ Based on the initial planning, proposal of a list of priority investment projects.

Criteria for selection are as follows:

- The projects are a major growth engine for economic development of the city;
- The projects are highly related to daily lives of the citizens (improvement of quality of life for a large number of residents, improvement and protection of the environment, preservation and promotion of urban heritage);
- The projects must be in line with the approved planning, in line with the provincial guidelines and directions;
- The projects must be in line with the city's financial capacity in each stage.

(9) Directions for development of urban space and technical infrastructure

○ Appropriate proportions must be applied to the map by stage. In the first stage, priority should be given to green areas and open space suitable for population in each stage.

5) Green City Urban Planning Methodologies

○ Green city urban planing is based on an empirical, comparative and comparative approach to strategic objectives considering the followings:

- Using GDSS software in the process of examining and selecting alternatives;
- How to use indexes on software;
- Investigation, analysis and processing of input data by applying appropriate indicators of RI from among indicators already approved by the competent authorities;
- From the start of designing to the appraisal and approval phase, the standardized development indicators as well as the Green Urban Index have been established by using the GDSS software for the selection

before choosing the optimal solution.

6) Green City Urban Planning Process

○ Green city urban planning process consists of 4 phases as follows:

– Phase 1(part I): Establishing planning tasks and planning steps of green city urban planning

– Phase 2(part II): Analysis and assessment of the current status and design of green city urban planning:

· Analysis and assessment of the current status of orientation for green city;

· Establishment of visions of green city and design of predictable city development.

– Phase 3(part III): Planning

· Planning for spatial development, social infrastructure, technology infrastructure, strategic environment assessment, major urban facilities, identification of special areas, priority investment projects and determination of financial resources.

– Phase 4(part IV): Development and operation of GDSS

· laying out and setting details of urban management in compliance with general planning;

· Responsibility of related parties;

· Using and monitoring GDSS.

<Table 4> Green Urban Planning Process

Content		Tasks
Part I Planning tasks and organization of green planning	1.1 Planning tasks	1.1 Review existing planning to determine the need for green city urban planning 1.2 Planning tasks (setting goals and indicators for green city urban planning)

Content		Tasks
management	1.2 Tasks to implement and monitor general planning	1.2.1 Set up the planning steps 1.2.2 Prepare detailed task plan
Part II Assessment of current status and orientation of urban development	2.1 Analysis of the current status and problem finding regarding green cities (environment, society, urban economy, population· labor, land use, status of construction of technical and social infrastructure, city environment)	2.1.1 Data collection 2.1.2 Database building 2.1.3 Situational analysis 2.1.4 Problem finding
	2.2 Establish a vision and development plan for green city urban planning using GDSS	2.2.1 Set vision and common goals 2.2.2 Framing development 2.2.3 Establish basic strategies and directions for development 2.2.4 Establish urban planning indicators in accordance with QCXDVN 01:2008 / BXD, establish green city indicators, and set up functional zones in line with planning goals and green city indicators
Part III Planning	3.1 Spatial development	3.1.1 Regional links 3.1.2 Partitioning environment 3.1.3 Urban growth scenarios 3.1.4 Community consultation 3.1.5 Architecture concept of urban 3.1.6 structure 3.1.7 Land use planning General development orientation + Orientations for urban development + Orientation for green urban development 3.1.8 Establishment and appraisal of planning options 3.1.9 General planning orientation 3.1.10 General orientation of green city urban planning (Land use planning, social and technical infrastructure)
	3.2 Develop a social infrastructure planning in	3.2.1 Housing 3.2.2 Educational facilities

