Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

GREEN CITY ACTION PLAN VIENTIANE CAPITAL 2023-2030



Vientiane Capital, Lao PDR
2023

Green City Action Plan
Vientiane Capital
(2023-2030)

FOREWORD FROM MAYOR OF VIENTIANE CAPITAL



Mr. Athsphangthong Siphandone
Mayor of Vientiane Capital

Vientiane Capital, situated in the central part of the Lao People's Democratic Republic, stands as the quintessential heart of the nation, serving as a focal point for economic and social development. With its rapid growth and significant allure for foreign investment, the city has garnered attention on both national and international fronts. In anticipation of its continued development and in alignment with the eleventh 5-year national socio-economic development strategy (2021-2025), Vientiane Capital has strategically prioritized green and sustainable development initiatives. Notably, particular emphasis has been placed on this creation of a comprehensive Green City Action Plan tailored specifically to the needs of Vientiane Capital.

The Green City Action Plan functions as an extensive framework outlining guidelines for Vientiane Capital's transition into a clean, green, livable, and sustainable urban hub. Its primary objective is to establish clear objectives aimed at addressing environmental issues and preparing for future climate change challenges. Moreover, it articulates a visionary outlook, prioritizes key tasks, and devises strategic plans to navigate the myriad challenges facing Vientiane Capital. These include initiatives to expand green spaces and promote the adoption of clean energy, thereby enhancing the quality of life for its inhabitants incrementally.

On behalf of Vientiane Capital, I am deeply honored by the generous financial support extended by Korea International Cooperation Agency (KOICA), in the formulation of Vientiane Capital's Green City Action Plan. This support comes under the guidance of the project aimed at enhancing waste management and sewage treatment capacities to improve the urban environment in the Lao People's Democratic Republic. I wish to convey my heartfelt appreciation to the Global Green Growth Institute (GGGI) Lao PDR for their invaluable contributions to the development of Vientiane Capital's Green City Action Plan. Additionally, I extend my sincere gratitude to the Ministry of Public Works and Transport, particularly the Public Works and Transport Institute and the Faculty of Science, Vientiane Capital, for their unwavering commitment to research, collaboration, and coordination, which have been instrumental in realizing this achievement.

I am confident that Vientiane Capital is poised to transform into a green city in the foreseeable future. We stand prepared to collaborate with our partners to bring the Green City Action Plan of Vientiane Capital to realization.

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FOREWORD FROM THE GLOBAL GREEN GROWTH INSTITUTE LAO PDR



Mr. Rowan Fraser
Country Representative, GGGI Lao PDR

The Global Green Growth Institute (GGGI) is a treaty-based inter-governmental organization dedicated to supporting and promoting strong, inclusive and sustainable economic growth in developing countries. By fostering the green transition, GGGI's work leads to a reduction in greenhouse gas emissions as well as enhancements in climate resilience across key economic sectors in rural and urban areas. In this way, we help our partners to achieve both climate change mitigation and climate change adaptation.

Today, towns and cities across low- and middle-income countries are urbanizing rapidly. Cities are some of the largest greenhouse gas emitters, accounting for 75 percent of greenhouse emissions worldwide. Most of these emissions come from industry, transport, energy consumption and solid waste. At the same time, many cities are very vulnerable to extreme climate events such as floods, droughts, storms and heat waves. To address these varied challenges, cities need a clear and sustainable action plan to tackle urban development, enhance economic growth, build social inclusion, and maintain and repair urban environments and biodiversity.

Vientiane Capital is a beautiful and fast-growing city located along the bank of the Mekong River. To ensure the long-term sustainable growth of the city, improvements in the management of solid waste, wastewater and sanitation delivery, and the management of flood risk are all needed. Vientiane Capital also needs to adopt energy efficient technologies, as well as green buildings and industry, and speed up the adoption of low-emissions vehicles. This Green City Action Plan (GCAP) will help Vientiane Capital respond to current and future climate challenges, enhance green investment through the identified programs and projects, and drive the city's development toward a more sustainable, inclusive, and climate-resilient path. By implementing this GCAP, Vientiane Capital will become a cleaner, greener and more livable city.

On behalf of GGGI, I would like to express my sincere gratitude to our partners, particularly the Mayor of Vientiane Capital, the Department of Planning and Investment, Vientiane Capital, as well as the Vientiane Core City Team, including the management team, and technical and coordination team. I would also like to extend my gratitude to the Ministry of Public Works and Transport, especially the Public Works and Transport Institute (PTI), for the strong coordination and advisory input throughout the development process. My special appreciation also goes to the Korean International Cooperation Agency (KOICA) for financially supporting this project. GGGI stands ready to support Vientiane Capital to realize its green growth and sustainable development targets and we look forward to supporting the implementation of this GCAP over the upcoming years.

Country Representative, GGGI Lao PDR

Lao PDR Country Office
G G G I
Global Green Growth Institute

Mr. Rowan Fraser

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ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ນະຄອນຫຼວງວຽງຈັນ

ເລກທີ 1365 /ຈນວ
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ຂໍ້ຕົກລົງ
ວ່າດ້ວຍ ການຮັບຮອງເອົາ ແຜນຈັດຕັ້ງປະຕິບັດຕົວເມືອງສີຊຽວ ປີ 2023-2030 ຂອງນະຄອນຫຼວງວຽງຈັນ

- ອີງຕາມ ມາດຕາ 6, ຂໍ້ 4, ໝວດທີ 2 ວ່າດ້ວຍ ສິດ ແລະ ໜ້າທີ່ ຂອງອົງການປົກຄອງທ້ອງຖິ່ນ ຂອງກົດໝາຍ ວ່າດ້ວຍການປົກຄອງທ້ອງຖິ່ນ (ສະບັບປັບປຸງ) ສະບັບເລກທີ 68/ສພຊ, ລົງວັນທີ 14 ທັນວາ 2015;
- ອີງຕາມ ການຊີ້ນຳຂອງກອງປະຊຸມອົງການປົກຄອງ ນະຄອນຫຼວງວຽງຈັນ ຄັ້ງວັນທີ 28-29 ມິຖຸນາ 2023;
- ອີງຕາມ ໜັງສືສະເໜີຂອງພະແນກແຜນການ ແລະ ການລົງທຶນ ນະຄອນຫຼວງວຽງຈັນ, ສະບັບເລກທີ 1206/ ພຜທ.ນວ, ລົງວັນທີ 29 ທັນວາ 2023;

ເຈົ້າຄອງ ນະຄອນຫຼວງວຽງຈັນ ອອກຂໍ້ຕົກລົງ:

ມາດຕາ 1 ຮັບຮອງ ແລະ ປະກາດໃຊ້ແຜນຈັດຕັ້ງປະຕິບັດຕົວເມືອງສີຊຽວ ປີ 2023-2030 ຂອງນະຄອນຫຼວງວຽງຈັນ.

ມາດຕາ 2 ຫ້ອງວ່າການ ນະຄອນຫຼວງວຽງຈັນ, ພະແນກ ແຜນການ ແລະ ການລົງທຶນ ນະຄອນຫຼວງວຽງຈັນ, ຫ້ອງການ ຄຸ້ມຄອງ ແລະ ບໍລິການຕົວເມືອງວຽງຈັນ, ພະແນກ ຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ, ພະແນກ ໂຍທາທິການ ແລະ ຂົນສົ່ງ, ພະແນກ ກະສິກຳ ແລະ ປ່າໄມ້, ພະແນກ ພະລັງງານ ແລະ ບໍ່ແຮ່, ອົງການປົກຄອງ ເມືອງ ແລະ ບ້ານ, ອົງການຈັດຕັ້ງມະຫາຊົນ, ສະຖາບັນການສຶກສາ ແລະ ພາກເອກະຊົນ ແລະ ພາກສ່ວນ ກ່ຽວຂ້ອງ ຈົ່ງພ້ອມກັນຈັດຕັ້ງປະຕິບັດແຜນຕົວເມືອງສີຊຽວ ປີ 2023-2030 ຂອງນະຄອນຫຼວງວຽງຈັນ ໃຫ້ ໄດ້ຮັບຜົນດີ.

ມາດຕາ 3 ມອບໃຫ້ພະແນກ ແຜນການ ແລະ ການລົງທຶນ ນະຄອນຫຼວງວຽງຈັນ ເປັນຜູ້ຕິດຕາມ ແລະ ລາຍງານຜົນການ ຈັດຕັ້ງປະຕິບັດ ເປັນປົກກະຕິ.

ມາດຕາ 4 ຂໍ້ຕົກລົງສະບັບນີ້ ມີຜົນສັກສິດ ນັບແຕ່ມື້ລົງລາຍເຊັນເປັນຕົ້ນໄປ.

ເຈົ້າຄອງນະຄອນຫຼວງວຽງຈັນ

ອາດສະພັງທອງ ສີພັນດອນ

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
CBD	Central Business District
CSR	Corporate Social Responsibility
CDIA	Cities Development Initiative for Asia
CTCN	Climate Technology Centre and Network
CCT	Core City Team
DAF	Department of Agriculture and Forestry of Vientiane Capital
DoH	Department of Health of Vientiane Capital
DoIC	Department of Industry and Commerce of Vientiane Capital
DEM	Department of Energy and Mines of Vientiane Capital
DPI	Department of Planning and Investment
DoNRE	Department of Natural Resource and Environment of Vientiane Capital
DCC	Department of Climate Change
DEWATS	Decentralized Wastewater Treatment System
EBRD	The European Bank for Reconstruction and Development
EPF	Environment Protection Fund
EDL	Electricite Du Laos
EPE	Expanded Polyethylene Foam
ESIA	Environmental and Social Impact Assessment
EVs	Electric Vehicles
ESCOs	Energy Service Companies
HHs	Households
GoL	Government of Lao PDR
GEF	Global Environment Facility
GCAP	Green City Action Plan
GDP	Gross Domestic Product

GGGI	Global Green Growth Institute
GCF	Green Climate Fund
IPCCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
KG	Kilogram
KOICA	Korean International Cooperation Agency
Lao PDR	Lao People's Democratic Republic
LDC	Leased Developed Country
LAK	Lao Kip
LED	Light-Emitting Diodes
MEM	Ministry of Energy and Mines
MONRE	Ministry of Natural Resources and Environment
MPWT	Ministry of Public Works and Transport
MSME	Micro, Small, and Medium Sized Enterprises
NSEDP	National Socio-Economic Development Plan
NA	National Assembly
NDC	Nationally Determined Contribution
NGGS	National Green Growth Strategy
ODA	Official Development Assistance
PA	Paris Agreement
PoNRE	Provincial of Natural Resources and Environment
PPP	Public-Private Partnership
PET	Polyethylene terephthalate
SEDP	Socio-Economic Development Plan
SDGs	Sustainable Development Goals
SWM	Solid Waste Management
SWOT	Strength, Weakness, Opportunity, and Threats

SSWMS	Sustainable Solid Waste Management Strategy
USAID	United States Agency for International Development
UN	United National
USD	United State Dollar
VTE	Vientiane Capital
WWM	Wastewater Management
WB	The World Bank

1. Introduction

Cities around the world are urbanizing rapidly, leading to negative impacts on both urban populations and the environment. These include overcrowding, increased traffic congestion, and insufficient basic services. Additionally, cities are among the largest contributors to greenhouse gas emissions, exacerbating climate change, while also being some of the most vulnerable to its effects.

Lao PDR, particularly Vientiane Capital, has experienced similar challenges. As the country's capital and largest city, Vientiane has seen rapid growth and extensive infrastructure development over the past decades, especially in urban and semi-urban areas. This rapid urbanization has resulted in several critical issues, including increasing municipal solid waste and wastewater, rising traffic congestion and road accidents, worsening air pollution, and heightened vulnerability to climate change impacts, particularly floods and heatwaves. Social challenges, such as promoting social inclusion and creating jobs, remain significant obstacles for Vientiane Capital.

To address these challenges and steer Vientiane Capital toward a greener and more sustainable future, a clear strategy is essential. The "Green City" concept provides a framework for tackling urban development issues while promoting environmentally sustainable growth. This approach aims to foster economic development while reducing greenhouse gas emissions and pollution, minimizing waste, promoting the efficient use of natural resources, and preserving biodiversity. To this end, the Green City Action Plan (GCAP) for Vientiane Capital has been developed. This plan outlines a vision for the city's sustainable development, setting strategic objectives, identifying priority areas, and proposing actions and projects that will guide the city's green urban development from the approval of the plan through 2030.

The structure of the GCAP is as below:

Part I	Introduces the rationale and background, regulations and policy frameworks related to green city development, purpose of the GCAP and its structure.
Part II	Highlights key urban challenges under each priority sector to provide baseline situation in Vientiane Capital as well as on-going and planned initiatives.
Part III	Covers the green city vision of Vientiane Capital and strategic objectives for green city development as well as identifying the green city priority areas.
Part IV	Describes the green city action planning, including sectoral objectives, targets and indicators for each priority area, defines priority actions and projects that are related to Green City Action Plan.
Part V	Provides information on implementation arrangement, monitoring and reporting, as well as capacity needed to implement the GCAP and potential funding sources.
Part VI	Provides conclusion of this GCAP document.

2. Green City Baseline and Strategic Analysis of Priority Areas for Green City Development

Vientiane Capital is urbanizing rapidly, driven by a high population growth rate. However, the city's public services have struggled to keep pace with this swift development, leading to numerous challenges that hinder the pursuit of a green and sustainable urban future. By aligning with national and sub-national policies and development plans, as well as international best practices in green city development, six key priority areas have been identified as crucial for Vientiane Capital's sustainable development. These areas are: 1) sustainable solid waste management, 2) wastewater and sanitation, 3) climate and disaster resilience, 4) sustainable mobility, 5) green space, and 6) sustainable energy. The strategic analysis of these priority areas is summarized below:

Key urban challenges of Vientiane Capital under 6 priority areas:

1) **Solid waste management:** Vientiane Capital faces significant challenges in solid waste management, including limited coverage and low-quality services provided by waste collection companies. Issues such as an inadequate number of trucks and staff, low public awareness of the environmental and health risks associated with illegal burning and dumping, and widespread il legal dumping in open spaces are prevalent. Additionally, there is weak enforcement of waste management regulations, and source separation and recycling are not sufficiently promoted. The Km 32 landfill is not a sanitary facility, resulting in problems such as waste scattering, odor, and leachate contamination. Furthermore, waste management in Vientiane Capital suffers from insufficient funding, as the VCOMS relies primarily on fees without receiving government incentives.
2) **Wastewater and Sanitation:** Vientiane Capital faces significant challenges in wastewater management, with inadequate treatment facilities for both households and businesses. This has resulted in the continuous overflow of untreated wastewater into public canals and natural areas, without proper treatment or monitoring. The drainage system suffers from a lack of regular cleaning and maintenance, and there are instances where protected forest areas and drainage systems have been encroached upon or filled in for other activities, further exacerbating the issue. Many households also lack access to standardized toilets, and there is limited public awareness about the importance of regular desludging. Additionally, law enforcement is weak, and there is insufficient promotion of decentralized wastewater treatment systems (DEWATS) within communities. These problems contribute to the blockage of public canals, leading to flooding, stagnant water, and disease outbreaks, particularly during the rainy season. Furthermore, there are inadequate human and financial resources available to effectively implement water and sanitation projects.
3) **Climate and Disaster Resilience:** Vientiane Capital has historically faced significant challenges related to forest destruction, timber theft, and forest fires, leading to a considerable reduction in forest coverage. These activities have contributed to abnormal weather patterns and pollution from forest fires. The city now experiences frequent flooding during the rainy season and water scarcity during the dry season. In recent years, flash floods and urban flooding during heavy rains have become more frequent and severe, primarily due to the construction and expansion of the city, which has obstructed natural water flow. Critical natural ecosystems, such as ponds, canals, and swamps, that once served as essential flood prevention mechanisms have been filled in for housing and other developments. Moreover, the integration of climate change considerations into development planning and construction projects remains limited. Disaster response and mitigation plans are inadequate, and community awareness of disaster risks, particularly regarding weather warning systems and information dissemination, is low. Additionally, there is no fully equipped committee dedicated to preventing and managing natural disasters. Where such committees do exist, their effectiveness is hampered by a lack of necessary tools and capacity.

Furthermore, there is a persistent lack of budgetary allocations for projects related to climate change, infrastructure maintenance, and the preservation of natural ecosystems, jeopardizing their long-term sustainability

4) **Urban Transportation or Mobility:** There is limited public transport service in particularly buses, traffic congestions and accidents due to rising use of private vehicles and weak traffic management. The management and placement of traffic systems, including zebra crossings, are not up to standard. Furthermore, roads and sidewalks are often obstructed by parked cars or shops, making it challenging to utilize the sidewalks. Additionally, flexible modes of travel such as cycling and walking are unpopular due to unfavorable weather, dust, and environmental conditions. The adoption of electric cars remains minimal due to concerns regarding their quality, standards, and unclear after-sales guarantee.
5) **Green Space:** Although there has been an agreement to create a greener Vientiane Capital, the actual implementation has not been as effective as intended. The city still lacks sufficient green public areas, such as parks, flower gardens, and green sidewalks. The amount of public green space per person remains below the World Health Organization's recommended standard of 9 square meters per person. Even in existing parks, their use for recreation and business purposes is not optimized. As a result, many parks lack essential facilities such as toilets, parking, and night time lighting. Additionally, there is a shortage of funding for the maintenance, enhancement, and creation of new green spaces.
6) **Energy:** Vientiane Capital primarily relies on hydroelectric power generated in other regions of Lao PDR, with some supplementation from solar energy. However, the city faces significant challenges related to energy infrastructure. One major issue is the lack of budget to implement infrastructure development projects needed to meet the energy demands of the rapidly growing city. Additionally, public debt, particularly related to street lighting, government office buildings, irrigation systems, and other lighting needs, is a concern. Although there was an agreement to enhance the illumination of Vientiane Capital, its implementation has been less effective than expected. Furthermore, the city's policies and strategies for renewable energy development and energy conservation remain insufficient and poorly managed. Public awareness of energy con servation practices and the health risks associated with using firewood and charcoal is also low.

3. Vision and Strategic Objective

To tackle challenges and foster opportunities for green and sustainable urban development, Vientiane Capital has set a vision for green urban development as follows ***"By 2030, Vientiane Capital will become a livable, attractive and environmentally friendly city, serving as a strategic development hub with sustainable economic growth, resilience to natural and climate risks, socially inclusive, equitable, and will provide a better quality of life for all its citizens"***

To realize this vision, the following **strategic objectives** are also set for Vientiane Capital:

1) Improve quality of life of all Vientiane Capital citizens through equal access to public services and enhance urban resilience to cope with natural disasters and climate change.
2) Protect urban environment in a systematic and sustainable manner, reduce air, water, noise and soil pollution, as well as reduce greenhouse gas emissions into the atmosphere.
3) Enhance quality economic growth through sustainable and efficient use of limited resources and environmentally friendly technologies.

4. Green City Actions

To achieve the above vision and strategic objectives, Vientiane Capital will focus on the below priority actions under each priority area set under this GCAP as the following:

Actions Related to Solid Waste Management:

A1. Enhance waste collection services by implementing an affordable fee structure, improving infrastructure accessibility, and increasing service quality for all city residents.
A2. Raise awareness and capacity building on impacts of waste management issues, and regulation enforcement.
A3. Reduce organic waste (vegetables, fruits and others) to landfill through resources recovery approaches such as composting and biogas.
A4. Promote recycling of plastic bottles, aluminum cans, glass and paper through introducing business model for recyclable materials.
A5. Strengthen safe collection and disposal of medical waste, construction and industrial waste through policy and regulatory enforcement and service coverage.
A6. Review and improve regulations, measures and legislations related to solid waste management
A7. Enhance the quality and standards of waste collection workers.

There are 13 green city projects proposed under the SWM priority area.

Actions related to Wastewater and Sanitation:

A1. Raise public awareness on urban sanitation related to wastewater and encourage regular desludging.
A2. Build technical capacity on sanitation management for relevant authorities from central to village level to effectively implement, monitor, inspect, and evaluate sanitation related works.
A3. Develop urban sanitation standards and regulations that include onsite system guidelines and grey water treatment requirements, and integrate these standards into construction permits to ensure all urban wastewater is treated before being released into the natural environment.
A4. Seek to promote centralized wastewater treatment system in the core city, DEWATS and standardized onsite system in Peri-urban and rural areas and ensure sanitation systems are climate resilient.
A5. Improve, maintain and protect drainages and canals through regulation enforcement and promoted public participation in terms of cleaning of litters and maintenance to enhance its function in treating wastewater.

There are 8 green city projects proposed under the wastewater and sanitation priority area.