Content		Tasks
	the direction of green cities	3.2.3 Medical facilities 3.2.4 Sports facilities 3.2.5 Commercial buildings 3.2.6 Public service facilities 3.2.7 Park and green area
	3.3 Planning for technical infrastructure in the direction of green cities	3.3.1 Evaluation of land conditions related to urban technical infrastructure 3.3.2 Urban technical infrastructure planning + Green transport network + Water supply + Rainwater + Wastewater + Electricity supply and urban lighting + Information and communications + New and renewable energy + Solid waste + Cemetery + Prevention of disasters, response to climate change
	3.4 Strategic Environmental Assessment (SEA)	3.4.1 Investigate, survey, gather information, define scope 3.4.2 Identify key environmental objectives and issues involved 3.4.3 Situation analysis before and after planning 3.4.5 Proposed solutions
	3.5 Major Urban Facilities	3.5.1 Analyze the difference between supply-demand 3.5.2 Select the system 3.5.3 Plan major urban facilities
	3.6 Identify the special areas	3.6.1 Identify special areas 3.6.2 Detailed study of identified areas 3.6.3 Define the boundaries of special areas
	3.7 Identify priority investment projects, financial resources for implementation	3.7.1 Make a list of projects / actions 3.7.2 Prioritize projects / actions 3.7.3 Group projects / actions into strategic programs 3.7.4 Organizational and institutional arrangements needed to implement
Part IV	4.1 Synthesize and set	4.1.1 Database of GDSS:

Content		Tasks
Develop and operate a green urban planning decision support system	urban planning-based content management general	+ Urban space information + Land use information + Green building information + Traffic information + Ecological and environmental information + New, renewable energy information + Waste information + Water supply information + Drainage information + Information on green production, green technology + Green Consumption Information + Green governance information + Information about green life + Information on green safety
	4.2 Responsibilities of related parties	4.2.1 Ministry of Construction 4.2.2 Local government 4.2.3 Officer in charge of the system 4.2.4 Working staff
	4.3 GDSS Management	4.3.1 Employer management 4.3.2 Program management 4.3.3 User management
	4.4 Implement and monitor the planning using the GDSS software	4.4.1 Develop monitoring / appraisal frame-work 4.4.2 Perform monitoring activities 4.4.3 Collect and explore community opinions 4.4.4 Reflect on policies, general planning and investment projects / programs

2.5 EXAMINATION AND APPRAISAL OF GREEN CITY URBAN PLANNING

1) General Requirements

- The contents, order and procedures for appraisal of green city urban planning tasks and plans should comply with the provisions of Urban Planning Law No. 30/2009/QH12; Decree on Planning, Appraisal, Approval and Management of Urban Planning No. 37/2010/ND-CP and other relevant legal documents on urban planning.

– The contents of appraisal of green city urban planning tasks and plans must correspond to the direction in green city urban development in Vietnam.
– Efforts are needed to reduce greenhouse gas emissions and to ensure that emissions are absorbed. It is important to ensure the resilience of the urban center, mitigate the effects of climate change, and deal effectively with natural disasters.
– Sustainable resource efficiency, reduced fossil fuel use, new energy use, waste management, and water resources management need to be continuously ensured.
– It is ensured compliance with indicators directly related to urban planning process and green city urban planning from among Green City Indicators approved by the government needs to be ensured.
– Green city urban planning should be formulated based on analysis of GDSS to ensure legitimacy, objectivity and efficiency for the process of appraisal.

2) Appraisal of Green City Urban Planning Tasks and Plans

(1) The agency submitting the evaluation of green urban planning tasks and plans

a) The Ministry of Construction shall appraise green city urban planning tasks and plans and submit them to the Prime Minister for approval.
b) Provincial People's Committees shall submit to the Ministry of Construction for appraisal of green city urban planning tasks and plans which the Prime Minister has the authority to approve, except for green city urban planning under the jurisdiction of the committees or the Prime Minister. The Ministry of Construction shall appraise the green city urban planning.
c) The organizer of green city urban planning stipulated in clauses 3, 4, 5 and 6 of Article 19 of the Urban Planning Law (After People's Committees of provincial cities and towns shall formulate a general

planning and organize subdivision, and district–level People's Committees shall formulate a general planning; the People's Committees shall submit them to the management agencies) shall appraise green city urban planning tasks and plans which provincial People's Committees have the authority to approve.

d) The provincial urban planning management agency shall appraise the green city urban planning tasks and plans formulated by the provincial People's Committees and submit them to the provincial People's Committee for approval.

e) The district-level urban planning management agencies shall appraise green city urban planning tasks and plans formulated by district-level People's Committees and submit them to the district-level People's Committees for approval.