Actions related to Climate and Disaster Resilience:

A1. Rehabilitate and maintain climate related infrastructures such as drainage network, canals, riverbank, and pumps stations are always in good condition especially prior to rainy season to ensure effective operation.
A2. Improve climate information system for Vientiane Capital, including early warning to ensure all citizen have access to climate information.
A3. Develop city climate and disaster prevention guideline, including preparedness and emergency response plan with regularly update and improvement, and ensure Vientiane Capital Disaster Prevention and Control Committee is strengthened with adequate capacity and resources.
A4. Develop smart and resilient urban planning through an integration of climate change adaptation into urban planning.
A5. Reduce carbon emissions and pollution through increasing carbon sequestration sources such as trees coverage, and pollution control measures.
A6. Natural hydrological systems including ponds and water-receiving bodies will be restored to

enhance flood management.

There are 9 green city projects proposed under the climate and disaster resilience priority area.

Actions related to Sustainable Mobility

A1. Develop sustainable transport strategy for Vientiane Capital.
A2. Improve city public transit service and operation to support the Bus Rapid Transit (BRT) system and railway in Vientiane Capital.
A3. Improve urban transport infrastructures that creates favorable conditions for active mobility in the city through improving walkways, fixing of road signages, removing of obstacles, improve streetlight, plant more trees and flowers to enhance city landscape.
A4. Promote and deploy low carbon transportation in Vientiane Capital such as electric vehicles, e-buses, e-bike and bicycle to reduce greenhouse gas emissions from city transportation.
A5. Develop and enforce traffic regulations, including road-side parking control to reduce traffic congestion, and road accidents.

There are 13 green city projects proposed under the sustainable mobility priority area.

Actions related to Public Green Space

A1. Develop and expand public green spaces in Vientiane Capital, including public parks, gardens and green pedestrian walkways for inclusive access for all citizens and suitable for social and economic activities such as exercise, kid playgrounds, toilets, designated parking, and businesses.
A2. Develop building regulations requiring 30% of total areas as green space, and awareness raising on design and development of green spaces including shade trees, permeable ground, rainwater capture using pond or rainwater tanks.
A3. Plant more trees along roadsides, schools, public building offices and households to increase tree covers and improve air quality.
A4. Implement strict measures for individuals and legal entities to protect and maintain roadside trees adjacent to their areas.

There are 10 projects proposed under the public green space priority area.

Actions related to Sustainable Energy

A1. Energy efficiency is enhanced in the residential, government, commercial buildings and industries to promote energy saving and reduce final energy consumption.
A2. Promote the use of clean energy technology, including home cooking technology (clean cook-stove, biogas) to reduce air pollution.
A3. Deployment of electric charging infrastructure in Vientiane Capital.
A4. Capacity building on renewable energy and technical specification for energy related personnel in Vientiane Capital.

There are 15 projects proposed under the sustainable energy priority area.

5. Institutional Arrangement

Realizing that the GCAP implementation does not fall under an individual agency's responsibility, but the entire city's efforts. All city stakeholders have the obligation to support the implementation of this GCAP where necessary. This GCAP will be implemented following the existing institutional arrangement of Vientiane Capital, particularly line departments, offices and communities. Each relevant stakeholder has a mandate to plan, implement the actions, projects, collect relevant data and report to the Vientiane Capital management in a regular basis. An efficient coordination among all the key stakeholders is very critical to ensure the efficient implementation of this GCAP and achieving Vientiane Capital Green City Vision by 2030.

6. Conclusion

In summary, the Green City Action Plan (GCAP) is a green investment strategy for Vientiane Capital, outlining specific medium- and long-term actions to address urban challenges and seize opportunities. Through the implementation of the GCAP, Vientiane Capital is expected to transform into a cleaner, greener, and more livable city by sustainably managing solid waste and wastewater, promoting low-carbon transport options such as electric vehicles, and utilizing clean energy sources like solar and wind. The plan also aims to enhance the city's climate resilience, particularly in coping with extreme weather events such as floods, storms, and droughts, through targeted climate-related projects and programs. Additionally, the development and expansion of green spaces, such as public parks and tree-lined streets, will improve citizens' well-being, create business opportunities, and increase carbon sequestration. Ultimately, the GCAP will significantly improve the urban environment, public health, and promote sustainable development in Vientiane Capital.

PART I.
INTRODUCTION

1. Rationale and Background for Green City Development

Many cities around the world are urbanizing rapidly, often without adequate planning, which in turn has negative impacts on the urban populations and urban environment. As more and more populations currently live in cities, urbanization has been consequently a major driver of environmental change. Rapid and often uncontrolled urban growth led to emergence of problems in the cities such as city overcrowding, more vehicles on the road leading to traffic congestion and accidents, unmet demand for basic services such as poor waste management and wastewater management, limited public transportation, more energy consumption, and increased exploitation of both surface and underground water resources. On top of these issues, cities are contributing to climate change by emitting greenhouse gases (accounting for around 70% of greenhouse gas emissions worldwide) and increasingly vulnerable to impacts of climate change such as flooding, drought, storms and heatwave.

Over the last decade, Lao PDR has experienced a surge in urbanization, leading the region in both urban population growth and expansion, with rates of 8.6% for Lao PDR and 9.3% for East Asia according to a 2015 World Bank report. Despite this growth, challenges persist, including unmanaged urban expansion, inadequate basic services, and increasing pollution. These issues pose risks to public health and well-being and contribute to environmental degradation. As a result, urban planning and management have become critical priorities for the Lao government, as highlighted in numerous policy documents.

Vientiane Capital has served as the capital city of Lao PDR for more than 450 years and is the largest city in the country, central to its political, economic, and socio-cultural development. Urbanization has accelerated, particularly in the four core urban districts – Chanthabouly, Sisattanak, Xaysettha, and Sikhottabong. there has been a notable increase in high-rise buildings, especially in the city center and Central Business District (CBD), alongside extensive infrastructure development in semi-urban districts like Xaythany, Hadxaifong, Sangthong, and Naxaythong, particularly in road construction. Despite this growth, Vientiane Capital faces significant urbanization challenges, including increasing municipal solid waste and wastewater, rising traffic congestion and road accidents, air pollution, and vulnerability to climate change impacts such as flooding and heatwaves. To address these issues and capitalize on opportunities, it is essential for Vientiane Capital to adopt a clear strategy for urban planning. This strategy should focus on reducing greenhouse gas emissions, enhancing climate change adaptation, prioritizing sustainable investments, and creating green jobs to improve residents' well-being. In response, Vientiane Capital has developed the Green City Action Plan (GCAP).

2. Overview of Socio-Economic Development in Vientiane Capital

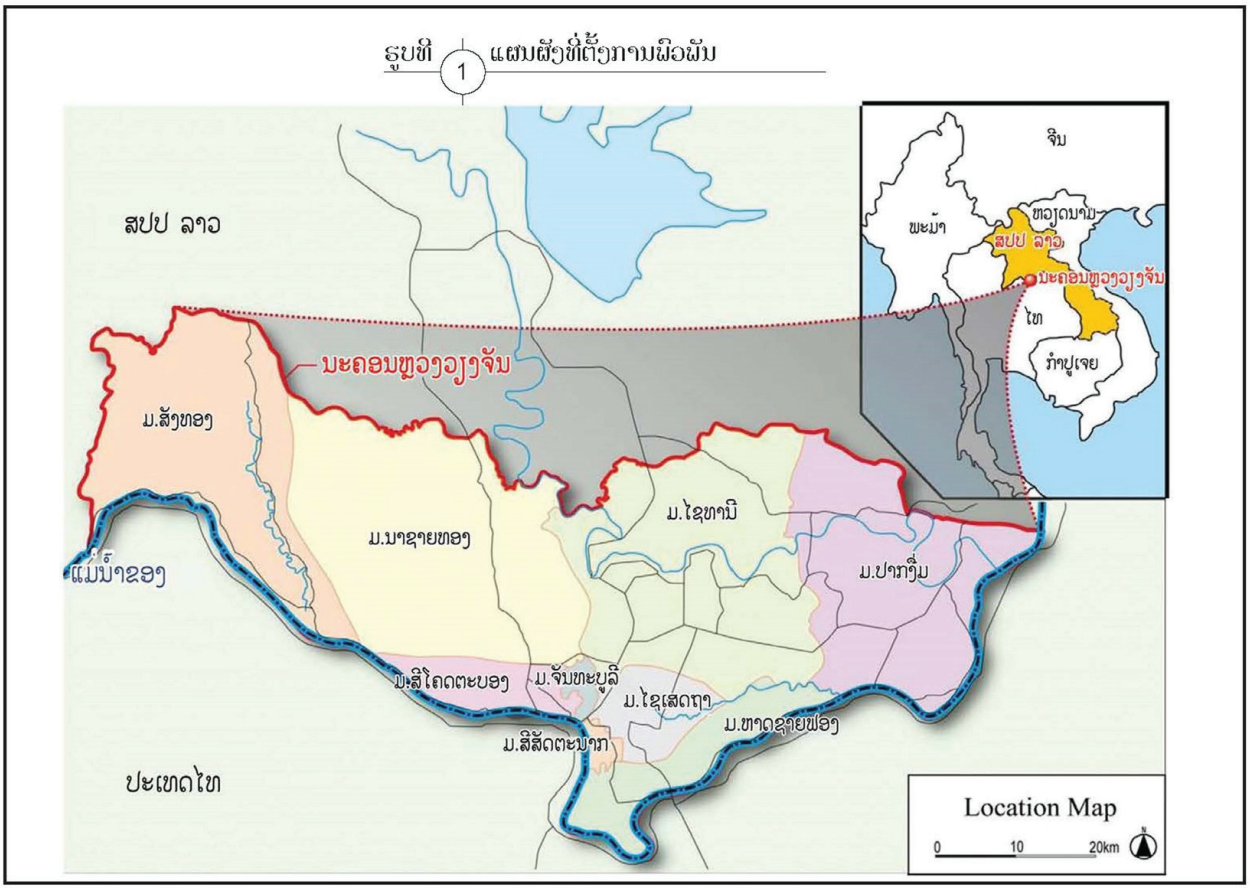
Vientiane Capital is located in the central-western part of the country along the bank of the Mekong River at latitude and longitude of 17° 47' 50'' to 18° 22' 32'' N and 103° 09' 37'' E. The administrative area of Vientiane Capital is about 3,920 km2, bordering with Vientiane Province to the North, Thailand to the South and West, and Bolikhmasay province to the East. There are 9 districts, namely Chanthabouly, Sikhottabong, Sisattanak, Xaysettha, Xaythany, Naxaithong, Hadxaifong, Sangthong, and Pakngum. The urbanized or core city areas include Chanthabouly, Sisattanak, Sikhottabong and Xaysettha Districts as shown in Figure 1.

As of 2020, there are 481 villages and 159,626 households in Vientiane Capital with a total population of 810,822 people of which 413,188 (50.5%) are female. The population growth rate is 3.1% as of 2020[1] , the majority of population (60%) aged between 0 – 44 years[2] . Vientiane Capital is divided into 4 zones based on the population density: i) population density over 2,000 people/km^2 –Chanthabouly and Sisattanak districts, ii) population density between 650 to 750 people/km^2 –Sikhottabong and Xaysettha districts, iii) population density between 180 to 300 people/km^2 – Hadxaifong and Xaythany district, and iv) population density lower than 100 people/km^2 – Pakngum, Naxaithong, and Sangthong districts[3].

[1] *"Population by province", LAOSIS, 2020*
[2] *Lao PDR 9th five-year NSEDP (2021-2025)*
[3] *"Sustainable Solid Waste Management Strategy and Action Plan for Vientiane 2021-2030," GGGI, October, 2021*

Vientiane Capital is in a tropical climate with two main seasons distinguished: monsoon (May to October) with average rainfall of 330 mm, and dry season (November to April) with average rainfall of 5-10 mm. Temperature ranges from a low of 18°C in the coolest months of December to February, to a high of 38°C in the hottest months of March to May. Relative humidity typically ranges between 65%-80%[4].

The GDP of Vientiane Capital was approximately 53,088 billion LAK in 2020, with contributions from the industry sector (49.5%), service sector (36.2%), and the agricultural sector (14.3%). The city's GDP growth rate was 6.4% compared to 2019 and GDP per capita was around 6,213 USD. Between 2016 and 2020, Vientiane Capital collected revenue totaling 21,000.69 billion LAK and expenditure of 3,276.47 billion LAK. In terms of investment, there was a total of LAK 112,791.52 billion, with the government budget contributing 900 billion LAK, or approximately 1.08% of the total investment, while the remainder was covered by ODA and both foreign and domestic private investments[5].



Source: *Vientiane Urban Master Plan III _2022*
Figure 1: *Map of Vientiane Capital*

3. Green City Development

3.1. Global Context

Green city concepts have emerged over the last two decades to tackle urban development issues and promote more environmentally sustainable cities that promotes economic development while reducing greenhouse gas emissions and pollutions, minimizing waste, promoting efficient use of limited natural resources, and protecting ecosystems and biodiversity.

[4] *Climate Change Vulnerability Assessment, 2020 (monre.myqnapcloud.com)*
[5] *The 9th SEDP of Vientiane capital (p.5).*

The Sustainable Development Goals (SDGs) highlight and promote countries around the world to build cities and human settlements in an inclusive, safe, resilient, and sustainable way in order to ensure access for all to adequate, safe, and affordable housing and basic services such as waste and wastewater management, and inclusive transport, while seeking to reduce adverse impacts from climate and natural disasters, protect city environment and reduce pollution.

Nevertheless, several definitions of "**Green Cities**" have been coined in various literatures by international organizations such as:

- **ADB** "Green Cities are energy efficient and reduce reliance on nonrenewable energy sources; actively encourage waste reduction and management; include green and resilient infrastructure, low-carbon transport, and water cycle management; and deliver improved quality of life outcomes for residents"[6]
- **EBRD** "A green city as a city that preserves or improves quality of its environmental assets (air, water, land, soil and biodiversity) and uses these resources sustainably, mitigates and adapts to risks of climate change, and ensures that environmental policies contribute to the social and economic wellbeing of residents"[7]
- **Global Green Growth Institute (GGGI)** "Green City is an urban area that moves toward long-term environmental protection, social inclusion, and economic sustainability. In other words, Green City is resource-efficient, climate resilient, low carbon, and socially inclusive and equitable"[8]

Green city strives to balance environmental protection, economic development and social inclusion in an integrated manner to deliver enhanced quality of life (well-being) and maximize the potential for green growth for all of its residents. Below are some aspects of green city development:

- Good urban planning with clear commitments to sustainability can result in more inclusive, resilient and prosperous urban communities. Improved service delivery can strengthen municipal revenues to support green city plans;
- Enhanced access to renewable energy like solar power can reduce GHG emissions and generate new green employment and business opportunities, for instance, retail and maintenance of solar panels;
- Well-designed buildings that follow green building codes can limit damage caused by disasters and make efficient use of water and energy resources, helping to reduce pollution, manage waste and create a healthy living environment;
- Sustainable transportation such as walking, cycling and low-carbon public transport modes (i.e., electric buses) can significantly improve air quality, ability of residents to move around the city, and health and well-being;
- Improved access to potable water and sanitation services reduces public health risks, supports local economic opportunities and avoids ecosystem pollution;
- Effective waste management helps reduce health risks, reduces GHG emissions, creates employment, supports SME development and urban circular economies such as waste recycling or waste to resources (composting, energy generation, etc.);
- Protecting nature and creating green spaces helps to mitigate the damage caused by climate related hazards and maintain air and water quality, provides recreation spaces to improve and health and well-being of people;
- Introducing low-carbon technologies like solar water heaters or solar streetlights can help limit air pollution and save budget.

It is important to recognize that there is no single, uniform definition of "Green Cities" or a standardized set of sectors, priority areas, or indicators for green city development. Given the dynamic and complex nature of cities, the concept of a green city can vary at different times and stages of development. Additionally, there is no one-size-fits-all solution applicable to all countries. Therefore, the definition of "Green Cities" should be tailored to the specific context and central themes relevant to each country's development needs.

[6] *ADB (2015) Green City Development Tool Kit*
[7] *"Green Action Plan Methedology" EBRD, Green Cities*
[8] *https://gggi.org/site/assets/uploads/2018/03/greencity_guide_WEB2.pdf*

3.2. Green City Development in the Context of Lao PDR

The concept of a green city began to take shape in Lao PDR in the 2000s, with Vientiane Capital leading the way by introducing six aspirations for city development: secure, green, clean, charming, civilized, and bright. These aspirations were intended to establish a strong foundation for development activities within the city's urban areas. Later, these six aspirations, in full or in part, have been adopted by many other cities across the country. In 2015, the Ministry of Natural Resources and Environment (MoNRE) developed the Guidelines for Environmentally Sustainable Cities of Lao PDR to provide guidance on how to analyze urban issues, set vision and promote institutional arrangement for urban environmental management. The objective of the Guidelines is to "encourage cities in Lao PDR to become **clean, green** and **beautiful** so that they become environmentally sustainable, free from pollution and improve the quality of living of the next generation". However, the term "green", as used in the guidelines, is primarily limited to defining trees, parks, green spaces, and flora and fauna. The draft Urban Development Strategy 2030 has also put forth a vision for cities in Lao PDR to be "unique, green, livable, climate resilient and sustainable". Again, the term "green" has its own place as part of the overall urban development instead of an overarching term for urban development.

Therefore, it is important to note that the term "**Green City**" used in this document is an umbrella term that covers various notions of sustainable urban development because cities that are clean, healthy, safe, resource/energy efficient, resilient to climate change and disasters will become more livable and sustainable as a green city. Some of the green city related initiatives that are currently happening in Vientiane Capital can be summarized as below:

- Vientiane Sustainable Urban Transport Project, supported by ADB, is ongoing and expected to be completed in 2024. The project aims to promote and improve urban mobility through the use of public transportation in the core areas of Vientiane Capital.[9]
- The Vientiane City Office for Management and Services (VCOMS) has developed the Solid Waste Management Vision and Strategy until the year 2030. This strategy outlines the vision, strategic outcomes, medium- and long-term targets, and associated work plan. It also lays out a basic framework for a paradigm shift from waste management towards resource management approaches that can eventually maximize waste to-resource opportunities while minimizing waste generation.[10]
- Project on Wastewater and Solid Waste Treatment Capacity Building Project for City Environment Implementation in Lao PDR funded by the Korea International Cooperation Agency (KOICA), implemented by GGGI in collaboration with VCOMS to improve sustainable solid waste management in Vientiane Capital.
- ASEAN Smart Cities Network (ASCN) was introduced during the 32nd ASEAN Summit on April 28, 2018. It is a collaborative platform where cities from the ten ASEAN Member states work towards the common goal of smart and sustainable urban development where Vientiane Capital is one of the city members among others.[11]
- An ongoing feasibility study on a Smart City project to be constructed on 2,900 hectares of land spread across 12 villages in Saysettha and Hatxayfong districts. A Smart City has been described as an urban area that uses technology to provide services and solve city problems, such as improving transportation and accessibility, improving social services, and promoting sustainability.[12]

[9] *Asian Development Bank "Vientiane Sustainable Urban Transport Project: procurement plan". March 2022. (accessed March 27, 2022).*

[10] *"Sustainable Solid Waste Management Strategy and Action Plan for Vientiane 2021-2030," GGGI, October, 2021*

[11] *Association of Southeast Asian Nation. "ASEAN Smart Cities Network", March 25, 2022.*

[12] *"Local Company to Construct Smart City in Vientiane Capital", Laotian Times, November 16, 2021.*

4. National Legislative and Policy Frameworks

Urban development can be framed around the following legislative frameworks and policies:

Legislative frameworks:

- Amended Law on Urban Planning (No. 40/NA) focusing on establishing rules and regulations for classification and management of urban planning, land use, and construction with an objective to ensure urban planning and development paying attention on the protection of nature including ecosystem and environment. In addition, Article 53 defined the use of urban land which is at risk of natural or man-made hazards, especially land-use plan and mitigation measures to avoid or minimize risk and impact.
- Amended Law on Land (No. 070/NA) requires the national land allocation master plan as well as local land allocation plan to be orderly. The law clearly defines 8 categories of land use including wetland that shall be protected for sustainability of water resources and ecosystems. Additionally, this law covers a category of construction land that is divided into different types.
- Public Roads Law was revised (No. 03/NA) to define classes of roads and their management. Decree on Land Transport (No. 615/GoL) also addresses parking management along the roads.
- Environmental Protection Law was revised (No.29/NA) to define regulations and measures for environmental management, protection, rehabilitation and preservation, as well as controlling pollution, and for environmental emergencies and natural disasters.
- Law on Water and Water Resources was revised (No.23/NA) aims to provide measures and regulations related to management, administration, development, and use of water and water resources for sustainable management of water resources to support environmental protection, as well as the building drainage system including canals, pipelines and wastewater treatment plants for the protection of water quality, health of people, animals and urban environment.
- The Vientiane Capital Mayor's Decision on Building a Bright Vientiane Capital (No. 748, dated December 15, 2020)[13] outlines the principles, regulations and measures aimed at enhancing the city's brightness to ensure traffic safety and convenience. It also seeks to extend business and service hours for residents, contributing to the development of Vientiane Capital as a livable, intelligent, and sustainable city.
- The Vientiane Capital Mayor's Decision on Building a Green Vientiane Capital (No. 699, dated November 11, 2020)[14] sets out the principles, rules and measures building a green Vientiane Capital to protect, rehabilitate and plant trees in a rich and colorful manner, aiming to balance the natural environment, have a healthy climate, cool and refreshing people, and promote the well-being of Vientiane Capital.
- The Vientiane Capital Mayor's Decision on the Canal Reserve of Vientiane Capital (No. 0966, dated November 11, 2019)[15] sets out the policies, principles of management and development plan for the Vientiane's canal reserve to prevent urban flooding, to be used as an agricultural area, as a sustainable green tourism destination, and as a precautionary measure to mitigate climate change and ensure climate change.
- The Vientiane Capital Mayor's Decision on building a Secure Vientiane Capital according to the Secure Aspiration (No. 1318, dated December 21, 2018)[16] sets out the goals, indicators and work plan for building a secure Vientiane Capital with the aim of making Vientiane Capital a prosperous city and cultivating it according to the vision and development strategy of Vientiane Capital in the new era.
- The Vientiane Capital Mayor's Decision on the Disposal of Urban and Suburban Disorder of Vientiane Capital (No. 1184, dated December 20, 2017)T[17] sets out the principles, rules and measures for the management of urban disorder in order to implement the Law on Urban Planning, the Law on National Highways, the Law on Trade, the Law on Culture and Tourism, and to promote Vientiane Capital as a prosperous city and to develop step by step.