(2) Adoption of the Committee

Before being appraised by the competent agency, the green city urban planning must be approved by the task appraisal committee.

(3) Appraisal

The appraisal agency of green city urban planning shall be responsible for completing appraisal of green city urban planning tasks and plans, based on the opinions of the relevant agencies and the appraisal committee and the content of the green city urban planning.

3) Appraisal committee of green city urban planning tasks and plans

a) The Ministry of Construction shall decide to set up appraisal committees in the following cases:

- Green city urban planning subject to the approval of the Prime Minister;
- Green city urban planning is of great political, socio-economic,

cultural and historical importance and is assigned to the Ministry of Construction by the Prime Minister.

b) The People's Committees having the authority to approve the green city urban planning shall decide to set up the appraisal committees, except for the cases the Prime Minister has the authority to approve and the Prime Minister assigns the planning to the Ministry of Construction.

c) The appraisal committee is composed of representatives of the concerned State management agencies and social organizations.

4) The agency appraising green city urban planning tasks and plans

a) The Ministry of Construction shall evaluate the green city urban planning tasks and plans which the Prime Minister has the authority to approve.

b) The provincial-level urban planning management agency shall evaluate the green city urban planning tasks and plans which the People's Committees of the same level has the authority to approve.

c) The district-level urban planning management agency shall evaluate the green city urban planning tasks and plans which the People's Committees of the same level has the authority to approve.

5) Dossier for green city urban planning task appraisal

a) A dossier of application for the appraisal of green city urban planning tasks consists of:

A written request for appraisal; the explanation of the task; draft of decision to approve the task; small color prints; and relevant legal documents.

b) A dossier of application for appraisal of a plan of green city urban planning is as follows:

A written proposal for appraisal of the plan; explanation of the plan including small color prints; draft of regulation on management according

to the green city urban planning plan; attached appendices; draft of decision to approve the project; color drawing printed by the prescribed scale; and the relevant legal documents.

6) Contents of appraisal of green city urban planning tasks and plans

a) Contents of appraisal of green city urban planning tasks are as follows:

– Whether green city urban planning tasks meet the requirements for socio-economic development, national defense and security, and improvement of urban planning;

– Green city urban planning task shall include the requirement of the following:

. Green city urban planning tasks prescribe the nature and role of urban centers, the basic requirements for research on the potential for urban development along the direction of green city urban development and request for strategic environmental assessment to develop and expand urban centers, to arrange social and technical infrastructure systems in urban centers and suburban areas;

– Depending on the specific conditions and characteristics of a green city, the basic requirements to build social and technical infrastructure in the area must be in line with Green City Indicators as follows:

. Construction density: quantitative
. Percentage of urbanization: quantitative
. Area of green trees per capita: quantitative
. The number of motorcycles per capita: quantitative
. Public transport use: quantitative
. The amount of waste per capita: quantitative
. Water consumption per capita: quantitative
. Share of green industry investment: quantitative

. Whether response measures to climate change are : qualitative
. Whether green city urban planning is implemented: qualitative

– In order to achieve goals of green city urban planning, the basic requirements for establishing social and technical infrastructure and creating spaces should be clearly defined in the planning tasks.