[13] *Vientiane Capital Mayor's Decision on Building a Bright Vientiane Capital (No. 748, dated December 15, 2020)*
[14] *The Vientiane Capital Mayor's Decision on Building a Green Vientiane Capital (No. 699, dated November 11, 2020)*
[15] *Vientiane Capital Mayor's Decision on the Canal Reserve of Vientiane Capital (No. 0966, dated November 11, 2019)*
[16] *Vientiane Capital Mayor's Decision on building a Secure Vientiane Capital according to the Secure Aspiration (No. 1318, dated December 21, 2018)*
[17] *Vientiane Capital Mayor's Decision on the Disposal of Urban and Suburban Disorder of Vientiane Capital (No. 1184, dated December 20, 2017)*

Policy framework:

- Vientiane Urban Development Master Plan III (2019-2030) is the key urban planning framework of Vientiane, aiming at finding the best way to develop Vientiane Capital toward the year 2030. The master plan promotes a multi-core structure, which aims at controlling expansion of existing urban centre by creating a few of sub-centres and urban clusters to avoid over-concentration and disordered expansion of the existing urban centre.[18] The 3rd vision is closely related to green city development as it highlights and emphasized on city sustainability, particular road and transportation, water supply and wastewater, solid waste management, parks and greenery.
- The 9th SEDP of Vientiane Capital, sets out development priorities for capital for the period of the 2021-2025.[19] The 9th SEDP emphasized on sustainable and quality economic growth through efficient use of natural resources and green low carbon technologies, promotes sustainable urban development through improvement of solid waste, wastewater, and sustainable energy.
- National Green Growth Strategy (NGGS) is an overarching policy framework of the Lao PDR promoting sustainable economic growth, social inclusion and poverty reduction, and environmental sustainability. The key objective of the strategy is to mainstream green and sustainable growth into sectoral and local development plans and strategies to ensure the achievement of long-term national development goals, LDC graduation, and achieving the Sustainable Development Goals (SDGs) by 2030.
- Lao PDR Nationally Determined Contribution (NDC 2021) is a climate action plan of Lao PDR to reduce greenhouse gas emissions and adapt to climate change impacts as part of the efforts toward achieving the Paris Agreement that Lao PDR has ratified on 7 September 2016. This NDC has established crucial objectives for Lao PDR to mitigate greenhouse gas emissions across major sectors and sub-sectors. Additionally, it also outlines goals and strategies to effectively adapt to diverse climate phenomena.
- National Energy Efficiency and Conservation (No. 209/GoL) is a national energy efficiency policy framework promotion energy saving, energy efficiency and conservation in the industrial sector (appliances, efficient machinery), residential sectors (such as household appliances, energy efficient housing, energy building), and transport sectors (such as fuels standards, quell quality testing, energy efficient vehicles, effective traffic control system, biofuels, promote EV and public transport).
- The Climate Change Strategy of the Lao PDR (SCC)[20] outlines strategies of mitigating climate change, promoting sustainable economic development, reducing poverty, protecting public health and safety, and enhancing the quality of the country's natural environment.
- The Renewable Energy Development Strategy of the Lao PDR[21] adopted in 2011 promotes renewable energy, such as micro hydro, solar, wind, biomass, biogas, biofuel, energy from solid waste, and geothermal which are all important for climate change mitigations and can contribute to energy independence and security, promotion of environmental sustainability, economic development, poverty reduction.
- Develop Vientiane Capital in the New Era Resolution (No. 107/RPCC, dated 30 April 2020): Establish Vientiane Capital as a strong, strategic unit of the country, functioning as a political, security, economic, socio-cultural, scientific, technological and regional and international integration center; build a strong Vientiane Capital to become an urban, clean, resilient and sustainable environment city in the future.
- Poverty Eradication and Development Standard Decree, No. 348/GoL, dated November 16, 2017, regarding success and development standards, establishes the criteria as the foundation for development, aiming to address poverty and gradually advance village development.

[18] *"The Project for Urban Development Master Plan Study in Vientiane Capital Final Report". JICA, March 2011. (accessed March 27, 2022).*
[19] *Lao PDR (2020), The 9th five-year National Socio-Economic Development Plan (2021- 2025), (accessed March 4, 2022).*
[20] *"National Strategy on Climate Change of Lao PDR" UNDP in Lao PDR. (accessed March 27, 2022).*
[21] *Lao PDR (2011) "Renewable Energy Development Strategy in Lao PDR" October 2011.*

5. Purpose and Implementation of the GCAP

Every city needs a long-term vision to realize its sustainable development and competitiveness potential tailored to its unique physical, economic and social characteristics. Achieving this vision necessitates a well-articulated plan that is actively enforced with the participation of key stakeholders. The Green City Action Plan (GCAP) process aligns strategic directions and priorities with the vision and aspirations of the people, taking a comprehensive approach to identifying urban development challenges and opportunities across various sectors. It provides a clear set of actions and priorities to address the city's pressing environmental challenges in the coming years. Additionally, the GCAP can attract, increase, and channel resources toward priority projects.

This GCAP is designed to deliver the following functions:

- Act as a policy framework and technical tool to interpret national, sub-national development plans, urban related policies into actions and projects;
- Act as a technical guideline on green city development for all Vientiane Capital city stakeholders, dedicating responsibility of each stakeholder in a clear manner on what actions to take, and what projects and activities to be undertaken;
- Act as the capacity development guideline for all stakeholders to be able to implement green city development in Vientiane Capital; and
- As a set of technical tools for mainstreaming green growth and green city concept into urban development for Vientiane Capital.

In summary, the Green City Action Plan is a green development plan for Vientiane Capital that outlines specific medium- and long-term actions to address urban challenges and identify sustainable opportunities for urban development. This GCAP aims to improve city environment by enhancing water and air quality, soil health, and urban biodiversity. It also seeks to improve urban planning, stakeholder coordination, and basic services for all residents, such as waste management, sanitation, urban mobility, and renewable energy. Additionally, the plan focuses on increasing access to green financing and investment, while promoting economic growth through efficient natural resource use, the development and deployment of low-carbon technologies, and social inclusiveness. This integrated approach aims to deliver an improved quality of life and maximize the potential for green growth for all city residents.

6. Green City Action Plan Methodology

The methodology used in developing the Vientiane Capital GCAP has nine steps as follows:

Step 1 – Establishment of GCAP City Core Team
Step 2 – Vision setting and priority areas identification
Step 3 – Identification of indicators and targets related to priority areas
Step 4 – Baseline assessment
Step 5 – Identification of priority actions and options in green city development
Step 6 – Arrangement of priority actions and projects
Step 7 – Needs and gap identification for implementation of priority actions
Step 8 – Implementation arrangement, Monitoring and Evaluation
Step 9 – Endorsement of GCAP

7. Structure of the GCAP

Part I Introduces the rationale and importance, policy frameworks related to green city development, purpose and steps of implementing the GCAP and its structure.

Part II Highlights key urban challenges of each priority area in Vientiane Capital to analyze and identify the initial problems, as well as to identify the tasks being carried out or defined in the plan.

Part III Covers the green city vision of Vientiane Capital and strategic objectives for green city development as well as identifying the green city priority areas.

Part IV Describes the green city action planning, including sectoral objectives, targets and indicators for each priority area, as well as defines related priority actions and projects.

Part V Provides information on implementation arrangement, monitoring and reporting, as well as essential needed to implement the GCAP such as: capacity building and potential funding sources.

Part VI Provides conclusion of this GCAP document.

PART II.
THE CITY DEVELOPMENT BASELINE OF VIENTIANE CAPITAL

1. Overall Urban Challenges of Vientiane Capital

In Vientiane Capital, urban areas are experiencing a higher population growth rate than the national average, indicating significant rural-to-urban migration. Rapid urbanization has been evident in recent years, marked by the rise of high-rise buildings in the city center and the swift expansion of residential areas and infrastructure into semi-urban districts. However, public services have struggled to keep pace with this rapid development.

Vientiane Capital still lacks infrastructure to sufficiently handle issues related solid waste management, wastewater treatment, urban mobility and sufficient energy network. In many cases, urbanization in Vientiane Capital has not adhered to city planning and standards. For example, narrow community roads, unstandardized and unsafe electricity cables, unmanaged waste dumping that blocks water ways and drainages, and construction without permits. These issues are primarily driven by communities themselves and happening speedily ahead of city plan.

In addition, the general public has low awareness on environmental issues and health impacts due to diseases linked with burning and disposing of solid waste, untreated wastewater, air pollution from cooking and cars, and climate change. This has caused significant pressures and impacts on the urban environment, biodiversity, and people's well-being in the long run. With more pressures on livelihood of urban population, often time children and women are at higher risks of exposing to such impacts given their key roles in managing the household work. This rapid urbanization has led to number of issues such as solid waste management, wastewater and sanitation, air pollution, traffic congestion and accidents as well as its vulnerability to the impact of climate change, coupled with weak regulatory framework and enforcement of regulations and compliance monitoring.

Table 1: *SWOT Analysis for Vientiane Capital*

STRENGTH	WEAKNESS
• Strong leadership and proactive Capital authorities focusing on socio-economic development. • Vientiane Capital is a center of economy growth, a strategic hub for development, tourism, and education in Lao PDR. • Vientiane Capital is a regional transit route and logistics hubs of Lao PDR both by land such as Lao-China Railway, logistic parks bordering with Thailand, and by air (through Wattay International Airport). • Sufficient public utilities (electricity, water supply, internet, and phone services). • Available public transportation such as buses, taxi, and other passenger mobility such as van, tuk tuk, and Songtheo. • Vientiane Capital is an entry point to many tourist attractions to the country. • Available public urban services such as solid waste collection, landfill and wastewater treatment facility. • The economy is growing as evidenced by an increased number of business operations over the years and raising GDP per capita of Vientiane Capital. • All sectors recognize the importance of	• Urbanization is happening rapidly and not compliant with city planning, permits, and standards, coupled with lack of effective law and regulation enforcement. • Lack of proper construction management and controls in terms of design standards, soil digging and filling, buildings, landscape and environmental impacts prevention. • Some informal housing from early (unplanned) settlements coupled with lack of budget to address this issue informal settlement (crowded areas). • Lack of sufficient city infrastructures and public services to cope with rapid urbanization such as roads, drainages, green public parks, solid waste management, wastewater treatment, urban mobility. • Very high demand for urban development, but lack of budget and human resources, coupled with high public debt. • Lack of budget for urban development projects • Lack of human resources and capacity of relevant authorities to plan, execute and manage urban development work. • Low awareness of city residents on city environments and its benefits.

improving the city's landscape and environment, for example, public parks, solid waste, and wastewater. • Proactively seeking and receiving supports from neighboring countries, international organizations and donors to develop Vientiane Capital. • Vientiane Capital has key development policies and strategies in place. Such as 9th PSEDP, sectoral development plans, Vientiane Urban Master Plan III, 6 aspirations, and other mayor decisions in developing sustainable Vientiane Capital.	• Traffic congestion due to increasing private cars, and insufficient public transport in the city. Lack of bypass road for trucks and big vehicles as well as limited cycling path and walking path. • Some roads are still in poor condition and inaccessible leaving difficulties for urban mobility and public services such as waste collection. • Unclear and overlapping institutional arrangement of city departments on urban related works such as parks, green space, drainages and others. • Vientiane Capital is a big and complex city with many departments and authorities leaving huge challenges and difficulties to have an effective coordination for urban development.
OPPOTUNITIES	**THREATS**
• Strong leadership from the Mayor of Vientiane Capital and management team. • Sustainable urban development, including green growth, including the 6 aspirations have been integrated into Vientiane Capital development policies and strategies such as 9th PSEDP, sectoral development plans, Vientiane Urban Master Plan III. This will be a good foundation pushing green city development. • Vientiane Capital is a regional hub for regional development, including business, industry, logistics and transport, technology, tourism, and education as well as international cooperation. • Seeking to promote domestic and foreign investment and access to external funding support (grants, loans). • Opportunities to develop and promote sustainable energy generation (such as hydro, solar and biomass), energy saving and efficiency, as well as electric vehicles and biofuels to reduce greenhouse gas emissions and air pollution in the city. • Promote the protection and expansion of greenhouse gas absorption sources such as forest coverage in the city, and green spaces. • Plan to develop public parks for recreational and microbusiness opportunities • The leadership of Vientiane Capital in developing and enforcing urban related regulations such as solid waste, wastewater and sanitation (black and grey water), construction permits, public water management.	• Gradual pollution of key natural resources, including air and waterways, some sound pollution from industrial development and business expansion. • Impacts from hazardous events such as storms, floods, and diseases outbreak. • Increased traffic congestion and road accidents • Insufficient effective wastewater and solid waste treatment system including operation and maintenance,. • Uncontrolled parking on the road and pedestrian sidewalks. • Insufficient public awareness and understanding of relevant regulations related to urban environment. • Insufficient public awareness of the city environment and the need to have basic services, such as solid waste collection service, wastewater fees, leaving illegal dumping to continue. • Increasing population, industry, tourists increase the amount of garbage* • Insufficient maintenance management, lack of budget and staff. Inadequate toilets, inadequate parking, knowledge of park use and community conservation are low. Tolerance to climate change such as floods is still low.

• Promote and integrate climate resilience into urban planning, sectoral development plans to enhance city resiliency to climate change and improve access to climate financing. • Opportunities to improve city environment for well-being of citizens of Vientiane Capital.	

2. Strategic Analysis of Challenges and Opportunities for Green City Priority Areas

Based on national and sub-national key policies, development plans, and international best practices in green city development, as well as considering local needs and available resources, Vientiane Capital has identified six priority areas: 1) sustainable solid waste management, 2) wastewater and sanitation, 3) climate and disaster resilience, 4) sustainable mobility, 5) green space, and 6) sustainable energy, with the latter being the top priority. The following section outlines the results of the strategic analysis of the challenges within each priority area.

2.1. Solid Waste Management

The Vientiane City Office for Management and Service (VCOMS) is the local authority responsible for municipal solid waste management for Vientiane Capital, under the supervision of mayor of Vientiane Capital. VCOMS previously managed the overall waste collection services, one transfer station in Nahai village, the KM 32 landfill, functions as the fees setting body, and governs the 10 collection companies within Vientiane Capital. VCOMS privatized waste collection services of its serviced areas to a private company, including the transfer station.

The waste generation in Vientiane Capital is approximately 970 tons per day (in 2020[22]), equivalent to 750g/day per capita. The main sources of waste generation are from households estimating at 711/tons per day, while the remainder comes from business entities, industries and public buildings. With this, only 31% or around 300 tons per day is collected and transferred to KM 32 landfill for disposal. Waste composition of Vientiane Capital can be summarized as below.

Table 2: *Waste composition in Vientiane Capital*

Types of waste	Waste Types	Share of waste composition (%)
Organic	Food waste	44.3
	Agricultural waste	22.7
Plastics	PET bottle	3.5
	EPE foam	0.2
	Other types of plastics	8.3
Paper/cardboard	Cardbord	4.8
	Paper	4.0

[22] *Sustainable Solid Waste Strategy of Vientiane Capital 2030*

Glass		3.3
Can		0.7
Textile		0.3
Metal and Aluminium		0.1
Other waste		7.8

Source: *Sustainable Solid Waste Management Strategy and Action Plan for Vientiane Capital 2021-2030*

Although waste collection service is available in Vientiane Capital, there are only 31% (50,624 households) of the total 161,655 households (HHs) use the waste services as of 2020, while 88,150 HHs do not use the service, despite locating within to the serviced areas. The remaining 22,877 HHs do not have access to waste collection service as the households are located in the rural and semi-urban areas outside serviced areas.[23]

Municipal solid waste has become a growing and an urgent issue in Vientiane Capital, with increased focus needed across the entire waste management value chains, starting from generation to final disposal. Waste is inadequately separated at source (either at households, markets, or establishments), making it difficult to have an efficient recycling system. As a result, recycling rate is only around 10%, mainly the plastic bottles, cardboards and paper, metal and aluminum can. Glass recycling is very minimal. Without source separation and waste to resources intervention, leaving the huge amount waste to landfill. Open littering and burning are still on going, particularly uncontracted and outside service area households.

Challenges of sustainable solid waste management in Vientiane Capital include:

- Low coverage of waste collection services as only 31% using the service, the remaining still practice open dumping, and trash burning;
- Lack of quality waste collection services;
- Low awareness on environmental and health impacts from improper waste disposal;
- Weak enforcement of rules and regulations for municipal solid waste;
- Insufficient regulation in managing hazardous waste such as construction waste, industrial waste, and medical waste;
- The KM 32 landfill is not a sanitary landfill, leading to issues such as waste being scattered, unpleasant odors, and leachate contaminationKm ;
- Additionally, there is an insufficient budget for waste management in Vientiane Capital, as the VCOMS relies solely on revenue from fee collection, without any government incentives (see Annex I for the SWOT analysis on solid waste management).

Vientiane Capital has recently adopted Sustainable Solid Waste Management Strategy and Action Plan for Vientiane Capital 2021-2030 with the main objective of providing guidance and roadmaps for solid waste management improvement in Vientiane Capital toward 2030. In addition, VCOMS in partnership with GGGI are currently implementing a solid waste management project in 3 villages (Pakthang, Dongnasok Tai, and Nongbouathong Neua villages), in Sikhottabong district Vientiane Capital, funded by KOICA. The project aims at enhancing waste collection rate in the target villages by deploying of decentralized waste collection service using e-truck to collect waste from small/ narrowed roads where they are not accessible for big waste collection trucks, while promoting waste separation and waste to resources by recycling and composting in order to capture the value of waste, while reducing the waste amount to landfill. However, to further enhance waste management in Vientiane Capital, there is still a need to scale up such initiatives, not only to a few villages but across the entirety of Vientiane Capital.

[23] *Sustainable Solid Waste Management Strategy and Action Plan for Vientiane Capital 2021-2030*

2.2. Wastewater and Sanitation Management

The water supply in Vientiane Capital is at almost 100% accessible, with the same rate having access to toilets at almost 100%. Nevertheless, wastewater treatment is insufficient due to the fact that provision of sanitation infrastructure has not been able to keep up with the urban growth. The majority of on-site systems such as septic tanks lack proper maintenance (no regular de-sludging) and unfollow standardized design as such causing overflow and contamination of black water into open drains, open spaces, ponds and canals. As a result, fecal contamination to in water body is still high causing health risks to the public, particularly poor communities, children and women.

Vientiane Capital has a fecal sludge treatment plant available at Nahai village, Xaysetha district, but there is a lack of regulation and enforcement on regular de-sludging. Most people only empty their septic tanks voluntarily when they are full. In addition, there are no guidelines or regulations for grey water treatment and management, resulting in grey water from kitchens and laundry being discharged directly into open drains, water bodies, and public canals without treatment. The combination of overflowing black water and untreated grey water severely pollutes public canals and drainage systems including Hongxeng, Hongke, Hong Pasak, Hong Khoua Khao, Hong Thong, and finally drains to Thatluang Marsh. Littering solid waste into public canals clotting water flow is also a key issue for public canals in Vientiane Capital.

Below are the key challenges of wastewater and sanitation in Vientiane Capital:

- Inadequate wastewater treatment facilities in Vientiane Capital;
- Overflow of black water into drainage system, public canals, and natural area without proper treatment nor monitoring evaluation of concerned authority;
- No treatment or standard guideline for grey water from households, all discharge directly to public canals;
- Insufficient standardized onsite sanitation system, no quality check and monitoring;
- Fecal-sludge treatment plant available, but lack of regular de-slugging of septic tanks;
- Insufficient regulations and enforcement on regular de-sludging;
- Insufficient promotion on community decentralized waste treatment system (DEWATS);
- Blockage of public canals causing floods and diseases outbreak in rainy season posing a high risk of waterborne disease and the diseases transmitted by the fecal-oral route;
- Insufficient human and financial resources to implement water and sanitation related works; and
- Insufficient public awareness of the impacts of wastewater and sanitation issues.

Vientiane Capital is currently implementing the project on Centralized Wastewater Treatment Plant for the core city areas funded by Hungarian government. The project itself will not likely be able to connect the entire Vientiane Capital, particularly the sub-urban and rural Vientiane. Thus, it is necessary for the city to seek other solutions to treat wastewater for the rest of the city. There are several community decentralized waste treatment systems (DEWATS) in Vientiane Capital, but lack of promotion and investment to scale up such initiatives.

2.3. Climate and Disaster Resilience

Vientiane Capital, located along the Mekong River to the south and the Ngeum River to the east, experiences a tropical climate with significant climate-related risks, primarily flooding during the rainy season. For instance, the 2018 floods affected over 11,500 hectares of agricultural land, causing livelihood and economic losses as well as health issues from water-borne diseases.[24] Flooding in Vientiane Capital is mainly due to rising water levels in the Mekong and Ngeum Rivers during the rainy season, combined with stagnant water in the city caused by an inadequate drainage network and blockages in public canals from algae, solid waste, and land filling. To address these issues, Vientiane Capital has implemented several riverbank protection projects, including Phase II of the Mekong Riverbank Protection Project (12 km), the Don Xingsu River Project, and the Ngeum Riverbank Project.[25]

[24] *9th SEDP of Vientiane Capital.*

All city storm water in Vientiane Capital mainly is carried by the key public canals namely Hong Ke, Hong Thong, Hong Khoua Khao, Hong Ouay Louay, Hong Phone Thanh, Hong Kai Keo, Hong Thong Sang Nang, Hong Pasak to Thatluang Marsh and down to Houy Mark Yao into Mekong River. However, the function of these canals does not function effectively due to lack budget to maintain and clean. Natural ponds also play a crucial role in retaining and treating wastewater in Vientiane Capital such as Thaluang March, Nong Veng, Nong Pan, Nong Seum, Nong ta leur, and others. These natural ponds will need to be protected and improved in order to keep up with the increasing needs.

The temperature in Vientiane Capital has been rising over the past decades, with an expected increase of approximately 1.28 degrees Celsius from 2021 to 2050 due to global warming and greenhouse gas emissions. This rise in temperature underscores the need for improved carbon sequestration efforts. While droughts have a lesser impact on the city itself, they significantly affect farmers in semi-urban and rural areas without irrigation systems. Additionally, heat waves are a major concern, especially from March to May.

Key challenges related to climate change can be summarized as below:

- Climate events are increasing in urban areas - floods, droughts, storms, heat waves - diseases and economic loss;
- Settlements and urban expansion block water flow;
- Natural ponds and marsh are not protected;
- Integrating climate change into development planning, and activities is very limited;
- Insufficient disaster response and reduction plans;
- Insufficient awareness of disaster risk of communities, particularly early warning systems and climate information;
- Climate and natural disaster prevention committees are not well established, equipped with the right technical knowledge and tools;
- Insufficient budget to maintain existing infrastructures and develop new climate resilience projects;
- Air pollution and greenhouse gas emissions are key issues for Vientiane Capital.

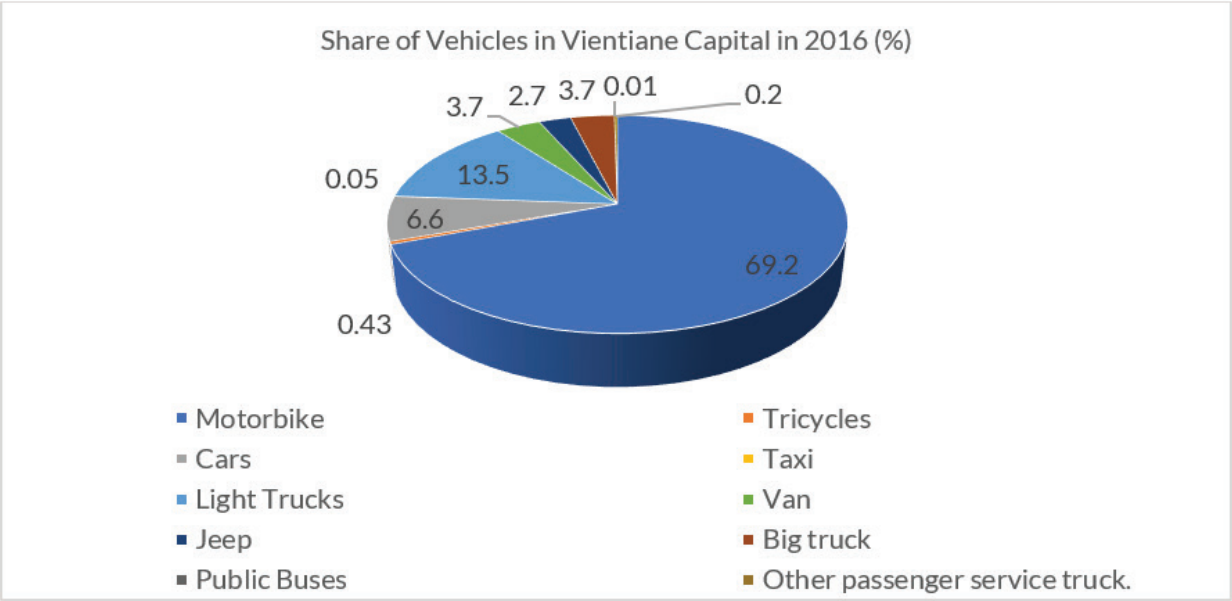
The Ministry of Natural Resources and Environment (MoNRE) and VCOMS are implementing a project on improvement and maintenance of public canals and drainages in Vientiane Capital aiming to reduce stagnant floods in Vientiane Capital, and improved water ecosystem which is funded by Environmental Protection Fund (EPF) of 500 million LAK (approx. USD 40,000). Target area includes Hongxeng and connected network to Hong Houy Mak Nyao of 6 districts. This implies the strong leadership of Vientiane Capital in adapting and getting ready for climate related events. The government of Lao PDR has adopted a decree on climate change, but challenges over implementation is there, particularly financing sources to implement. Thus, more efforts from all city stakeholders are needed to build a more climate resilient Vientiane Capital.

2.4. Sustainable Mobility

Ground transport is the main type of transportation in Vientiane Capital, dominated by two-wheeler motorbikes (69%), light trucks (13%), passenger cars (6%), van (3.7), big truck (3.7) and jeep or SUV (2.7%), while buses, tri-cycles, and other passenger truck account for less than 1%. With this, the total registered vehicles in Vientiane Capital in 2016 is around 789, 262 unit[26] as shown in Figure 2.

[25] *Climate Change Vulnerability Assessment, 2020 (monre.myqnapcloud.com)*
[26] *MPWT Statistic 2016, (2017)*

Figure2: Share of Vehicles in Vientiane Capital in 2016 (source: MPWT, 2016)



The number of vehicles in Vientiane Capital has significantly increased over the past years, leading to severe traffic congestion during rush hours, particularly on major roads such as Road 13th South (from Don Noun to the city center), Road 13th North (from Sikhai to city center), and Phontong Road. Police are required to manage traffic flow at key intersections each morning. This rise in vehicle numbers has also led to an increase in road accidents. According to the Ministry of Public Works and Transport (MPWT) annual report, 2016 saw 1,554 road accidents in Vientiane Capital, damaging over 3,306 vehicles, injuring more than 2,050 people, and resulting in 261 fatalities.[27]

Public transportation in Vientiane Capital remains limited. While there is a state bus enterprise, its service coverage does not extend throughout the entire city, and many residents prefer private transport over public buses. Currently, a Bus Rapid Transit (BRT) project funded by the ADB and European Investment Bank (EIB) is underway, which will introduce 45 electric buses and additional diesel buses to improve public transportation significantly. The Lao PDR government has endorsed electric vehicle (EV) development through Resolution No. 08/PM, dated October 4, 2021, promoting EV adoption. To date, around 300 EVs have been imported, with 166 registered, excluding electric two-wheelers. Vientiane Capital has 16 EV charging stations and 1 EV fast-charging station.[28] TTaxi services, including Tuk Tuks and Songtheos, are available, with LOCA company offering urban taxi services via a mobile app. LOCA is in the process of transitioning its fleet to electric vehicles to reduce its greenhouse gas emissions.

Main challenges regarding city urban transportation or mobility:

- Limited public transport service;
- Rising use of private vehicles;
- Weak traffic management;
- Uncontrolled parking, and inadequate designated parking spaces especially for markets and schools,
- Weak pedestrian management constrain;
- Insufficient lit roads during night times;
- Road and sidewalk are often obstructed by parked cars or occupied business, making it uncomfortable for walking;
- Active mobility such as cycling, and walking are only viewed as an exercise and not promoted as a mode of transportation.

[27] *MPWT Statistic 2016, (2017)*
[28] *Lao Youth Radio_ 3rd Ordinary session of National Assembly IX, June 16, 2022*

Vientiane Capital has been addressing these issues through several initiatives, including the construction of a by-pass road around the city, a traffic jam prevention and management project, a railway project, and a sustainable transport master plan developed by JICA.[29]

2.5. Green Space and Walkability

Vientiane Capital recognizes the importance of green spaces in its endeavor to be the "beautiful, green and liveable cities." There are several parks in the city and along the Mekong River such as Chao Anouvong Park – being the largest. It has been developed as a recreational center along with an excellent landscape consisting of a rich collection of trees that are both native and ornamental. Other parks in the city include Xaysettha and National University of Laos Parks. Smaller pocket parks are located in government, university and school campuses and along some of the canal parks. The WHO recommended minimum for green spaces is 9m^2 per person or at least 15 percent of the city's area should be green spaces. In this context of Vientiane Capital, which has a permanent population of 948,447, excluded the seasonal visitors, this works out to be about 8.55 km^2, as a result, Vientiane Capital falls short of that recommendation as well. Current master plan indicates that there are only 9 public parks in Vientiane Capital with total area of 20.6 hectares, with implies that there only 0.26 m^2 per person, dividing total areas of public parks by the population gives a parameter of public park area per person[30]. The master plan does identify over 825 hectares of additional public spaces that could potentially be converted into parks, which could help meet the WHO standards. To achieve this, further study, planning, and investment are needed to expand public parks in Vientiane Capital.

Urban green spaces are the lungs of cities, particularly in a land-locked one. With rapid urban expansion, the land values increase and the first compromise that tends to be made is to convert open green spaces into other land use types. This has a large negative impact on the livability of the city, both from the perspective of air quality as well as city scenery. The green spaces in Vientiane Capital are already below the WHO norms both in population terms and in area terms. Therefore, efforts to preserve existing green spaces, intensify and expand green spaces where possible are required. Due to the limited availability of developable land, there is considerable pressure to develop green spaces; also, illegal use of land in the form of encroachment can be found in the city.

Key Issues and challenges regarding green space in Vientiane Capital include:

- Green public space in Vientiane Capital is limited and lack of facilities such as toilets, parking areas, lighting;
- Limited utilization for recreational and business activities;
- Insufficient budget for improvement and maintenance;
- Unclear management arrangement between concerned authorities;
- Roadsides, road median, and open canal spaces are not utilized as green public space, including insufficient trees to provide shades and greenery for walkability.

Green space is one of the key urban development components that promotes beautiful, green and liveable city. Mayor of Vientiane Capital has issued a decision on Green Vientiane Capital, interpreting the 6 aspirations, particularly the "green" aspect, aiming at promoting and enhancing public spaces and greenery for the well-being of all citizens. In addition, Vientiane Capital has committed to increase 2 additional public parks toward 2025 as city's pipeline project, while will also implement several projects on eco-friendly tourism projects as part of the green space initiatives. These new parks together with the existing ones will contribute toward achieving city's target of increasing green public space at 10 times by 2030 compared to the current areas.[31]

[29] *9th SEDP of Vientiane Capital.*
[30] *"The Project for Urban Development Master Plan Study". https://openjicareport.jica.go.jp/pdf/12023719_03.pdf*
[31] *9th SEDP of Vientiane Capital.*

2.6. Sustainable Energy

Vientiane Capital's energy access is at an excellent level, all villages have access to permanent electricity, with 99.97% access to electricity for all households. However, like other main cities in Lao PDR, when it comes to power supply, Vientiane Capital is in a situation of "too much and not enough". During the rainy season, excess hydropower from domestic plants creates a surplus, while in the dry season, energy deficits require imports from neighboring countries. This clearly implies that energy security in Vientiane Capital is significantly susceptible. There is no large energy production in Vientiane Capital, the city primarily relies on hydroelectricity that is domestically produced in other parts of Lao PDR, and minimal solar productions.

Energy consumption in Vientiane Capital is around 537 MW (around 2,352 GWh per year) and energy generation is around 46 MW. The energy consumption rate is expected to increase at around 4.1 percent from 2020-2030[33] significantly due to rapid urbanization, industrial activities and other development activities within the city. Vientiane Capital is planning to conduct feasibility study on two run-off hydropower plants on the mouth Ngum river, and Xang river with potential 93 MW and 5 MW installed capacity to increase internal energy generation.

Currently, there are around 7 solar projects in Vientiane Capital that are operating, totaling 46 MW; a private floating solar plant in Hatxayfong district of 14 MW installed capacity and EDL Gen solar projects of 32 MW installed capacity. EDL Gen is planning to add another 33 MW of solar to its existing project, including 4MW in Xangthong district 4 MW in Xathany district. There are some solar rooftop systems in the city, but lack of proper data available.

Vientiane Capital was able to produce 67.1 million liters of bio-diesel over the past five years, particularly from Naxaythong palm biofuel company.[34] Charcoal and fire wood is the main cooking fuels at the household level, while imported cooking gas has been used widely in Vientiane Capital. Clean cook stoves are available at the market, but it has not yet been fully promoted.

The key challenges of sustainable energy in Vientiane Capital are:

- Lack of financial resources for energy infrastructure projects to take up the needs of rapid urban expansion;
- High public debts, particularly public buildings, irrigation systems, streetlights and public lighting;
- Insufficient specific policies or strategies on renewable energy promotion for Vientiane Capital;
- Energy management has not yet been clearly governed, energy consumption could not be clearly planned and implemented given high needs and rapid urbanization;
- Limited understanding of energy efficiency and saving; and
- Charcoal and firewood are key cooking fuels causing air pollution and health risks.

To cope with some of these issues, Vientiane Capital has implemented several projects related to energy efficiency such as installation of solar streetlights for key roads in Vientiane Capital, such as a project funded by Chinese government amounting of 300 million Chinese Yuan. Other street light projects are replacing crescent lighting with LED light bolts.

[32] *Vision to 2030, 10th Year Energy and Mines Development Strategy (2016-2025), and Energy and Mines Development Plan (2016-2020) of Vientiane Capital, 2014.*
[33] *The Lao PDR Country Energy Outlook Report, 2021*
[34] *Vientiane department of Energy and Mines, 2022.*

PART III.
GREEN CITY VISION 2030 AND STRATEGIC OBJECTIVES

1. Green City Vision and Strategic Objectives of Vientiane Capital

To tackle challenges and opportunities in urban development, the below green city vision has been set for Vientiane Capital as a strategic goal to become a green city by 2030.

> ***"By 2030, Vientiane Capital will become a livable, attractive and environmentally friendly city, serving as a strategic development hub with sustainable economic growth, resilience to natural and climate risks, socially inclusive, equitable, and will provide a better quality of life for all its citizens"***

To realize this vision, the following **strategic objectives** are also set for Vientiane Capital.

- Improve quality of life of all Vientiane Capital citizens through equal access to public services and enhance urban resilience to cope with natural disasters and climate change.
- Protect urban environment in a systematic and sustainable manner, reduce air, water, noise and soil pollution, as well as reduce greenhouse gas emissions into the atmosphere.
- Enhance quality economic growth through sustainable and efficient use of limited resources and environmentally friendly technologies.

2. Priority Areas for Green City Development in Vientiane Capital

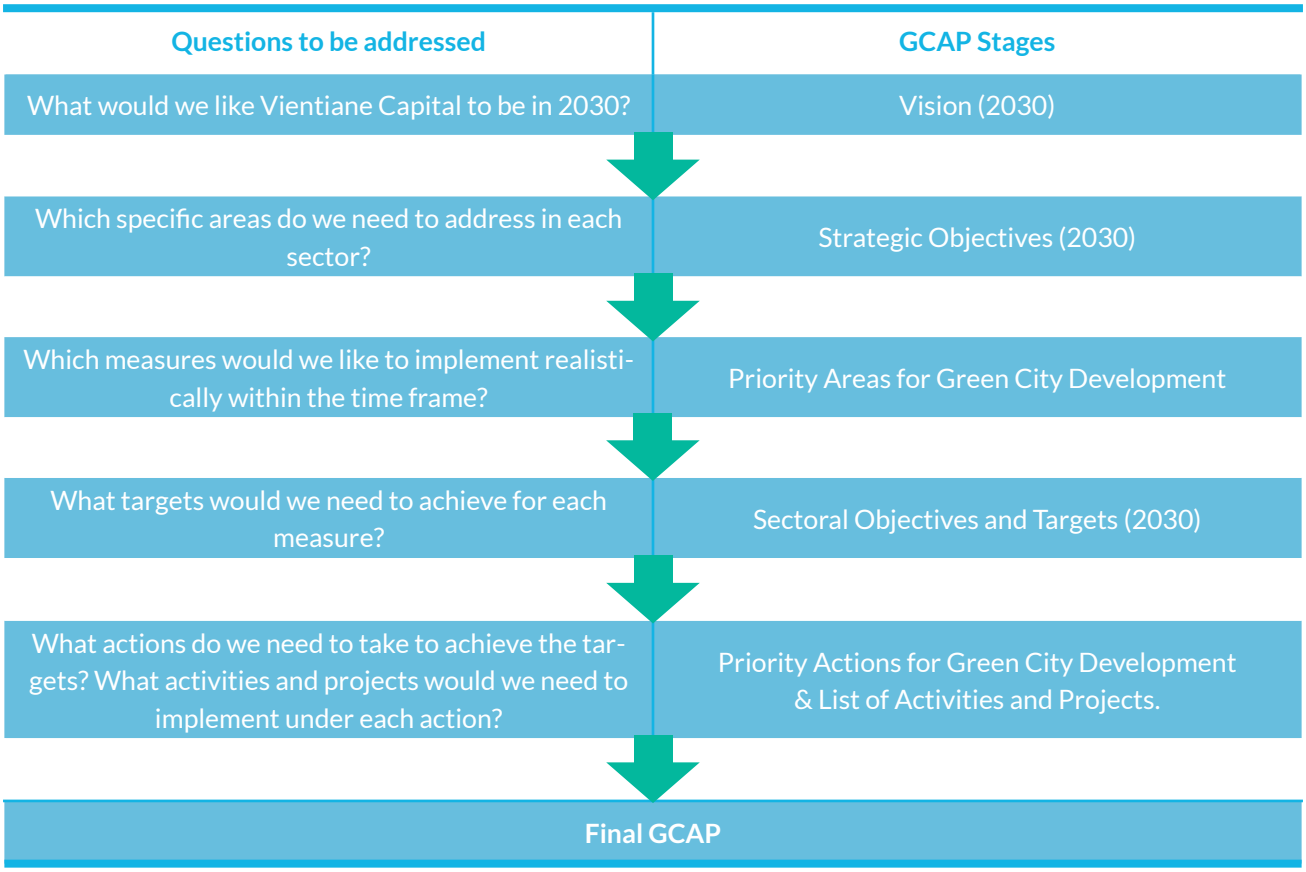
Based on the SWOT analysis in PART II, several urban development concerns need attention. However, due to limited technical capacity, human resources, and financial constraints, this GCAP will focus on the six top priority areas for Green City Development in Vientiane Capital until 2030: 1) sustainable solid waste management, 2) wastewater and sanitation, 3) climate and disaster resilience, 4) sustainable mobility, 5) green space, and 6) sustainable energy. Future updates to the GCAP could include areas like green building, sustainable tourism, and industry and technology.

PART IV.
GREEN CITY ACTION PLAN

1. Stages of Green City Action Plan

To develop Vientiane Capital toward a green, livable, attractive and environmentally friendly, and climate resilient city, while seeking to promote quality economic growth in a green and sustainable manner for better quality of life and more social inclusive for all citizens. There are some key questions that need to be addressed through the GCAP Stages as per outlined below Figure.