– The planning task of the green city urban area must determine the boundary, area and nature of the planning area, as well as expected norms on population, land use, and social and technical infrastructure. In addition, requirements and basic principles for functional sub-zones to ensure the appropriate architectural space and technical infrastructure in accordance with the approved master plan of green city and conditions of surrounding areas, and in such case, request for strategic environmental assessment should be included. In cases where there is no approved master plan for green city, the criteria for land use, social and technical infrastructure and basic principles for functional sub-zones must satisfy requirements for achieving green city urban planning.

b) The contents of appraisal of plans of green city urban planning include:

– Whether to satisfy the conditions of green city urban planning consultancy organizations under Article 10 of Urban Planning Law No. 30/2009/QH12;

– Grounds for plans of green city urban planning should meet the requirements of the following:

. The strategy and approved master plan for socio-economic development, national defense and security, orientations for overall planning of the national urban system, regional construction planning and improvement of urban planning;

. The approved detailed planning;

. Approved green city urban planning task;

. Regulations on urban planning and industry standards;

. Topographic maps prepared by surveying and measuring agencies;

. Documents or data on socio-economic conditions of neighboring areas of the relevant city;

. Green city urban planning Decision-making Support System(GDSS).

- Whether green city urban planning is in line with the tasks and requirements of green city urban planning (especially, clear statement of general directions of national urban systems and related regional planning,;strategies for socio-economic development and goals of master plan in line with national defense and security; consistency with the development planning of areas within urban centers, publicness and transparency; and harmony between national interests, communities and individuals:

. Scientific forecast, meeting the practical requirements, and applying development trend of green cities; effective use of GDSS; and compliance with the regulations on urban planning and other related standards;

. Environmental protection, hazard prevention affecting the community, improvement of the landscape, protection of cultural relics, conservation of historic and regional characteristics through strategic environmental assessment in the process of green city urban planning;

. Restriction on use of farm land to efficiently exploit natural resources in the direction of green urban development. Economic and efficient use of urban farm land, in order to create resources for urban development and growth, economic and social security, national defense and security and sustainable development;

. Ensuring of synchronizing building area including green architectural space, social infrastructure system, and underground space; encouraging of harmony among areas of green cities;

. Satisfaction with the demand for the use of housings, medical services, education, culture, sports, commerce, parks, trees, water supply and

other social infrastructure projects;

. Satisfaction with the demand for use of technical infrastructure including traffic systems, energy supply, public lighting, water supply and drainage, waste treatment, communications technical infrastructure projects, link with and consistency of technical infrastructures of urban centers, and the interconnection with regional, national and international technical infrastructures.

– Whether to meet the requirements of each project of green city urban planning:

. Contents of green city urban planning including goal-setting, goals of green growth, motivation for development, and population;

. Social and technical infrastructure, development model, spatial structure of urban and suburban area, orientation for building technical infrastructure, strategic environment assessment, priority investment projects, and use of resources.

2.6 APPRAISAL AND EVALUATION OF GCP BLUEPRINTS

1) Appraisal and Approval of Affairs and Blueprints of Green City Urban Planning

a) The Prime Minister shall approve the following affairs and blueprints of green urban planning:

– The master plan for green cities in cases of centrally-run cities; the general plan for green cities in cases of the cities under the province equivalent to grade I; basic plan for urban green areas; forecasts for cities of grade III or higher and new urban centers with the planning scope related to the administrative boundaries of two or more provinces;

– The general plan for green cities, the plan for urban green areas and areas of special significance in terms of the country's political, socio-economic, cultural, and historical aspects as prescribed by the Prime Minister;

– The general plan for green cities and green city plans for other areas designated by the Prime Minister and the Ministry of Construction.

b) The People's Committees of the local People' s Committees and centrally-run cities shall approve the following affairs and blueprints of green city urban planning:

– General urban greenery includes a city of a province or town, town, or new urban area, except for green city urban planning area which is subject to approval by the Prime Minister. For urban blueprints of grade II, III, IV urban centers and new urban centers, the Ministry of Construction's written approval must be obtained before approval;