Figure 3: *Stages of Green City Action Plan*



2. Green City Action Plan for 6 Priority Areas

In the context of the GCAP, priority areas refer to the most important and urgent priority areas that city needs to focus and take actions in to achieve its long-term goals and vision. Specifically, these refer to the six key priority areas described in PART III. Actions consist of one or more activities and projects that the city needs to undertake and implemented.

This section will detail the Green City Action Plan, which comprises sectoral objectives, targets, and actions under each priority area. These are necessary steps for Vientiane Capital to efficiently address urban challenges and enhance development opportunities, with the aim of achieving its strategic objectives and overall green city vision by 2030.

2.1 Sustainable Solid Waste Management



Given the current challenges of solid waste management in Vientiane Capital, the specific sectoral objectives, targets and indicators for Vientiane Capital have been set to move forward achieving the green city vision as below:

Sectoral objectives:

- Expand quality solid waste collection services and waste related infrastructure (landfill, material recovering facility),
- Minimize the volume of waste sent to landfills by decreasing overall waste generation, enhancing source-segregation and recycling rates, and effectively utilizing organic waste,
- Strengthen city regulations on solid waste management,
- Raise public awareness on solid waste management issues.

Targets and Indicators:

Table 3: *Indicators and Targets for SWM*

Indicators	Baseline 2020	Targets 2030
Waste collection rate throughout the capital (%) *	35	100
Waste recycling rate (%) *	10	40
Waste disposed of at the landfill properly treated (%) *	50	80
Waste generation per capital stabilized in Vientiane Capital (kg) *	237	180
Waste recycling banks at village level (# villages) *	3	170
Urban waste generation reduction (ton/day) *	600	50
Development of a new landfill in Sangthong district (# landfill) **	0	1
Development of a new transfer station in Naxaythong district (# of transfer station) **	0	1

Source: ** Sustainable Solid Waste Management Strategy of Vientiane Capital;*
*** 9th SEDP of Vientiane Capital.*

Priority Actions:

Solid waste management is a critical and ongoing challenge for Vientiane Capital that demands immediate action from all stakeholders, including the public, private sectors, and communities. To achieve the objectives and targets by 2030 in building a green Vientiane Capital, the city will undertake the following actions to ensure that solid waste is managed sustainably, with minimal impacts on the urban environment

Table 4: Priority actions for sustainable solid waste management in Vientiane Capital

<table>
<tr><th rowspan="2">Priority Actions</th><th colspan="2">Link to</th></tr>
<tr><th>Sectoral Objectives</th><th>Strategic Objectives</th></tr>
<tr><td>A1. Increase and enhance quality waste collection services for all city residents through introduction of affordable fees structure, accessible infrastructure, and improved service quality.</td><td>1) Expand quality solid waste collection services and waste related infrastructure (landfill, material recovering facility).</td><td rowspan="5">• Improve quality of life of all Vientiane Capital citizens through equal access to public services, handle natural disasters and adapt to climate change.

• Protect urban environment in a systematic and sustainable manner by reducing air, water, noise and soil pollution, including reducing greenhouse gas emissions into the atmosphere.</td></tr>
<tr><td>A2. Raise awareness and capacity building on impacts of waste management issues, and regulation enforcement.</td><td rowspan="2">4) Raise public awareness about waste management issues.

2) Minimize waste going to landfill by reducing waste generation, increasing source-segregation and recycling rate, and utilizing of organic waste.</td></tr>
<tr><td>A3. Reduce organic waste (vegetables, fruits and others) to landfill through resources recovery approaches such as composting and biogas.</td></tr>
<tr><td>A4. Promote recycling of plastic bottles, aluminum cans, glass and papers through introducing business model for recyclable materials.</td></tr>
<tr><td>A5. Strengthen safe collection and disposal of medical waste, construction and industrial waste through policy and regulatory enforcement and service coverage.</td><td rowspan="2">3) Strengthen city regulations on solid waste management</td></tr>
<tr><td>A6. Review and improve regulations, measures and legislations related to solid waste management</td></tr>
</table>

Table 5: Solid Waste Management projects

Action	Project Code	Project Name	Project Objectives	Activities	Time Frame	Location / target	Budget (USD)	Responsible agency
A1	SWM1	Development of a new waste collection service charge structure for Vientiane Capital	• To provide an affordable service collection fee for households. • Increase collection rate in Vientiane Capital. • Improve city environment.	• Conduct study on people's affordability and willingness to pay, as well as return of investment. • Develop a new fees structure for waste collection service. • Pilot the new fee structure and revise update the fee structure. • Develop a decree to enforce new fee structure.	2022 - 2025	Entire Vientiane	100,000	VCOMS, Mayor's Office, DONRE, District Authority
	SWM2	Decentralized waste collection services for inaccessible communities	• To increase waste collection coverage to inaccessible areas, specifically small road where big waste collection trucks cannot access. • Increase waste collection rate in Vientiane Capital by encouraging households to use waste collection service. • Raise awareness on SWM for communities.	• Baseline assessment of the target community to identify uncontracted households. • Identify possible circular business model for informal waste pickers to engage in waste collect service. • Identify collection points of small road. • Deploy e-truck for decentralized waste collection. • Community awareness raising.	2023-2025	One district	4,500,000	VCOMS, Private collection companies
	SWM 3	Feasibility study on establishing a new transfer station and a new landfill site	• To ensure there is enough infrastructure for the solid waste management for Vientiane Capital. • To reduce the time and cost for transportation waste to KM 32 landfill.	• Conduct pre- feasibility study on transfer station and new landfill site. • Formulate project activities.	2027-2030	Xangthong district, Naxaythong district	300,000	VCOMS, Mayor's Office, DPWT, DONRE

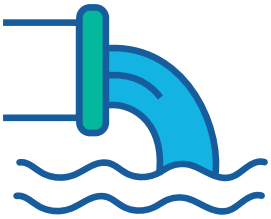
A2	SWM4	Capacity building for VCOMS and waste collection companies	• Enhance the quality of waste collection service of VCOMS and private companies. • To build capacity of operators aiming at protecting health risks of waste collection staff. • To enhance managerial and financial capacity for VCOMS and operation companies.	• Design training curriculum. • Deliver training sessions. • Provide materials and tools necessarily for the activities.	2023-2027	VCOMS staff, Private companies, contractual workers.	50,000	VCOMS , Private companies
	SWM5	Eco-friendly business program for business entities in Vientiane Capital	• Raise awareness to business entities on the impacts of plastics. • To reduce waste to landfill, increase recycling rate. • To promote the role of business in greening Vientiane Capital. • To promote environmentally friendly business. • Improve green investment by private sectors.	• Identify business entities, focusing hotels, guesthouses, restaurant, tour companies, local manufacturers. • Conduct situational analysis to identify challenges and opportunities for eco-friendly business initiative (solid waste, recycling, plastic free, organic waste, wastewater, and other packaging). • Develop guidelines and criteria for improvement for each of the business types. • Develop green business certificate to promote eco-friendly and environmentally friendly businesses.	2025 - 2030	100 business entities in Vientiane Hotels, guesthouses, restaurants, tour agencies, and local manufacturers.	500,000	VCOMS, DOIC, Business Entities
A3	SWM6	Promotion of waste resource recovery through waste separa-tion, recycling and	• To raise awareness on solid waste management and related public health risks for communities.	• Identify target villages, households, schools, temples. • Conduct situation analysis to identify challenges and opportunities.	2024-2030	Communities, schools, temples,	500,000	VCOMS DONRE, District Authority, Villages

A3		composting of organic waste at household level	• To reduce the amount of waste through recycling, home composting, and bio-gas. • To create jobs and incomes for selling recyclables.	• Provide training and awareness raising campaigns on waste separation, recycling, home composting, biogas options. • Introduce and connect recycling buyers, as well as negotiate the recyclables price. • Provide bins for waste separation.		public buildings and business entities.		
	SWM7	Establishment of organic waste treatment facility for markets and business entities	• To promote waste separation and use of organic waste as resources. • To reduce organic waste amount to landfill. • Reduce greenhouse gas emissions from organic waste. • To promote the use composts as fertilizer.	• Conduct preliminary assessment of organic waste, its sources, amount (from markets, shops, etc.). • Identify location for resource recovery facility. • Construct waste resource recovery facility. • Provide organic waste collection trucks. • Design collection and operation plan.	2026-2029	Landfill	3,000,000	VCOMS, Private company
A4	SWM8	Waste recycling banks in schools, public offices, and shopping malls	• To promote recycling and reducing the amount of waste to landfill. • Create green jobs, income for schools and students. • Raise awareness on waste management for students. • Create a green school model for schools that has good capability.	• Identify schools and offices for the project. • Provide waste bins for each type of waste. • Provide capacity building sessions for teachers and students. • Create a selling plan. • Connect to recycling buyers.	2023-2028	100 schools in Vientiane Capital	500,000	VCOMS DONRE, Schools and public offices

A4	SWM9	Establishment of recycling centers to increase the value of waste	• To enhance the recycling efficiency. • Reduce the amount of waste sending to landfill. • Create jobs and generate incomes for informal waste pickers.	• Conduct pre-FS on the installation of waste segregation center • Construct and install waste segregation system (mechanical system), including machinery. • Provide capacity building for operators. • Provide trainings for information waste pickers who work in the facility.	2025-2030	Transfer station/ the landfill	700,000	VCOMS, Private investor
	SWM10	Engagement with consumer goods industries and retailers to provide options for end-user consumers to reuse, reduce, and recycle materials as part of corporate social responsibility	• To reduce waste generation. • Promote 5 Rs (refuse, reduce, reuse, repurpose and recycling). • Enhance social corporate social responsibility among industries in Lao PDR.	• Identify industries for the projects. • Conduct baseline assessment to identify key challenges and opportunities. • Develop 5 Rs plan and activities. • Provide trainings and raise awareness for industries to implement.	2023 - 2027	Brewery, food processing, wood industries in Vientiane Capital.	300,000	VCOMS, Mayor's Office, DOIC, District Authority, Industries
	SWM11	Promotion of plastic free initiatives for business entities in Vientiane Capital	• To reduce plastic waste generation from business entities. • To protect marine life from microplastic. • Raise awareness to business entities on the impacts of plastics.	• Identify business entities for the project. • Conduct situational analysis of plastic use and consumers behavior as well as their willingness to change. • Provide trainings for business entities on how to handle this consumers questions. • Introduce other means of containments for consumers such as eco-bags. • Initiate and promote plastic free programs through social visibility.	2023-2025	100 business entities (Grocery, mini-marks, retailers, whole seller).	300,000	VCOMS, DOIC, Business Entities

A5	**SWM12**	Improvement of medical waste management from hospital and clinics in Vientiane Capital	• To properly and safely manage infectious wastes Vientiane Capital through the use of high efficiency incinerator. • To reduce health risk from medical wastes on citizens, animals and surrounding ecosystem.	• Conduct baseline assessment for medical waste in Vientiane Capital. • Develop separation, containment, transportation plan for medical waste. • Develop safety guidelines for medical waste collection operators. • Conduct assessment of existing incinerator to ensure high efficiency.	2024-2026	Landfill	300,000	VCOMS DoH, Hospitals, Clinics, collection company
A6	**SWM13**	Development of guideline for medical waste, construction waste and hazardous waste	• To manage the medical, construction, and hazardous waste in a systematic way. • To provide clear guidance and instruction for waste generators. • To improve the city environment and health of city residents.	• Conduct situational or baseline assessment of each type of wastes. • Develop guidelines and regulations. • Provide awareness raising and enforce the guidelines.	2023 – 2025	Entire Vientiane	300,000	VCOMS DONRE, DOIC, Mayor's Office

2.2. Wastewater and Sanitation Management



Wastewater and sanitation are ongoing challenges in Vientiane Capital, particularly regarding wastewater from households, markets, shopping centers, public buildings, industrial facilities, and other sources. The majority of on-site systems, such as septic tanks, suffer from inadequate maintenance, including irregular de-sludging, and often do not adhere to standardized designs. This lack of proper maintenance results in the overflow of black water into open drains. Additionally, grey water from kitchens and laundering is typically discharged directly into open drains and water bodies without any treatment, contributing to the pollution of the city's waterways and public health risks.

To overcome these challenges, Vientiane Capital has set the below objectives and targets, and will undertake the below actions to address urban issues related to wastewater and sanitation.

Sectoral objectives:

- Improve guidelines, enforcement, capacity building, and awareness raising for sustainable (on-site) sanitation and grey water treatment.
- Enhance fecal sludge treatment and regular de-sludging of onsite sanitation and DEWATS systems through awareness raising, promotion campaigns and regulation enforcement to improve sanitation for all.
- Protect and maintain natural ponds and canals to enhance city's wastewater treatment through natural based solution.

Targets and Indicators:

Table 6: Targets and Indicators for wastewater and sanitation

Indicators	Baseline	Targets 2025	Targets 2030
All people have improved onsite sanitation (improved latrines) (% of pop) **	NA	90	100
Wastewater in Vientiane Capital is safely treated before discharging to the nature (% of ww)	NA	50	>50
Vientiane Capital residents have access to adequate sanitation service through regular desludging and proper fecal sludge treatment (% of pop)**	NA	70	100
Gender has been integrated into water supply and sanitation (%) **	NA	44	100
Sanitation systems are climate change resilient (% of system) **	30	37	100
A centralized wastewater treatment plant with a capacity of 20,000 cubic meters per day (Unit) is built for core city area *	0		1
Construction of public canals to improve city waste-water management using budget from international organizations *		5	>5

Source: ** VTE Capital 9th SEDP, 2021 and MPWT 9th ESDP, 2020*
*** National Urban Sanitation Strategy, 2022*

Priority Actions:

Table 7: Priority actions for wastewater and sanitation

Priority Actions	Link to	
	Sectoral Objectives	Strategic Objectives
A1. Raise public awareness on urban sanitation related to wastewater and encourage regular desludging.	1) Improve guidelines, enforcement, capacity building, and awareness raising for sustainable (on-site) sanitation and grey water treatment. 2) Enhance fecal sludge treatment and regular de-sludging of onsite sanitation and DEWATS systems through awareness raising, promotion campaigns and regulation enforcement.	Improve quality of life of all Vientiane Capital citizens through equal access to public services, handle natural disasters and adapt to climate change.
A2. Build technical capacity on sanitation management for relevant authorities from central to village level to effectively implement, monitor, inspect, and evaluate sanitation related works.		
A3. Develop urban sanitation standard guidelines, and regulations, including onsite system standards, grey water treatment, including integrating into construction permits to ensure urban wastewaters must be treated before being released to natural environment.		
A4. Seek to promote centralized wastewater treatment system in the core city, DEWATS and standardized onsite system in Peri-urban and rural areas, and ensure sanitation systems are climate resilient.		
A5. Improve, maintain and protect drainages and canals through regulation enforcement and promoted public participation in terms of cleaning of litters and maintenance to enhance its function in treating wastewater.	3). Protect and maintain natural and constructed drainage canals, and ponds to enhance urban wastewater treatment through natural ecosystems.	

Table 8: Wastewater and sanitation projects

Action	Project Code	Project Name	Project Objectives	Activities	Time Frame	Location	Budget (USD)	Responsible agency
A1	WWS1	Awareness raising on the impacts of wastewater and sanitation for communities	• Raise awareness on wastewater and sanitation for communities.	• Design training programs and materials focusing on awareness raising and behavior changing. • Deliver training sessions for target groups. • Design communication materials, and campaign. • Monitor and follow up household sanitation in target areas.	2022-2024	District authorities and villages	100,000	VCOMS, DoNRE
A2	WWS2	Capacity building on sanitation management for relevant authorities from central to village level	• Build technical capacity for authorities to be able to raise awareness, enforce, implement, monitor, inspect, and evaluate sanitation related works at local level.	• Conduct the baseline assessment of sanitation personnel capacity at different levels. • Design and develop training programs that suitable for all the level. • Provide training to relevant authorities.	2023-2025	All levels of national and local governemnts	200,000	DPWT, DONRE, VCOMS, Districts, Villages.
A3	WWS 3	Development of sanitation standards guidelines and regulation on for onsite system	• To improve wastewater and sanitation in Vientiane Capital. • To provide the standards of onsite sanitation system for households as part of construction permits. • To enforce regular de-sludging of septic in Vientiane Capital, including fees and penalties. • To improve the overall health condition of Vientiane Capital residents.	• Develop guidelines on the standards of septic tanks for households, buildings and business entities. • Develop/draft regulations on enforcing the standards, including de-sludging, and maintenance. • Integrate the standard guideline into construction permits. • Disseminate the guideline and regulation to all local authorities. • Provide awareness raising on the sanitation issues and the enforcement of the guidelines and regulation.	2023-2025	Entire Vientiane Capital	300,000	DPWT, Mayor's Office, Districts, Villages

A3	WWS 4	Development guidelines and regulations on the management of household grey water from domestic use	• To improve wastewater in Vientiane Capital. • To provide solutions for grey water treatment. • To improve city environment quality, and overall health condition of Vientiane Capital residents.	• Develop guidelines for grey water treatment for households, buildings and business entities. • Develop/draft regulation introducing and enforcing the guideline. • Integrate the standard guideline into construction permits. • Endorse regulation by city mayor. • Disseminate the guidelines and regulation to all local authorities. • Provide awareness raising on the sanitation issues and the enforcement of the guideline and regulation.	2023-2025	Entire Vientiane	200,000	DPWT, Mayor's Office, Districts, Villages
A4	WWS 5	Scaling up Decentralized Wastewater Treatment System (DEWATS) for communities, hospitals, business and public buildings	• To treat wastewater from hospital to before discharging to natural water body. • To improve and provide better hygiene for patients and communities. • To improve sanitation and hygiene for public servants.	• Preliminary assessment on the location. • Design and construct treatment system (DEWATS), • Establish management and operation unit for management and operation.	2024-2030	In Vientiane Capital	3, 500,000	DPWT, DONRE, Hospital, Communities
	WWS 6	Wastewater management planning by clustering city areas into zones for appropriate treatment services	• To define effective wastewater management solutions for each area zone of the city.	• Conduct a baseline assessment on wastewater condition for Vientiane Capital to identify current and existing treatment types (using sea level map, urban development/ extension map). • Define wastewater management approach/identify appropriate treatment solutions for each area. • Develop wastewater management plan by clustering the city into different zones for different types of treatment.	2024-2028	Entire Vientiane Capital	100,000	DPWT

A5	WWS 7	Community canal improvement and maintenance	• Clean and maintain community canals for better efficient drainage capacity. • To ensure no floods in the communities during rainy season. • To protect the health of urban citizens.	• Develop improvement and maintenance plan for the community canals. • Awareness raising for communities resides along community canals on solid waste handling and their engagement in cleaning and maintaining of the canals.	2022-2030	Key public canals in Vientiane Capital	50000	VCOMS , District, Villages
	WWS 8	Protection and conservation of natural canals, wetland and canals	• To promote natural based solutions for wastewater treatment. • To raise awareness on the importance of natural ponds. • To conserve and protect natural assets for the long-term city environment and well-being of people.	• Conduct a baseline assessment of all natural canals, ponds, and wetlands in Vientiane Capital. • Conduct inventory of those assets and conserve such public assets. • Develop management plan for those assets to enhance its function in terms of treating and retaining water.	2024-2028	Entire VTE	200,000	DPWT, DONRE, Mayor's Office, District, Villages

2.3 Climate Change and Disaster Resilience



Flooding is the most critical climate-related threat for Vientiane Capital, causing significant impacts and losses to local people and economic activities. Additionally, the increasing intensity of extreme climate events, such as heat waves, poses a major challenge due to climate change. To overcome these challenges and achieve the green city vision in the long term, Vientiane Capital has set forth the following specific actions.

Sectoral objectives:

- Increase urban resilience to climate risk through mainstreaming climate change mitigation and adaptation into city development planning;
- Enhance urban environment through emissions reduction from waste, pollution, and increase carbon sequestration sources in the city;
- Protect populations and reduce impacts from climate and disaster related events (storms, floods, heatwaves) trough infrastructure improvement, and awareness raising;
- Promote ecosystem-based adaptation and nature-based solutions (stream and ponds restoration).

Targets and Indicators:

Table 9: Targets and Indicators for climate change and disaster resilience

Indicators	Baseline	Targets 2030
Development of Net Zero Plan for Vientiane Capital (# plan)***	0	1
Greenhouse gas emissions per capita per annual (ton/person/year) ****	2.7	2
The number of people affected by disasters (people) ***	2,000	<1,200
Amount of economic loss due to natural disasters (% of GDP) **	0.3	0.25
Urban forest coverage rate in Vientiane Capital (%)	NA	75
Development of disaster risk management plans for districts (# district), including disaster risk fund *	NA	9
Establishment of district disaster management committees with disaster response plan. For 3 districts (Sangthong, Pak Ngum and Hadxaifong) and 10 villages*	NA	3 dist. &10 villages
Development and improvement of public accessibility to climate information, including early warning system*	NA	3 dist. &10 villages *
Construction of flood protection barriers and sluices in Xaythany and Pak Ngum districts*	NA	2 districts

Source: * *9th SEDP of Vientiane Capital*
** *NGGS (WB report) -the number of people affected by disasters is declining (people)*
*** *adopted from NGGS - calculated by population proportion.*
**** *(CO2 emissions (metric tons per capita) - Lao PDR | Data (worldbank.org)*

Priority Actions:

Table 10: Priority actions for climate change and disaster resilience

Priority Actions	Link to	
	Sectoral Objectives	Strategic Objectives
A1. Rehabilitate and maintain climate related infrastructures such as drainage network, canals, riverbank, and pumps stations are always in good condition especially prior to rainy season to ensure effective operation.	1) Protect populations and reduce impacts from climate and disaster related events (storms, floods, heatwaves) through infrastructure improvement and awareness raising;	Protect urban environment in a systematic and sustainable manner by reducing air, water, noise and soil pollution, including reducing greenhouse gas emissions into the atmosphere.
A2. Improve the climate information system for Vientiane Capital, including early warning to ensure all citizen have access to climate information.		
A3. Develop city climate and disaster prevention guideline, including preparedness and emergency response plan with regularly update and improvement, and ensure Vientiane Capital Disaster Prevention and Control Committee is strengthened with adequate capacity and resources.	2) Increase urban resilience to climate risk through mainstreaming climate change mitigation and adaptation into city development planning;	
A4. Develop smart and resilient urban planning through an integration of climate change adaptation into urban planning.		
A5. Reduce carbon emissions and pollution through increasing carbon sequestration sources such as trees coverage, and pollution control measures.	3) Enhance urban environment through emissions reduction from waste, pollution, and increase carbon sequestration sources in the city;	
A6. Natural hydrological systems including ponds and water-receiving bodies will be restored to enhance flood management.	4) Promote ecosystem-based adaptation and nature-based solutions (stream and ponds restoration).	

Table 11: Climate and disaster resilience projects

Action	Project Code	Project Name	Project Objectives	Activities	Time Frame	Location	Budget (USD)	Responsible agency
A1	CCR1	Maintenance and improvement of public canals	• To improve city wastewater flow, remove blockages and prevent flooding. • To protect and manage public canals, improve esthetics and create water related ecotourism business opportunities in the city. • To protect and rehabilitate the water ecosystem in Vientiane Capital.	• Conduct situational analysis to identify key issues of the key public canals in Vientiane Capital. • Develop management plan, including operation & monitoring plan. • Implement maintenance activities-annual basis.	2023-2030	6 key public canals in Vientiane Capital	300,0000	VCOMS, DPWT, DONRE
	CCR2	Pilot project on green infrastructures to enhance flood resilience for Vientiane Capital	• To enable Vientiane Capital government in integrating green infrastructure concept into urban development and flood management. • To promote green infrastructure and its benefits for the city.	• Conduct flood risk assessment for Vientiane Capital, and identify the areas with high flood risks. • Assess the current condition of canals and its vulnerability to climate change. • Identify green infrastructure options based on the results of the assessments, including conducting a cost-benefit analysis of green infrastructure. • Develop investment plan and implement the green infrastructure projects.	2026-2030	Entire Vientiane	1,500,000	DPWT, DPI, DONRE, Mayor's Office

A1	CCR 3	Flood protection infrastructure project for vulnerable communities, particularly flood gates	• Prevent floods and loss of infrastructures due to flooding. • To prevent economic properties losses of Vientiane Capital residents due to flood related events.	• Conduct situational analysis on the current condition of vulnerable areas, focusing on the flood gates and pumping system. • Design the flood gates and construction. • Develop maintenance and operation guidelines for the infrastructure.	2024-2030	Mekong River, Xaythani and Pak Ngum districts	2,500,000	DONRE, DPWT, Districts
A2	CCR4	Early warning system improvement for communities through the use of real time mobile application	• To improve access to real time information on climate risk and disasters for all citizens. • Enhance preparedness of communities in case of emergency related to climate risk and disaster. • Prevent damage and losses due to climate events.	• Conduct baseline assessment on current dissemination of climate related information, such early warning system. • Develop real-time mobile application and integrate climate risk info into the mobile network and connect with national climate center/ Department of Meteorology and Hydrology, MoNRE. • Improve the national climate center/climate committee at national and sub-national level to ensure climate data is up to date and real time. • Pilot the early warning systems, application and ensure its function. • Launch the application and provide necessary capacity building for operation.	2025-2028	Entire Vientiane	2,500,000	DONRE, DPI, Mayor's Office
A3	CCR5	Flood vulnerability assessment in Vientiane Capital, including developing of flood management plan	• To develop flood risk management plan for risky areas in Vientiane Capital. • To protect the loss of infrastructures due to flooding. • To prevent economic properties losses of Vientiane Capital residents due to flood related events.	• Conduct flood risk and vulnerability of Vientiane Capital, focusing on risky areas and communities. • Develop flood management plan. • Improve and maintain key infrastructures in the risky areas. • Implement flood management plan to ensure climate resilient in the future focusing on natural based solution.	2023-2027	Entire Vientiane	500,000	DPWT, DONRE

A4	CCR 6	Development of public canal and drainage management master plan for Vientiane Capital	• To enhance Vientiane Capital in managing the drainage system, particularly public canals and key drainage system. • To develop management plan for the capital public canals and drainage system. • Prevent unpermitted possesses of public canals, drainages, and adjacent areas that belong to public. • Prevent flooding and damage to infrastructures and property of communities.	• Conduct assessment on the current situation of public canals and drainage system in Vientiane Capital, looking from climate risk perspective. • Develop public canal and drainage system master plan for Vientiane Capital. • Develop regulations to manage and control the utilization of public canals and drainages. • Develop maintenance plan for public canals and drainages, including improving the damaged canals.	2024-2028	Entire Vientiane Capital	1,500,000	DPWT, DONRE, Mayor's Office
	CCR7	Impact assessment of the sand and gravel extraction from Mekong and NamNgeum river	• To develop a proper management and monitoring plan for the sand and gravel extraction activities in Vientiane Capital. • Protect long term impact on environment, riverbanks, and communities in Vientiane Capital.	• Conduct a situational assessment of the current sand and gravel extraction from Mekong and Ngeum River to identify issues and opportunities for improvement. • To develop a management and monitoring plan for the sand and gravel extraction activities, including penalization measures to ensure the activities are well compliant. • Develop implementation guidelines for companies to follow.	2023 -2025	Entire Vientiane	300,000	DONRE, DOIC, Mayor's Office
A5	CCR8	Development of Net Zero plan for Vientiane Capital	• To reduce greenhouse gas emissions of Vientiane Capital for long-term city environment improvement. • To develop a clear plan for greenhouse gas reduction. • To enhance the Vientiane Capital leadership's commitment greenhouse gas reduction toward net zero emissions of Vientiane Capital.	• Conduct baseline assessment of Vientiane Capital greenhouse gas emissions, challenges and opportunities. • Develop Net Zero Plan for Vientiane Capital, including implementation strategy, workplan and targets as well as monitoring and evaluation framework. • Endorse the Net Zero Plan, raise awareness for all Vientiane Capital stakeholders.	2024-2028	Entire Vientiane	500,000	DONRE, Mayor's Office DPI, City Departments

			• To improve the well-being of city citizens in the long run.	• Promote and integrate the Net Zero Plan into sub-national and local development plan.				
A6	**CCR 9**	Climate change adaptation for Vientiane Capital through the promotion of water and natural ecosystem	• To pilot using water ecosystem for city climate adaptation solution. • To promote and create water related ecotourism business opportunities in the city. • To protect and rehabilitate the water ecosystem in Vientiane Capital.	• Conduct preliminary assessment on the natural ponds in Vientiane Capital. • Identify and select natural ponds/ marsh for the project. • Develop management plan for those ponds. • Improve and rehabilitate selected natural ponds for better water ecosystem. • Promote eco-friendly tourism and recreational activities in those natural ponds.	2026-2030	Entire Vientiane, and Thatluang Marsh.	500,000	DONRE, DPI, Mayor's Office

2.4. Sustainable Mobility



Key challenges to the city's urban transportation and mobility include limited public transport services, weak traffic and pedestrian management, a lack of sidewalks, uncontrolled parking, inadequate designated parking spaces, and insufficient road lighting at night. To address these challenges, Vientiane Capital will undertake the following actions

Sectoral objectives:

- Improve urban transport infrastructures that creates favorable conditions for sustainable public transportation, including active mobility in the city.
- Introduce sustainable and low carbon public transportation in city; including cycling, walking, using of public transport, using electric vehicles to reduce traffic congestion, air pollution, and GHG emissions.
- Reduce traffic congestion and road accidents through regulations, road safety measures and awareness raising campaigns.

Targets and Indicators:

Table 12: *Targets and indicators for sustainable mobility*

Indicators	Baseline	Targets 2030
The proportion of EVs in all vehicles increased (%)*	< 1	30
Number of EV charging station in Vientiane Capital (#)	20	100
Road accidents reduction per year (%) ***	(1.072 cases)	30
Public bus service coverage (% of service coverage)	30	80
Non-motorized areas (#)	NA	1
Establishment of modern vehicle management system *	NA	1

Source: ** NDC 2021 and Prime Minister resolution on promotion of EV in Lao PDR.*
*** MPWT strategy 2020-2030*
**** Traffic accidents | Country*
***** 9th SEDP of Vientiane Capital*

Priority Actions:

Table 13: Priority Actions for sustainable mobility

<table>
<tr><th rowspan="2">Priority Actions</th><th colspan="2">Link to</th></tr>
<tr><th>Sectoral Objectives</th><th>Strategic Objectives</th></tr>
<tr><td>A1. Develop sustainable transport strategy for Vientiane Capital.</td><td rowspan="3">1) Improve urban transport infrastructures that create favorable conditions for sustainable public transportation, including active mobility in the city.</td><td rowspan="4">• Improve quality of life of all Vientiane Capital citizens through equal access to public services, handle natural disasters and adapt to climate change.

• Enhance quality economic growth through sustainable and efficient use of limited resources and environmentally friendly technologies.</td></tr>
<tr><td>A2. Improve city public transit service and operation to support the Bus Rapid Transit (BRT) system and railway in Vientiane Capital.</td></tr>
<tr><td>A3. Improve urban transport infrastructures that creates favorable conditions for active mobility in the city through improving walkways, fixing of road signages, removing of obstacles, improve street light, plant more trees and flowers to enhance city landscape and create shades.</td></tr>
<tr><td>A4. Deploy low carbon transportation in Vientiane Capital through replacing buses with emissions buses.</td><td>2) Introduce sustainable and low carbon public transportation in city, including cycling, walking, using of public transport, using electric vehicles to reduce traffic congestion, air pollution, and GHG emissions.</td></tr>
<tr><td>A5. Develop and enforce traffic regulations, including road-side parking control to reduce traffic congestions, and road accidents.</td><td>3) Reduce traffic accidents and congestions through regulations, road safety measures and awareness raising campaign.</td></tr>
</table>

Table 14: Sustainable mobility projects

Action	Project Code	Project Name	Project Objectives	Activities	Time Frame	Location	Budget (USD)	Responsible agency
A1	SM1	Sustainable urban transportation and mobility strategy for Vientiane Capital	• To define green and sustainable urban transportation and mobility for Vientiane Capital. • To develop sustainable urban transportation strategy and road maps for Vientiane Capital.	• Conduct baseline assessment on current transportation and mobility of Vientiane Capital to identify underlying problems and challenges. • Develop low carbon and sustainable transportation and mobility strategy, including action plan. • Integrating sustainable transportation and mobility strategy into city urban planning and city socio-economic development plan.	2025-2030	Entire Vientiane Capital	300,000	DPWT, DEM, VCOMS, Mayor's Office
A2	SM2	Enhancing quality, and transparent transport service of taxi, including tuk-tuk and Xongtheo through capacity building program	• To improve the quality and transparency of city transportation services. • Improve the capacity of drivers to provide ethic services. • Promote passengers to use the service and create jobs for drivers.	• Conduct baseline assessment on current service of taxi services, including tuk-tuk and Songtheo to identify underlying problems and challenges. • Define project participants (drivers). • Develop service improvement plan and training materials. • Conduct training programs for drivers.	2023-2025	Taxi association, and Tuk Tuk drivers.	200,000	DPWT, VCOMS, Mayor's Office
	SM3	Improve bus operation service through using ICT application to help passengers with real time information	• To improve public transport service for all citizens. • To encourage people to use public service. • Reduce traffic congestion in the city.	• Conduct baseline assessment on current bus service to identify underlying problems and challenges. • Identify and develop bus schedule for all the bus routes, including bus top points. • Develop application integrating bus schedule into google maps and install GPS on every bus to provide real time schedule for all the citizens.	2024–2027	Entire Vientiane Capital	500,000	DPWT, VCOMS, Mayor's Office, ICT companies

A2	SM4	Improve bus stops for the entire city to have access to bus services	• To encourage people to use public bus service. • Reduce traffic congestion in the city. • Reduce air pollution and greenhouse gas emissions.	• Conduct baseline assessment on current bus service (routes) to identify underlying problems and challenges. • Define all bust stops, and develop improvement plan. • Develop and improve bus stops to provide sufficient facilities for people.	2025-2030	Entire Vientiane Capital	1,000,000	DPWT, VCOMS, Mayor's Office, ICT company
	SM5	Enhance public bus service to cover the entire Vientiane Capital	• To provide sufficient public transportation for all citizens. • Provide better access to public transportation for poor communities outside of existing bus routes. • Improve well-being of all citizens.	• Conduct baseline assessment identify inaccessible areas. • Develop bus service plan and establish bus stops in those areas. • Procure buses or e-buses for the services. This could be done by calling for a bid from private investor.	2024-2026	Entire Vientiane Capital	2,500,000	DPWT, DPI, VCOMS, Mayor's Office
A3	SM6	Pilot project on defining specific lane for bicycle to promote the use of bicycle for transportation in city, including bicycle renting, regulation enforcement	• To promote the use of the bicycle as a form of transportation in the city. • To promote low carbon transportation. • To reduce carbon emissions from vehicles.	• Conduct survey, identify target roads in the core city, and define special lane for bicycle connecting key important places. • Employ driving regulations in the areas where there are bicycle lanes so that commuters are aware and be compliant. • Improve signages for better understanding of bicycle riders. • Raise awareness for drivers and riders of cars and motorcycles.	2026-2030	Roads along Mekong Riverbank. Lanexang road, roads to tourist destinations	1,000,000	DPWT, DPI, VCOMS, Mayor's Office
	SM7	Project on improvement of walkways, pedestrian crossings, traffic lights systems in Vientiane Capita	• To improve and enhance driving experience in the city. • To enhance the efficiency of city active mobility and walkability.	• Conduct baseline assessment to identify challenges and opportunities and define project areas. • Improve walkways along main roads by removing barriers, signs, electric cables.	2025-2027	Pilot in core city	300,000	DPWT, DPI, VCOMS, Mayor's Office, Traffic Police office

A3	SM7			• Improve crossroads conditions, including directional signs, traffic light systems. • Enforce traffic regulations on side road parking to minimize road blockages and barriers.				
	SM8	Parking space development and improvement for the better urban transportation	• To improve overall urban transportation. • To develop designated parking spaces for better city environment. • Improve overall city landscape.	• Conduct baseline assessment on the current condition of parking and parking areas in Vientiane Capital. • Identify the most needed parking areas to be developed and improved. • Develop public parking space development plan (for both public areas, and parking requirement for private entities). • Improve existing parking areas. • Develop and enforcing parking regulations in the city.	2024-2030	Entire Vientiane	2,500,000	DPWT, DPI, VCOMS, Mayor's Office, Traffic Police office
A4	SM9	Pilot the use of EV for city bus service and public agencies	• To scale up e-bus service for public transportation in addition to the BRT system. • To encourage using of EV for governmental agencies.	• Conduct study on using e-bus for the additional route outside BRT system. • Develop e-bus procurement plan for the state bus enterprise, including financial modeling and cost-benefit analysis. • Develop EV procurement plan for government agencies to initiate piloting, as part of government commitment to EV transition. • Launch public EV procurement.	2023-2028	DPI, DEM, DPWT DoNRE, Mayor's Office	3,000,000	DPWT, DPI, DEM, Mayor's Office
	SM10	Pre-feasibility study on piloting e-tuk tuk and e-two wheelers for passenger service feeding the BRT and railway station	• To improve public transits between key transportation terminals. • To improve reduce air pollution and greenhouse gas emissions. • Increase domestic consumption of electricity. • Create jobs.	• Conduct study on e-tuk tuk and e-two wheelers for passenger service feeding the BRT and railway station, including charging station. • Develop investment plan for the e-tuk tuk and e-two wheelers, including financial modeling.	2025-2038	Entire Vientiane Capital	300,000	DPWT, DPI, DEM, DoIC

A4	SM11	Piloting Battery Swapping System in Vientiane Capital	• To promote EV transition in Vientiane Capital. • To reduce air pollution and greenhouse gas emissions. • To reduce imports of Fossil fuels.	• Utilize an available study conducted by GGGI and MPI funded by UK embassy on the Battery Swapping System in Vientiane Capital. • Foster development in the investment sector.	2023-2028	Key ministries or departments	300,000	DPWT DEM DPI
	SM12	Pre-feasibility on the development of non-motorize area within Vientiane Capital core city to improve air quality, traffic congestion, promote EV transition and create business opportunities	• To improve the city environment and landscape. • Promote city tourism and business opportunities. • To reduce air pollution and greenhouse gas emissions.	• Conduct baseline assessment on the non-motorized areas in the old city area of Vientiane Capital. • Define non-motorized zone and develop non-motorized master plan. • Develop regulations and management plan for the non-motorized zone. • Public awareness on non-motorized zone.	2025-2030	Vientiane Capital core city	500,000	DPWT DPI Mayor's Office VCOMS
A5	SM13	Develop and enforce regulations on parking, bike lanes, walkways to reduce traffic congestions and road accidents, and awareness raising	• To effectively manage city urban transportation. • To raise awareness for all residents regarding the regulations, safety measures and penalties.	• Review existing road safety regulations and guidelines. • Improve and develop new regulations that do not yet exist. • Endorse those regulations by relevant government agencies. • Enforce regulations and raise awareness of the public.	2024-2030	Entire Vientiane Capital	400,000	DPWT DPI Mayor's Office Police Office Department of Justice

2.5. Public Green Space



Public green space in Vientiane Capital remains limited, especially considering its growing population. Currently, there are only nine public parks available for recreation, and the facilities in these parks—such as toilets, parking areas, lighting, and cleaning services—are still insufficient.

In summary, the availability and quality of green space are inadequate to significantly enhance the quality of life for Vientiane Capital's citizens. Recognizing this, Vientiane Capital has established the following objectives and targets and will undertake the actions outlined below as part of its efforts to achieve the green city vision and objectives by 2030.

Sectoral objectives:

- Develop public green spaces for recreational and business opportunities through development of new parks & gardens and improvement of existing parks.
- Promote an incorporation of green space concept into development/ construction projects including public and private investment projects.
- Increase tree coverage in the city to increase greenery and well-being of residents.

Targets and Indicators:

Table 15: Targets and indicators for green space and walkability

Indicators	Baseline 2020	Targets 2025	Targets 2030
Green space area per person (m^2/person)	0.26	2.6****	9
Number of public parks in Vientiane Capital (number of parks) **	9	11	13
Tree coverage in Vientiane Capital (%) **	57	70	80
Public building areas (offices, schools) is covered by green space (#) ***	NA	25	30

Source: * *Modern Compact Cities: How Much Greenery Do We Need? (nih.gov) 9m2 – 50 m2.*
** *9th SEDP of Vientiane Capital*
**** *VTE Master Plan III*

Priority Actions:

Table 16: Priority actions for green space and walkability

Priority Actions	Link to	
	Sectoral Objectives	Strategic Objectives
A1. Develop and expand public green spaces in Vientiane Capital, including public parks, gardens and green pedestrian walkways for inclusive access for all citizens and suitable for social and economic activities such as exercise, kid playgrounds, toilet, designated parking, and businesses.	1) Develop public green spaces for recreational and business opportunities through development of new parks & gardens and improvement of existing parks.	• Improve quality of life of all Vientiane Capital citizens through equal access to public services, handle natural disasters and adapt to climate change. • Protect urban environment in a systematic and sustainable manner by reducing air, water, noise and soil pollution, including reducing greenhouse gas emissions into the atmosphere.
A2. Develop building regulations requiring 30% of total areas as green space, and awareness raising on design and development of green spaces including shade trees, permeable ground, rainwater capture using pond or rainwater tanks.	2) Promote and incorporation of green space concept into development and construction projects, including public and private investment projects.	
A3. Plant more trees along roadsides, schools, public building offices and households to increase tree coverage and improve air quality.	3) Increase tree coverage in the city to increase greenery and the well-being of residents.	