– The planning of green urban centers for urban centers of special grade or grade I, green urban planning for areas related to the administrative boundaries of two or more districts except for district division plan, areas of important significance, and areas in new urban centers shall be designated and assigned by the Prime Minister to the Ministry of Construction.

c) The provincial or municipal People's Committees, and People's Committees of the urban areas and the rural areas of centrally-run cities shall approve affairs and blueprints for green city urban planning within their administrative boundaries. They shall manage, except for plans on urban green areas of cities under other cities that are subject to approval of the Prime Minister or the People Committees of provinces or centrally-run cities, urban planing of provinces, referring to the written comments of the relevant institutions.

d) The People's Committees of the provinces, cities, and towns shall submit to the People's Councils of the same level the general plans for green city before they are approved by the competent State bodies. The institutions formulating blueprints for green city shall consult with and report to the People's Committees of the relevant provinces, cities, and towns.

2) Procedures for approval of affairs and blueprints for green city urban planning

a) The agency submitting for approval the affairs and blueprints for the green city urban planning

- The Ministry of Construction shall submit for approval the affairs and blueprints for green city urban planning to the Prime Minister who supervises the formulation of green city urban planning and the planning assignments and policy schemes shall be assigned by the Prime Minister;
- The People's Committees of provincial cities shall submit for approval the affairs and blueprints for green city urban planning under their jurisdictions to the Prime Minister or to the Ministry of Construction in cases the Prime Minister assigned the authority for approval to the said ministry, except for the green city urban planning for which the Prime Minister has the authority to approve;
- The agencies in charge of formulating green city urban planning as stipulated in Article (3) through (6) of the Urban Planning Law shall formulate general plans and determine the details thereof, and the district-level People' s Committees shall formulate general plans and submit them to provincial-level People' s Committees and obtain approval of the provincial-level People' s Committees for the affairs and blueprints for green city urban planning;
- The province-level planning management agencies shall submit to province-level People's Committees for approval the green urban planning tasks and blueprints which have been formulated by provincial-level People's Committees;
- Where the province-level People's Committees formulate the affairs and blueprints for green city urban planning, the province-level urban planning management agencies shall appraise them and submit them to the province-level People's Committees for approval;

- Where the district-level People's Committees formulate the affairs and blueprints for green city urban planning, the district-level urban planning management agencies shall appraise them and submit them to the district-level People's Committees for approval.

b) The agencies in charge of appraising, in receipt of the total affairs and blueprints for green city urban planning, shall submit the details of appraisal to the relevant institutions for approval and determine after reviewing the details of appraisal.

c) For green city urban planning of grade IV or higher, the province-level People's Committees shall gather the written opinions of the Ministry of Construction before approval.

d) For green city urban planning projects subject to approval of district-level People's Committees, district-level People's Committees shall gather written comments of province-level urban planning agencies before approval.

3) Documents to be submitted for approval of affairs and blueprints for green city urban planning

a) The documents to be submitted for appraisal and approval of affairs for green city urban planning include a written request for appraisal and approval, exposition of the content of the affairs, draft of a written decision for approving the affairs, small color prints, and relevant legal documents.

b) Documents to be submitted for appraisal and approval of blueprint for green city urban planning include a written request for appraisal and approval, exposition of the contents of the blueprint, small color prints, draft of management regulations following the blueprint for green city urban planning, draft of a written decision for approving the blueprint, attached appendices, color-printed drawings according to the prescribed percentage, and relevant legal documents.

4) The contents of approval of affairs and blueprint for green city urban planning

(1) The competent agencies are responsible for approving in writing the affairs and blueprints for green city urban planning, and the details of approval shall be as follows:

a) Green city urban planning:

- The contents of the decision approving the green city urban planning shall cover the scope and boundaries of the planning; characteristics of the city; basic indicators regarding population, land, and technical infrastructure; major research requirements for green city urban development; spatial organization; plans for the organization of social and technical infrastructure systems; list of documents of blueprints;
- The contents of decisions approving the affairs for green city urban planning shall clearly state the requirements including spatial organization and social and technical infrastructures;
- The contents of decisions approving the blueprint for green city urban planning shall clearly state the requirements including the boundaries, size, characteristics, population, land use of the green city urban planning areas; plans for constructing social and technical infrastructure systems; indicators regarding land use; requirements and principles for spatial organization; connection of building and technical infrastructures for green city urban development; and list of documents of blueprints;
- The contents of decisions approving the blueprint for green city urban planning shall clearly state that the land use, spatial organization, and social and technical infrastructures shall meet the standards of green city indicators.