Table 17: Green space projects

Action	Project Code	Project Name	Project Objectives	Activities	Time Frame	Location	Budget (USD)	Responsible agency
A1	GS1	Public parks development in Vientiane Capital using the available data in the Vientiane Urban Master Plan III	• To increase public parks in Vientiane Capital to meet minimum requirements. • To enhance business opportunities and well-being of Vientiane Capital residents. • To improve the city environment and biodiversity.	• Conduct a baseline assessment on the available public areas that could be converted into public parks. • Design public parks for those public areas, including access and facility aspects. • Develop investment plan for the proposed public parks to attract investment from both government and private investors.	2023-2027	Entire Vientiane Capital	500,000	DPWT, DAF, Mayor's Office, VCOMS
	GS2	Improve existing public parks for better access and utilization of Vientiane Capital residents. (Lighting, parking areas, facilities, waste management, maintenance	• To improve access and utilization for the city residents. • To provide sufficient facilities to the public parks, including lighting, parking space, restroom, waste management, and maintenance. • To enhance MSME business opportunities. • To improve city environment and biodiversity.	• Conduct a baseline assessment on the existing public parks in Vientiane Capital to identify challenges and opportunities for improvement as well as potential businesses. • Identify target parks in Vientiane Capital. • Develop improvement and management plan, including investment plan. • Engage private sectors to invest for the improvement via PPP approaches.	2023-2030	Entire Vientiane Capital	1,000,000	DPWT, DAF, Mayor's Office, VCOMS, DCIT
	GS3	Improve the sidewalk, crossroad, bicycle lanes, solar lights, tree coverage along key roads in Vientiane Capital according to the 6 aspirations – Lanexang Road from	• To improve access and utilization for city residents. • Promote active mobility such as walking, cycling, other low carbon transportation such as EV in the city.	• Conduct a baseline assessment on the key roads in Vientiane Capital to identify current issues. • Develop improvement and management plan for the identified issues.	2023-2028	Lanexang Road, Kaysone Phomvihane Road, Souphanouvong Road, and 450 Roads*	2,500,000	DPWT, DAF, VCOMS, DPI, Mayor's Office

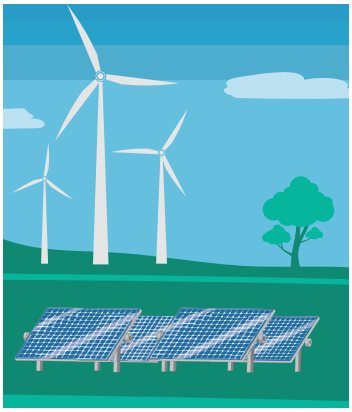
A1		Horkham to Patuxay, Patuxay to Thatluang and Horkham to Jao Anou Park, Kaysone Phomvihane Road, Souphanouvong Road, and 450 Roads*	• To enhance and improve city greenery, city environment and biodiversity. • To improve city air quality and increase carbon sequestration source.	• Develop investment plan to be submitted to Vientiane government and or seek support from donors and private sectors. • Develop tree planting plan by engaging with city stakeholders, include international organization.				
	GS4	Develop and extend public parks along Mekong River, as part of the river bank protection project*	• To increase the number of public parks in Vientiane Capital. • To enhance business opportunities and well-being of Vientiane Capital residents.	• Conduct a prefeasibility study on the potential parks along Mekong River. • Design public parks. • Develop investment plan to be submitted to Vientiane government and or seek support from donors and private sectors.	2023-2028	Along Mekong River	5,000,000	DPWT, DAF, VCOMS, DPI, Mayor's Office
	GS5	Develop roadside green spaces and improve walkability among key roads in Vientiane Capital	• To increase public green space for city residents' utilization. • Promote active mobility such as walking, cycling, other low carbon transportation such as EV in the city. • To enhance and improve city greenery, city environment and biodiversity.	• Conduct a baseline assessment on the key 21 roads in Vientiane Capital to identify current issues. • Develop improvement and management plan. • Conduct the improvement that may include removing of roadside barriers (shops, construction, houses along the roads, cable lines), improving lighting, crossroad. • Plant more trees along roadsides.	2024-2030	21 key roads in Vientiane Capital*	1,500,000	DPWT, VCOMS, Mayor's Office
A6	GS6	Develop green space regulations and integrate into construction permits requiring 30% of green space	• To promote the green space concept for all residents. • To enhance and improve city greenery, city environment and biodiversity. • Increase carbon sequestration source.	• Review existing national, sub-national city regulations to identify challenges, gaps and opportunities. • Develop green space regulation for Vientiane Capital. • Integrate the green space regulation into construction permits, city urban development plans.	2025-2028	Entire Vientiane	300,000	DPWT, VCOMS, Mayor's Office.

A2	GS7	Develop a green space master plan for Vientiane capital, including demarcation of potential public parks and areas to protect land invasion and possession	• To develop a green space master plan for Vientiane capital toward 2050. • To enhance pipeline park development, and • Reserve adequate public areas for future parks development.	• Conduct baseline study on the current public parks and public areas to identify appropriate land that can be converted into future public parks. • Develop and draft green space master plan for Vientiane Capital. • Develop regulation or decision to reserve such areas for future parks. • Demarcate such future parks for future development to protect land use change and conversion.	2024 - 2028	Entire Vientiane	1,000,000	DPWT, VCOMS, Mayor's Office
	GS8	Capacity building and awareness raising on green city and green public spaces for communities	• To provide capacity building on city environmental protection for communities in Vientiane Capital. • To raise awareness on the importance and necessity of city environment, including clean, green and tidiness.	• Design green family standard (to promote green space around households and at village level. • Design and develop a green awareness training program (on green, clean and tidiness, including environment protection, pollution control, waste handling). • Provide green awareness training programs at schools, communities, and business entities. • Follow up support to green family and green village according to the standard set.	2025-2027	5 districts in Vientiane Capital.	300,000	DPWT, VCOMS, Mayor's Office
A3	GS9	Increase tree coverage in the city to improve city greenery and environment through social engagement	• Increase trees coverage in the urban areas to improve greenery in the city and well-being of Vientiane Capital residents. • Provide shade for walkability and cycling. • Improve city environment and biodiversity. • Raise awareness on greenery and the importance of tree coverage for city stakeholders.	• Conduct an assessment of the key roads in Vientiane Capital to identify where more trees are needed. • Develop tree planting plan, including maintenance plan. • Conduct campaigns to promote tree plantings, targeting key ministries, NGOs, and DPs to support the program financially. • Conduct the tree planting on national plantation day.	2024-2030	Entire Vientiane Capital	500,000	DPWT, VCOMS, Mayor's Office, NGOs, DPs

A3	GS10	Inventory of roadside trees for species identification and management	• Improve data collection of roadside trees, particularly number of trees and species to enhance better management and maintenance.	• Design and develop survey tools, including database. • Conduct the inventory of trees along the main roads and public offices (excluding protected forest). • Develop management and maintenance plan of the trees according to the species. • Promote tree planting where needed.	2025-2027	Entire Vientiane Capital	300,000	DPWT, VCOMS.

Source: ** 9th SEDP of Vientiane Capital*

2.6. Sustainable Energy



Vientiane Capital has set below objectives, and targets for energy sector as well as will undertake the below actions as part of the efforts to achieving its green city vision, objectives by 2030.

Sectoral objectives:

- Reduce electricity consumptions, reduce public debt through introduction of energy efficiency measures.
- Promote the use of renewable energy, including solar, wind energy, and biofuels to increase energy mix and reduce dependence on imported energy sources.
- Promote energy saving and energy efficiency in the industrial, residential, and transport sectors through awareness raising and capacity building.

Targets and Indicators:

Table 18: *Targets and Indicators for energy priority*

Indicators	Baseline	Targets 2030
Average electricity consumption per person year (KWh/person/year) ***	636.13	<1000
Production of renewable energy (solar energy& waste to energy) (MW)*	46	159
Deployment of clean cooking stoves (unit)**	NA	6,775 (14%)
Share of renewable energy in energy mix (hydro, solar, wind) (%)**	12	30
Final energy consumption reduction (%) **	NA	10
Proportion of biofuels in the transport sector **	1 (2019)	10
Reduce public debt from the use of electricity in public buildings, streetlights, etc. (%)	NA	15

Source: ** 9th SEDP of Vientiane Capital (p67)*
*** Adopted from NDC 2021*
**** NGGS (Electricity consumption per capita | Country (gms-eoc.org))*

Priority Actions:

Table 19: Priority actions for sustainable energy

<table>
<tr><th rowspan="2">Priority Actions</th><th colspan="2">Link to</th></tr>
<tr><th>Sectoral Objectives</th><th>Strategic Objectives</th></tr>
<tr><td>A1. Energy efficiency is enhanced in the residents, government, commercial buildings and industries to promote energy saving and reduce final energy consumption.</td><td>1) Reduce electricity consumption through introduction of energy efficiency measures.</td><td rowspan="3">• Protect urban environment in a systematic and sustainable manner by reducing air, water, noise and soil pollution, including reducing greenhouse gas emissions into the atmosphere.

• Enhance quality economic growth through sustainable and efficient use of limited resources and environmentally friendly technologies.</td></tr>
<tr><td>A2. Promote the use of clean energy technology, including home cooking technology (clean cookstove, biogas) to reduce air pollution.

A3. Deployment of electric charging infrastructure in Vientiane Capital.</td><td>2) Promote the use of renewable energy, including solar, wind energy, and biofuels to increase energy mix and reduce dependence on imported energy sources.</td></tr>
<tr><td>A4. Capacity building on renewable energy and technical specification for energy related personnel in Vientiane Capital.</td><td>3) Promote energy saving and energy efficiency in the industrial, residential, and transport sector through awareness raising and capacity building.</td></tr>
</table>

Table 20: Sustainable energy projects

Action	Project Code	Project Name	Project Objectives	Activities	Time Frame	Location	Budget (USD)	Responsible agency
A1	SE1	Development of energy efficiency guideline and regulations	• To promote energy saving and efficiency in residential, commercial, and industrial sectors. • To reduce electricity consumption.	• Develop energy efficiency guidelines for residential, commercial and industrial buildings. • Develop energy efficiency regulations and enforce appropriately. • Raise awareness of the public towards the guideline and regulations to the public.	2023-2025	Entire Vientiane Capital	200,000	DEM, Mayor's Office
	SE2	Energy efficiency in buildings	• To reduce energy consumption in buildings through energy efficiency solutions.	• Identify target public buildings for the project. • Conduct energy audits in those buildings. • Provide investment for energy efficiency improvement, such as replacing energy intensive appliances. • Provide awareness-raising training session on energy efficiency for relevant stakeholders.	2023-2027	Public buildings such as: builds of Mayor's Office, Department of Energy and Mines	300,000	DEM, Mayor's Office, DPI
	SE3	Energy efficiency program in industrial sector	• To promote energy saving and efficiency in the industrial sector. • To reduce electricity consumption and financial saving.	• Identify target industries. • Conduct energy audit in those industries. • Develop energy efficiency and saving plan for the industries, including investment plan for improvement, such as replacing energy intensive equipment and; appliances. • Provide awareness raising training session on energy efficiency for relevant stakeholders.	2025-2028	Industrial Parks, SEZs	500,000	DEM, DoIC, DPI

A1	SE4	Energy Service Company (ESCO) in Vientiane Capital	• To create business opportunities on ESCO services. • To promote energy efficiency to the public.	• Develop an ESCO business development plan, including financial model and investment plan. • Provide capacity building on the ESCO program. • Engage private sector for investment and pilot programs.	2025-2028	Entire Vientiane Capital	300,000	DEM, DoIC, Private investor
	SE5	Replacement of energy intensive streetlights with smart and energy efficient lights	• To reduce energy consumption from public streetlights. • To reduce public debt from public streetlight. • To promote energy efficient technologies.	• Conduct a baseline assessment on the current streetlights in Vientiane Capital, including parks to identify current energy intensive streetlights. • Develop replacement and investment plan to the replacement. • Procure and install smart and energy efficient streetlights. • Private investment in the form of PPP can be an option.	2023-2027	Entire Vientiane Capital	1,500,000	DEM, VCOMS, DPI, Private investor
	SE6	Assessment of community willingness to pay for installing solar streetlights in Vien-tiane Capital	• To assess the willingness to pay and contribution of communities in stalling solar streetlights. • To improve and provide sufficient streetlights in the city social safety and road accident reduction.	• Design survey tools and identify target community groups or villages. • Conduct survey to assess community willingness to pay and contribution in installing solar streetlights. • Develop plan to mobilize fund from communities.	2023-2024	Communities	50,000	DEM, DPI, EDL, Mayor's Office
A2	SE7	Development of solar energy projects to enhance energy security in Vientiane Capital	• To enhance energy security for Vientiane Capital, particularly where high loss existed. • To promote renewable energy deployment.	• Conduct baseline assessment to identify where high energy loss existed. • Identify potential available land, ponds for the potential solar farm, floating solar. • Develop investment plant to attract investors. • Prepare power purchase agreement with EDL, • Auctions to attract private investors can also be an option.	2025-2030	Sub-urban areas of Vientiane Capital	1,500,000	DEM, DPI, EDL, Mayor's Office

A2	SE8	Deployment of solar rooftop for public buildings	• To reduce energy consumption from grid connected electricity. • To save electricity cost and reduce public dept. • To promote renewable energy deployment.	• Identify target buildings, targeting public buildings. • Develop investment plan and financial modeling to see the cost-benefit. • Procure solar panels and installation. • Develop maintenance and operation plan.	2024-2028	Key public buildings, Example; DEM, DPWT, EDL, Mayor's Office	5,000,000	DEM, DPI, EDL, Mayor's Office
	SE9	Feasibility study on potential hydropower generation in Vientiane Capital	• To increase internal power generation for Vientiane Capital	• Conduct a feasibility study to identify potential hydropower generation plants in Vientiane Capital. • Develop investment plan, • Social and environmental impact assessment.	2023-2030	Namgeum Namxang	500,000	DEM, DPI, EDL, Mayor's Office
	SE10	Biodiesel production in Vientiane Capital to offset imported fossil fuels	• To enhance energy security in Vientiane Capital. • Reduce imported fossil fuels. • Reduce greenhouse gas emissions from transportation.	• Conduct pre-feasibility study on the bio-fuel production from variety of crops, using current Naxaythong palm bio-diesel plant as a case study. • Develop investment plan, and financial model. • Engaging private sectors both domestic and international for investing.	2024-2030	Entire Vientiane Capital	500,000	DEM, DPI, EDL, DAF, Mayor's Office
	SE11	Pilot biogas production from livestock farms and slaughter-houses in Vientiane Capital	• To promote sustainable energy production. • Reduce imported fossil fuels. • Reduce greenhouse gas emissions.	• Conduct baseline assessment on the potential of biogas production in Vientiane Capital. • Develop investment plan, including financial model. • Engage the owners to invest in the project, and or seek funding from donors.	2024-2028	Key livestock farms, Slaughter-houses	2,000,000	DEM, DAF, Mayor's Office, Private sector

A2	SE12	Installation of solar lighting at public parks and roads	• To provide sufficient lights for public parks where needed; • To enhance social safety and aesthetics, including transportation safety; • To promote renewable energy. • To reduce public debt from public streetlight.	• Conduct preliminary assessment to identify where solar lights are needed. • Procure solar lights. • Install solar lights. • Develop a monitoring and management plan.	2023-2028	21 key roads in Vientiane Capital 11 public parks in Vientiane Capital	3,000,000	DEM, VCOMS Mayor's Office, Private sector
	SE13	Deployment for clean cook stoves for households	• To reduce energy consumption at household level. • Raise awareness on clean cook stoves for communities.	• Identify target households for clean cook stove piloting. • Study and select types of clean cook stoves. • Awareness raising campaign on clean cook stoves for communities. • Pilot clean cook stoves with households. • Monitoring and evaluation.	2023-2026	Some villages in Vientiane Capital	500,000	DEM, DAF, Mayor's Office, Private sector
A3	SE14	Development of electric charging station in Vientiane Capital to promote domestic energy consumption and EV deployment	• To promote EV transition in Vientiane Capital. • To enhance domestic use of electricity. • Reduce greenhouse gas emissions and air pollution in the Capital.	• Conduct assessment on the current EV charging stations and identify where EV charging stations are needed. • Design EV charging station according to the national standards. • Develop investment plan and financial model. • Engage private sectors to invest in the charging station or in the form of public-private partnership (PPP).	2024 - 2030	Entire Vientiane Capital	500,000	DEM, Mayor's Office, Private sector
A4	SE15	Capacity building on energy management and planning, including technical session on renewable energy (RE)	• To build capacity for relevant agencies on renewable energy management.	• Conduct a rapid assessment to identify the needs and knowledge gaps. • Design training programs and sessions. • Deliver the training programs.	2024-2030	Key department	300,000	DEM, EDL

PART V. IMPLEMENTATION INSTITUTIONAL ARRANGEMENT, MONITORING AND EVALUATION

1. Institutional Arrangement for GCAP Implementation

This GCAP will adhere to the existing institutional framework of line departments in Vientiane Capital, involving various departments, relevant sectors, districts, offices, mass organizations, and communities. Each department or office is responsible for planning and implementing actions and projects, collecting relevant data, and regularly reporting to the Vientiane Capital Mayor's Office. The coordination and leadership will be provided by the Mayor's Office, the Department of Planning and Investment of Vientiane Capital, and other relevant departments as follows:

1.1. Roles and responsibility of Vientiane Capital Mayor's Office:

- Provide strategic advice and oversee the implementation of the GCAP, ensure the overall strategic plan is successfully implemented.
- Review and approve green city related projects, programs, policies and regulations.
- Oversee the overall progress of the GCAP implementation.
- Coordinate with relevant sectors and stakeholders and raise awareness to private and communities on the GCAP and its implementation.
- Seek funding opportunities to support the implementation of the GCAP both from public funding, private or donors.
- Integrate green city development into the Vientiane Capital development agenda.
- Provide advisory support to line departments when needed.

1.2. Roles and responsibility of Department of Planning and Investment (DPI) of Vientiane Capital:

- Coordinate with relevant stakeholders to ensure an effective coordination between capital line departments, offices, communities and private sectors during the GCAP implementation.
- Review and approve green city programs and projects proposed by line departments and offices in Vientiane Capital.
- Lead the implementation, monitoring, evaluation and reporting of the GCAP.
- Regularly follow up and ensure all the line departments implement the actions related to its mandate effectively and produce timely manner report.
- Provide advisory and technical support to accelerate the implementation of the GCAP.
- Seek funding opportunities to support the implementation of the GCAP as appropriately, including public, private and other funding.
- Provide advisory and technical inputs to line departments when needed. Integrate green city development into the Vientiane Capital development agenda.
- Raise awareness to the public on the importance of the GCAP and the need to achieve green city vision in the long term.

1.3. Roles and responsibility of Vientiane City Office for Management and Service:

- Responsible for developing, planning, implementing, monitoring, and evaluating priority actions, projects, and various initiatives under priority areas, or works that are related to **waste management**, cleanliness, and city organization as outlined in the GCAP.
- Coordinate with relevant sectors to continue planning, designing detailed projects, and securing funding for implementation, particularly funding from donors, budget from the government, and investment from private sector.
- Monitor, incentivize, collect data, and report on the progress of each priority action based on the targets and indicators outlined in the GCAP.
- Prepare quarterly, semi-annual, and annual progress reports, and submit them to the Department of

Planning and Investment, Vientiane Capital and Vientiane City Mayor's Office.
- Seek advice and recommendations from the Mayor of Vientiane Capital as needed to ensure effective implementation of the GCAP.
- Enhance technical capacity among organization employees and raise public awareness about the significance of green city and the GCAP to foster participation from all stakeholders.

1.4. Roles and responsibility of Department of Natural Resources and Environment, Vientiane Capital:

- Responsible for developing, planning, implementing, monitoring, and evaluating priority actions, projects, and various initiatives under priority areas, or works that are related to **climate change and disaster resilience** as outlined in the GCAP.
- Coordinate with relevant sectors to continue planning, designing detailed projects, and securing funding for implementation, particularly funding from donors, budget from the government, and investment from private sector.
- Monitor, incentivize, collect data, and report on the progress of each priority action based on the targets and indicators outlined in the GCAP.
- Prepare quarterly, semi-annual, and annual progress reports, and submit them to the Department of Planning and Investment, Vientiane Capital and Vientiane City Mayor's Office.
- Seek advice and recommendations from the Mayor of Vientiane Capital as needed to ensure effective implementation of the GCAP.
- Enhance technical capacity among organization employees and raise public awareness about the significance of green city and the GCAP to foster participation from all stakeholders.