(2) Methods of approving the affairs and blueprints for green city urban planning

The drawing and regulations for green city urban planning accompanying

the written decision for approval of green city urban planning shall be verified and sealed by the agency in charge of appraising the green city urban planning.

3. GREEN CITY DECISION SUPPORT SYSTEM

3.1. BUILDING AND OPERATING THE GREEN CITY DECISION SUPPORT SYSTEM

1) Building and operation

(1) In order to effectively implement national policies and reach targets for reducing greenhouse gas emission and responding to climate change as well as to support the planning and implementation of the green city urban planning in centrally-run cities and provincial cities, it is necessary to build and operate an integrated system for making decisions regarding green city urban planing that allow the standardization and systematic management of information on green city urban planning.

(2) In formulating green city urban planning, the People's Committees of centrally-run cities and provincial cities are required to build a system for supporting decision-making on green city planing (hereinafter referred to as "Green City Decision Support System, GDSS) in order to assess the suitability and effectiveness of reduction of greenhouse gas emissions and climate change response and ensure the feasibility and objectiveness of the green city urban planning.

(3) The Ministry of Construction (BXD) and People's Committees of centrally run cities and provincial cities that intend to build an integrated system for supporting decision-making may install relevant facilities including online servers in the department in charge of urban planning (hereinafter referred to as "the department in charge") or in a separate place equipped with security system where it is necessary for effective management of the decision support system.

(4) The Ministry of Construction shall provide centrally-run cities and provincial cities with standard software programs to help their operation of the GDSS.

2) Database of the GDSS

(1) Urban space information

- Urban space: Percentage of public green area, access to the greenery, ratio of green area to urban development area, urbanization rate, and population density;
- Land use: The area of green trees per capita, urban land per capita, density of construction, percentage of land area for traffic, percentage of green space, percentage of land area for public transportation, percentage of land area for the construction of urban infrastructure, percentage of land area for environmentally friendly agriculture, percentage of households granted land use right certificates in the total number of households owning houses;
- Green building: Percentage of state agencies and public facilities certified as green buildings, percentage of households having permanent or semi-permanent houses in urban areas, and average house area within a city;
- Traffic: The length of roads used for bicycles per capita, rate of public transport use, percentage of roads using energy-saving lighting equipment or new and renewable energy, percentage of public transport using clean energy, etc.;
- Green ecology and environment: The proportion of natural space and landscape in an urban area accessible by the citizens, the area of public green trees outside the house area per capita;
- New and renewable Energy: The amount of electricity consumption relative to per capita income, percentage of households using renewable energy, etc.;
- Waste: The rate of wastewater meeting the technical standards, the amount of waste collected and proper treatment thereof, percentage of households with septic tank toilets in a city, rate of water loss, rate of excessive air pollutants, degree of water source pollution, rate of

wastewater treatment, rate drainage system, etc.;

- Others: Resource recycling, green production and green technology, etc.

3) Affairs regarding the GDSS

(1) The department in charge of the integrated GDSS at the Ministry of Construction shall perform the following affairs:

- Building a database related to the GDSS;
- Monitoring the management of documents using the GDSS and controlling the quality thereof;
- Connecting the GDSS with other systems;
- Providing and managing standard software for the use of the GDSS;
- Sharing of data through the GDSS;
- Developing and providing system security software programs.

(2) The department in charge of the GDSS of centrally-run cities, provincial cities, and towns shall perform the following affairs:

- Supervising the use and management of input data and controlling the quality thereof;
- Updating the system in accordance with the regulations for management of attribute data;
- Checking the system security.

(3) The departments in charge of the GDSS shall input data into the GDSS and cooperate with the department in charge of the Ministry of Construction for its affairs.

(4) The heads of the departments in charge of the GDSS shall have system managers and the electronic data management staff to effectively perform the assigned affairs.

3.2. MANAGEMENT OF THE GREEN CITY DECISION SUPPORT SYSTEM

1) User of the GDSS and Management of the GDSS

(1) The department in charge of the GDSS shall designate a user to use the GDSS among those responsible for the green city urban planning.

(2) None other than the GDSS user shall perform affairs such as importing, editing, extracting electronic data through the GDSS.

(3) The department in charge of the GDSS must immediately change the GDSS user if any change occurs to the relevant work due to changes in the duties, replacement, retirement, etc. of the user.

(4) The department in charge of the GDSS may allow other users to handle the relevant affairs in cases the user encounters difficulties in handling affairs regarding the GDSS due to accidents, business trips, etc.

(5) The department in charge of the GDSS must keep records of changes in the GDSS user.

2) Management of the Integrated GDSS

(1) The department in charge shall manage the Integrated GDSS software.

(2) The department in charge of the GDSS of a centrally-run city or a provincial city shall request the department in charge of the Integrated GDSS of the Ministry of Construction to improve functions of the GDSS where necessary.

3) Opening and Use of Electronic Data

The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns may open and distribute electronic data relating to green city urban planning to domestic organizations and individuals as stipulated in Decree 36a/NQ-CP on E-Government.

4) User Management and Recording User History

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall regularly check the user history and take necessary measures such as denying the access by inappropriate users.

(2) Users accessing the GDSS shall not provide others with the information necessary to identify the user and manage such information in a safe manner.

(3) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall record and manage the history of data use, stating the following:

- User's access history and usage time;
- Details of the data that users viewed or deleted, and the reasons thereof;
- Details of the data that the system administrator created, edited, viewed, or deleted and the reasons thereof;
- Other matters deemed necessary to verify the misuse, abuse, or leakage of data.

(4) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities and provincial cities shall keep in electronic storage media the history of use of the GDSS or related data.

(5) The department in charge of the GDSS of the Ministry of Construction and in that of the centrally-run cities, provincial cities, and towns shall ensure that the history of data use is not changed or deleted.

5) Backup

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall regularly back up the relevant data in preparation for any possible loss of electronic data or breakdown of software.

(2) The data backed up in accordance with the regulations must be stored

in a safe space in order not to be stolen, destroyed, or lost.

6) Dealing with system failure and recovery

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall prepare a log book on failures of the GDSS and make records if any failure occurs.

(2) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall immediately take measures necessary to deal with the causes of failures in the event of any failure that the system can not handle by itself.

(3) When any problem is detected in the software or data of the GDSS, the relevant software or data shall be immediately recovered after inspection.

7) Training system users

The Ministry of Construction shall train the GDSS users for the use and dissemination of the GDSS.

8) Monitoring of the Integrated GDSS

(1) The department in charge of the GDSS of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall regularly monitor the status of the green city urban planning and the use of the GDSS.

(2) The monitoring should consider the following matters as well as whether the technological standards regarding the green city urban planning and the GDSS are appropriate to cope with climate change or technological changes in software programs:

- Whether the details of the green city urban planning comply with the national objectives and policies to reduce greenhouse gas emission

and respond to climate change;

- Whether the GDSS is effectively utilized to minimize or mitigate the effects of greenhouse gas-emission and climate change.

9) Reflecting the results of monitoring and review

The department in charge of the Ministry of Construction and that of the centrally-run cities, provincial cities, and towns shall reflect in the GDSS the results of the monitoring and review.