1.5. Roles and responsibility of Department of Public Works and Transport, Vientiane Capital:

- Responsible for developing, planning, implementing, monitoring, and evaluating priority actions, projects, and various initiatives under priority areas, or works that are related to **wastewater and sanitation management, sustainable mobility, as well as the detailed overall planning of the city and urban green space** as outlined in the GCAP.
- Coordinate with relevant sectors to continue planning, designing detailed projects, and securing funding for implementation, particularly funding from donors, budget from the government, and investment from private sector.
- Monitor, incentivize, collect data, and report on the progress of each priority action based on the targets and indicators outlined in the GCAP.
- Prepare quarterly, semi-annual, and annual progress reports, and submit them to the Department of Planning and Investment, Vientiane Capital and Vientiane City Mayor's Office.
- Seek advice and recommendations from the Mayor of Vientiane Capital as needed to ensure effective implementation of the GCAP.
- Enhance technical capacity among organization employees and raise public awareness about the significance of green city and the GCAP to foster participation from all stakeholders.

1.6. Roles and responsibility of Department of Agriculture and Forestry, Vientiane Capital:

- Responsible for developing, planning, implementing, monitoring, and evaluating priority actions, projects, and various initiatives under priority areas, or works that are related to **urban green space** as outlined in the GCAP.

- Coordinate with relevant sectors to continue planning, designing detailed projects, and securing funding for implementation, particularly funding from donors, budget from the government, and investment from private sector.
- Monitor, incentivize, collect data, and report on the progress of each priority action based on the targets and indicators outlined in the GCAP.
- Prepare quarterly, semi-annual, and annual progress reports, and submit them to the Department of Planning and Investment, Vientiane Capital and Vientiane City Mayor's Office.
- Seek advice and recommendations from the Mayor of Vientiane Capital as needed to ensure effective |implementation of the GCAP.

1.7. Roles and responsibility of Department of Energy and Mines, Vientiane Capital:

- Responsible for developing, planning, implementing, monitoring, and evaluating priority actions, projects, and various initiatives under priority areas, or works that are related to **sustainable energy** as outlined in the GCAP.
- Coordinate with relevant sectors to continue planning, designing detailed projects, and securing funding for implementation, particularly funding from donors, budget from the government, and investment from private sector.
- Monitor, incentivize, collect data, and report on the progress of each priority action based on the targets and indicators outlined in the GCAP.
- Prepare quarterly, semi-annual, and annual progress reports, and submit them to the Department of Planning and Investment, Vientiane Capital and Vientiane City Mayor's Office.
- Seek advice and recommendations from the Mayor of Vientiane Capital as needed to ensure effective implementation of the GCAP.

1.8. Roles and responsibility of Local Authority in Vientiane Capital:

- Local government agencies at the district, group, and village levels have the responsibility of jointly developing, planning, implementing, monitoring, and reporting the outcomes of priority actions and projects, in collaboration with relevant departments and offices in Vientiane Capital, ensuring efficiency and effectiveness in execution.
- Actively contribute, cooperate, and facilitate the successful and efficient implementation of various tasks outlined in this GCAP.
- Raise awareness and disseminate knowledge within the community to foster understanding of the rationale and importance of the GCAP.

1.9. Roles and responsibility of Mass Organization, Institution and Private Sector:

- Mass organizations in Vientiane Capital, such as the Lao Women's Union, Lao Youth Union, educational institutions, students, and the private sector, are tasked with developing, planning, and assisting in the implementation of various works, plans, priority actions and projects.
- Actively contribute, cooperate, and facilitate the successful and efficient execution of the tasks outlined in this GCAP.
- Promote private sector investment in related projects to support the implementation of the GCAP.
- Raise awareness and provide knowledge to villages and communities to help them understand the importance of the GCAP, its priority areas, and various projects to aid in their implementation.

2. Monitoring and Evaluation Plan

Relevant departments of Vientiane Capital are mandated to implement related actions and projects, collect data, and report on the progress of this GCAP. Specifically, they are responsible for tracking progress toward the respective targets and indicators set under each priority area. These reports should be submitted to the Department of Planning and Investment of Vientiane Capital on an annual basis and to the Mayor's Office as requested. The table below provides detailed information on data collection methods, frequency, and means of collection.

Table 21: *Indicators, reporting and data collection*

Indicators	Responsible Departments / Offices	Collection Frequency	Collection Method
1. General Urban Environment Quality			
Air 1.1: Average Annual Concentration of PM 2.5	DoNRE	Continuously	Data, report
Air 1.2: Average annual concentration of PM10	DoNRE	Continuously	Data, report
Air 1.3: Average daily concentration of SO2	DoNRE	Continuously	Data, report
Air 1.4: Average daily concentration of NOx	DoNRE	Continuously	Data, report
Water 1.5: Surface water quality	DoNRE	Annually	Data, report
Water 1.6: Ground water quality	DoNRE	Annually	Data, report
GHG 1.7: Annual CO2 equivalent emissions per capital	DoNRE	Annually	Data, report
2. Sustainable Waste Management			
2.1 Waste collection rate throughout Vientiane Capital (%)	VCOMS	Annually	Contract data, report
2.2 Waste recycling rate (%)	VCOMS	Annually	Survey, report
2.3 Waste disposed of at the landfill properly treated (%)	VCOMS	Annually	Survey, report
2.4 Waste generation per capital stabilized in Vientiane Capital (kg)	VCOMS	Annually	Survey, report
2.5 Waste recycling banks at village level (# villages)	VCOMS	Annually	Report
2.6 Urban waste generation reduction (ton/day)	VCOMS	Annually	Survey, report
2.7 Development of a new landfill in Sangthong district (# landfill)	VCOMS	Annually	Report
2.8 Development of a new transfer station in Naxaythong district (# of transfer station)	VCOMS	Annually	Report
3. Sustainable Wastewater Management			
3.1 All people have improved onsite sanitation (improved latrines) (%)	DPWT	Annually	Survey, data, project report
3.2 Wastewater in Vientiane Capital is safely treated before discharging to the nature (%)	DPWT	Annually	Survey, data, project report
3.3 Vientiane Capital residents have access to adequate sanitation service through regular desludging and proper fecal sludge treatment (%)	DPWT, VCOMS	Annually	Survey, data, project report

3.4 Gender has been integrated into water supply and sanitation (%)	DPWT	Annually	Survey, data, project report
3.5 Sanitation systems are climate change resilient (%)	DPWT	Annually	Survey, data, project report
3.6 A centralized wastewater treatment plant with a capacity of 20,000 cubic meters per day (Unit) is built for core city area	DPWT	Annually	Report
3.7 Construction of public canals to improve city wastewater management	DPWT	Annually	Report
4. Climate and disaster resilience			
4.1 Development of Net Zero Plan for Vientiane Capital (# plan)	DoNRE	Annually	Plan, report
4.2 Greenhouse gas emissions per capita per annual (ton/person/year)	DoNRE	Annually	Survey, data, project report
4.3 The number of people affected by disasters (people)	DoNRE	Annually	Survey, data, project report
4.4 Amount of economic loss due to natural disasters (% of GDP)	DoNRE	Annually	Survey, data, project report
4.5 Urban tree coverage rate in Vientiane Capital (%)	DoNRE, MAF	Annually	Survey, data
4.6 Development of disaster risk management plans for districts (# district), including disaster risk fund	DoNRE	Annually	Report
4.7 Establishment of district disaster management committees with disaster response plan. For 3 districts (Sangthong, Pak Ngum and Hadxaifong) and 10 villages	DoNRE	Annually	Report
4.8 Development and improvement of public accessibility to climate information, including early warning system	DoNRE	Annually	Survey, data, project report
4.9 Build flood protection barriers and sluices in Xaythani and Pak Ngum districts	DoNRE	Annually	Report
5. Sustainable Mobility			
5. 1 The proportion of electric vehicles (EV) in all vehicles	DPWT	Annually	Statistic data
5.2 Number of EV charging station in Vientiane Capital	DPWT, DEM	Annually	Statistic data
5.3 Road accidents per year (%)	DPWT, City Police	Annually	Statistic data
5.4 Public bus service coverage	DPWT	Annually	Statistic data
5.5 non-motorized areas	DPWT	Annually	Report
5.6 Establishment of modern vehicle management system (number)	DPWT	Annually	Statistic data
6. Public Green Spaces			
6.1 Green space area per person (m2/person)	DPWT, VCOMS	Annually	Survey, report
6.2 Number of public parks in Vientiane Capital (%)	VCOMS	Annually	Survey, report
6.3 Tree coverage in Vientiane Capital (%)	DAF, DPWT	Annually	Survey, report

6.4 Public building areas (offices, schools) is covered by green space	DAF, DPWT	Annually	Survey, report
7. Sustainable Energy			
7.1 Average electricity consumption per person year (KWh/person/year)	DEM	Annually	Report, statistic
7.2 Production of renewable energy (solar energy& waste to energy) (MW)	DEM	Annually	Report, statistic data
7.3 Deployment of clean cooking stoves (unit)	DEM	Annually	Report, survey
7.4 Share of renewable energy in energy mix (hydro, solar, wind) (%)	DEM	Annually	Report, survey
7.5 Final energy consumption reduction (%)	DEM	Annually	Report, survey
7.6 Proportion of biofuels in the transport sector	DEM	Annually	Report, survey
7.7 Reduce public debt from the use of electricity in public buildings, streetlights, etc. (%)	DEM	Annually	Report

The targets and indicators will be collected by respective stakeholders as described in table 20 above and will be evaluated in comparison to the agreed targets set under each priority area in an annual basis and or upon completion of the actions and projects as shown in Table 22 below.

***Table 22:** Summary of targets and indicators*

Indicators	Unit	Baseline	Target 2025	Target 2030	Source
1. General Urban Environment Quality					
Air 1.1: Average Annual Concentration of PM 2.5	µg/m3	13	<20	<200	Accurate weather
Air 1.2: Average annual Concentration of PM10	µg/m3	10	<20	<20	
Air 1.3: Average daily Concentration of SO2	µg/m3	5	<50	<50	EPA
Air 1.4: Average daily concentration of NOx	µg/m3	10	<50	<50	EPA
Water 1.5: Surface water quality	mg/l		< National standard	< National standard	National Environmental Standard
Water 1.6: Ground water quality	mg/l		< National standard	< National standard	National Environmental Standard
GHG 1.7: Annual CO2 equivalent emissions per capita	Ton/ person/year	**2.6**	2.3	2	CO2 emissions (metric tons per capita) - Lao PDR | Data (worldbank.org)

2. Sustainable Waste Management					
2.1 Waste collection rate throughout Vientiane Capital (%)	%	35		100%	VTE SWM Strategy
2.2 Waste recycling rate (%)	%	10		40%	VTE SWM Strategy
2.3 Waste disposed of at the landfill properly treated	Ton	50		80%	VTE SWM Strategy
2.4 Waste generation per capital stabilized in Vientiane Capital (kg)	Kg/person/ year	237		180	VTE SWM Strategy
2.5 Waste recycling banks at village level (# villages)	# of villages	3		170	VTE SWM Strategy
2.6 Urban waste is generation reduction	Ton/day	600		50	VTE SWM Strategy
2.7 Development of a new landfill in Sangthong district	# of landfill	0		1	VTE 9th SEDP
2.8 Development of a new transfer station in Naxaythong district	# of transfer station	0		1	# of transfer station
3. Sustainable Wastewater Management					
3.1 All people have improved onsite sanitation (improved latrines)	% of population	NA	90	100	National Urban Sanitation Strategy (NUSS), 2022
3.2 Wastewater in Vientiane Capital is safely treated before discharging to the nature	% of wastewater	NA	50	>50	NUSS, 2022
3.3 Vientiane Capital residents have access to adequate sanitation service through regular desludging and proper fecal sludge treatment (% of population) (%)	% of population	NA	70	100	NUSS, 2022
3.4 Gender has been integrated into water supply and sanitation (%)	%	NA	44	100	NUSS, 2022
3.5 Sanitation systems are climate change resilient (%)	% of total systems	30	37	100	NUSS, 2022
3.6 A centralized wastewater treatment plant with a capacity of 20,000 cubic meters per day (Unit) is built for core city area	Number of plant	0		1	VTE 9th SEDP
3.7 Construction public canals to improve city wastewater management using budget from international organizations *	Number of canal	5		>5	VTE 9th SEDP

4. Climate and disaster resilience					
4.1 Development of Net Zero Plan for Vientiane Capital	# of plan	0		1	VTE 9th SEDP
4.2 Greenhouse gas emissions per capita per annual	(ton/ person/year)	100		25	NGGS
4.3 The number of people affected by disasters	# of people	2,000		<1,200	Adopted from NGGS
4.4 Amount of economic loss due to natural disasters (% of GDP)	% of GDP	0.3%		0.25%	Adopted from NGGS
4.5 Urban trees coverage rate in Vientiane Capital (%)	% of total area	NA		75	VTE 9th SEDP
4.6 Development of disaster risk management plans for districts, including disaster risk fund	# of district	NA		9	VTE 9th SEDP
4.7 Establishment of district disaster management committees with disaster response plan. 3 districts (Sangthong, Pak Ngum and Hadxaifong) and 10 villages	# of district	NA		3&10	VTE 9th SEDP
4.8 Development and improvement of public acces-sibility to climate information, including early warning system	# of district & village	NA		3&10	VTE 9th SEDP
4.9 Build flood protection barriers and sluices in Xaythani and Pak Ngum districts	# of district	NA		2	VTE 9th SEDP
5. Sustainable Mobility					
5. 1 The proportion of electric vehicles (EV) in all vehicles	% of total regis-tered vehicle	< 1%		30%	NDC 2021
5.2 Number of EV charging station in Vientiane Capital	# of charging station	20		100	DEM
5.3 Road accident reduction per year (%)	% of previous year	(5,571 cases)		30%	Traffic Acci-dents
5.4 Public bus service coverage (%)	% of service cover in the city	NA		80%	Recommend
5.5 Non-motorized areas	# of number	NA		1	Recommend
5.6 Establishment of modern vehicle management system	# of system	NA		1	Recommend
6. Public Green Spaces					
6.1 Green space area per person (m2/person)	m2/person	0.26	0.26	9 m2	Urban master plan III, & WHO
6.2 Number of public parks in Vientiane Capital	# of parks	9	11	13	VTE 9th SEDP

6.3 Tree coverage in Vientiane Capital (%)	% of total area	70	75	>75	VTE 9th SEDP
6.4 Public building areas (offices, schools) is covered by green space	% of total area	NA	25%	30%	Recommend
7. Sustainable Energy					
7.1 Average electricity consumption per person year (KWh/person/year)	KWh/person/year	636.13		<1000	NGGS
7.2 Production of renewable energy (solar energy & waste to energy) (MW)	MW	46		159	VTE 9th SEDP
7.3 Deployment of clean cooking stoves (unit)	Unit	NA		6,775	Adopted from NDC 2021
7.4 Share of renewable energy in energy mix (hydro, solar, wind) (%)	% of energy mix	12%		30%	NDC 2021
7.5 Final energy consumption reduction	% of total energy consumption	NA		10%	NDC 2021
7.6 Proportion of biofuels in the transport sector	% of biofuel	1% (2019)		10%	NDC 2021

3. Capacity Development

To ensure the success of this GCAP implementation, it is crucial for Vientiane Capital to invest in building the necessary capacity for relevant city stakeholders, focusing particularly on enhancing technical and managerial skills related to implementing and monitoring green city actions and projects. Additionally, raising awareness among all citizens—including public authorities, communities, and private sectors—about their potential roles in the GCAP's implementation and the greening of Vientiane Capital is essential.

Based on the baseline assessment and consultations with various Vientiane Capital stakeholders, the needs to build capacity for relevant sectors to support GCAP implementation are as following:

- **Political support and government lead:** It is very important that the capital government, including Vientiane Mayor's Office, include this GCAP into its development agenda, regularly check on the implementation progress, and provide necessary supports where needed. The support of the city government may include approving green city related programs, projects, workplans and activities. Provide support in developing and issuing necessary policies, guidelines, regulations to ensure the GCAP are implemented in an effective manner.
- **Capacity building:** The green city concept is new to many of Vientiane Capital stakeholders, including management and technical staff of key departments, offices, local authorities, private sector, and citizens. Thus, providing necessary capacity building on green city concept, GCAP and technical skills on the priority areas such as solid waste management, wastewater management, sustainable energy, climate change and resilience and others will be beneficial. Capacity building on action planning for the GCAP, monitoring and reporting as well as data collection will also be required.
- **Communication and promotion:** Raising awareness to the public on the GCAP, its importance, related actions and projects will contribute to the success of GCAP implementation. This will enhance stakeholder engagement, specifically with local communities and private sectors when it comes to actions and projects implementation. Awareness raising can be done through government meetings, social media, radio, TV, and or community outreach.
- **Data collection and reporting:** Data collection is very important for monitoring, reporting and

evaluation of the GCAP implementation, particularly collecting relevant data related to green city targets and indicators set under this GCAP document.

4. Financial source for budget funds

One of the most critical factors toward achieving the city long-term green vision is ensuring the implementation of this GCAP, particularly the actions and projects listed under each priority area. The success of these initiatives will heavily depend on the availability of financial resources. This section will highlight potential sources of financing for green city actions and priority projects, as well as the budget allocations from the government.

- **Public central government finance:** National public finance allocated by central government for specific projects and programs;
- **Nationally administered funds:** Any national funding facilities that provide grants or loans to climate and green related projects and programs such as the national Environment Protection Fund (EPF), under the MoNRE;
- **International donor programmatic funding:** Bilateral cooperation funding available for climate related and urban green growth programmes both at national level and city level, such as Official Development Assistance (ODA) from donor countries, for example, KOICA, JICA, and others;
- **International financial institutions:** Supply loans, grants for capital investments, technical support and a variety of insurance and risk mitigation instruments for other potential investors such as ADB, World Bank and so on;
- **International climate finance:** Such as the Green Climate Fund (GCF), Global Environment Facility (GEF) and others that provide both grants and loans for developing countries for climate related project;
- **International carbon finance:** Where developed countries seek to trade and buy carbon emissions with developing countries to offset their emissions. (Information on carbon trading prices can be found at: Carbon Pricing | UNFCCC);
- **Corporate Social Responsibility (CSR):** CSR funding is a type of small grants provided by local or foreign-owned companies, including business corporations whose production and operation might cause adverse impacts on society and environment. These funds are generally allocated for social development issues as part of the companies' corporate social responsibility programs. While such programs are still in the early stages of operation in Lao PDR, some businesses are beginning to participate;
- **Private sectors/Commercial Bank:** Private investors can serve as a significant financial resource for green city-related projects, particularly in areas such as infrastructure and service provision across all green city priority sectors. Private investment can take the form of sole investment by the private sector or through public-private partnerships (PPP) in green city initiatives;
- **Others:** Other mechanisms to generate revenue for the city to implement urban green actions and projects include using fiscal tools such as taxes, user fees, land value recapture, and encouraging societal participation.

Given the limited public finance allocated by the central government, it is crucial for Vientiane Capital to seek financial support from alternative sources, especially international funding. Accessing these funds may require specific capacity and skills, which Vientiane Capital stakeholders need to develop and prepare for accordingly.

PART VI.
SUMMARY AND CONCLUSION

This Green City Action Plan (GCAP) for Vientiane Capital is designed to guide the city's long-term urban greening efforts. It outlines a green city vision, strategic objectives, and actions, including priority areas and projects to be undertaken by 2030. The GCAP was developed through a participatory process involving key stakeholders, drawing on the Global Green Growth Institute (GGGI) Green City Development Framework and international best practices in green city development. Under this GCAP, Vientiane Capital has set its green city vision as:

> ***"By 2030, Vientiane Capital will become a livable, attractive and environmentally friendly city, serving as a strategic development hub with sustainable economic growth, resilience to natural and climate risks, socially inclusive, equitable, and will provide a better quality of life for all its citizens"***

To achieve the vision of Vientiane Capital as a green, livable city, the GCAP focuses on six priority areas: 1) sustainable solid waste management; 2) wastewater and sanitation management; 3) climate and disaster resilience; 4) sustainable mobility; 5) green space; and 6) sustainable energy. Each area has defined priority objectives, indicators, targets, actions, projects, and implementing agencies. Coordination mechanisms and responsible units for each priority area have been established to monitor progress effectively.

By executing the actions and projects outlined in this GCAP, Vientiane Capital aims to transition into a cleaner, greener, and more livable city. This includes sustainable management of solid waste and wastewater, adoption of low-carbon transportation like electric vehicles (EVs), and utilization of clean energy sources such as solar and wind. The city is expected to become more climate-resilient, particularly in managing extreme weather events like floods, storms, and droughts. Expanding green spaces, including public parks and tree-lined roads, will enhance residents' well-being, create business opportunities, and increase carbon dioxide sequestration.

Implementing the GCAP will significantly improve the urban environment, public health, and promote sustainable development. The responsibility for GCAP implementation lies with all city stakeholders—including government agencies, private sector, communities, and citizens. Effective coordination and collective effort are essential for the successful implementation of the GCAP and achieving Vientiane Capital's green city vision by 2030.

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