Luang Prabang Smart and Integrated Urban Strategy

Urban Scenario Report





ASEAN AUSTRALIA SMART CITIES TRUST FUND Asian Development Bank



CONTENTS

1 INTRODUCTION	1
1.1 Overview	2
1.2 Urban Scenario Approach	3
1.3 Study Area	4
2 URBAN LAND 2040	7
2.1 Population Projections	8
2.2 Housing Land Projections	10
2.3 Urban Land Projections	11
3 2040 PROJECTED LAND REQUIREMENTS FOR VISITOR	
ACCOMMODATIONS	17
3.1 Visitor Growth Projections	18
3.2 Land Projections for Visitor Accommodations	23
4 LAND AVAILABILITY	29
4.1 Approach	30
4.2 Existing Built Area	30
4.3 2012 Urban Planning Regulations for Luang Prabang	31
4.4 Land Available for Development	33

5 URBAN SCENARIOS	37
5.1 Approach	38
5.2 Business-as-Usual Scenario	38
5.3 Polycentric Development Scenario	40
5.4 Scenario Assessment	42
6 ALTERNATIVE URBAN SCENARIO	47
6.1 Approach	48
6.2 Alternative Urban Spatial Concept	49
7 CONCLUSIONS AND NEXT STEPS	51
7.1 Key Findings and Recommendations	52
7.2 Next Steps	53
APPENDIX 1: DETAILED POPULATION PROJECTION METHODOLOGY	55
APPENDIX 2: HISTORICAL AND PROJECTED POPULATION FOR LUANG PRABANG CITY	59
APPENDIX 3: CALCULATION OF 2040 HOUSEHOLD NUMBERS AND	
HOUSING LAND REQUIREMENTS	67
APPENDIX 4: TOURISM PROJECTIONS	69
APPENDIX 5: URBAN PLANNING ASSESSMENT FRAMEWORK	73

TABLES AND FIGURES

TABLES

Table 1: Luang Prabang Buffer Zone's Resident Population Projections	9
Table 2: Luang Prabang Buffer Zone's Projected Population and Household Numbers (Scenario 1 – Declining Average Household Size)	9
Table 3: Luang Prabang Buffer Zone's Projected Population and Household Numbers (Scenario 2 – Constant Average Household Size)	10
Table 4: Housing Land Take Requirements	10
Table 5: Land Use Definitions	12
Table 6: Land Use Distribution Summary	12
Table 7: Proportion of Land Uses in Ban Thongchaleune	13
Table 8: Proportion of Land Uses in Ban Aham	14
Table 9: Proportion of Land Uses in Ban Viengxay	15
Table 10: Proposed Land Use Distribution and Area for New Villages	16
Table 11: Visitors' Typical Length of Stay and Expenditure in Luang Prabang	20
Table 12: Established Tourist Growth Rates for Scenarios 2 and 3	22
Table 13: Annual Visitor Arrival Projections for Tourism Scenarios	23
Table 14: Accommodation Type Availability, 2022	24
Table 15: Hotel and Resort Case Studies – Details	25
Table 16: Crowne Plaza Vientiane Details	26
Table 17: Accommodation Type Breakdown	26
Table 18: 2040 Visitor Accommodation Needs in Typical Management Scenario	27_

Table 19: 2040 Visitor Accommodation Needs in Proactive Management Scenario	28
Table 20: 2040 Projected Land Requirements for Visitor Accommodations	28
Table 21: Regulations for the Peri-Center and Urban Development Zones	32
Table 22: Land Available for Future Urban Development	34
Table 23: 2040 Land Requirements (Scenario 3 – Proactive Management Approach)	35
Table 24: Urban Scenario Assessment	43
Table 25: Luang Prabang Development Focus Areas, 2040	50
Table A4.1: Likely Projection of Typical Management Scenario	70
Table A4.2: Likely Projection of Proactive Management Scenario	71
Table A4.3: Likely Projection of Special Economic Zone-Driven Scenario	72
Table A5: Urban Planning Assessment Framework	74

FIGURES

Figure 1: Luang Prabang Smart and Integrated Urban Strategy –	
Methodology	3
Figure 2: Urban Scenario Approach	4
Figure 3: Study Area	5
Figure 4: Urban Village Case Studies	11
Figure 5: Ban Thongchaleune Land Use Distribution	13
Figure 6: Ban Aham Land Use Distribution	14
Figure 7: Ban Viengxay Land Use Distribution	15
Figure 8: Luang Prabang Tourist Arrivals, 2010–2019	18
Figure 9: National Museum Visitors Distribution, 2019	19
Figure 10: Hotel and Resort Case Studies	24
Figure 11: Existing Built Area, as of February 2022	30
Figure 12: 2012 Urban Planning Regulations for Luang Prabang	31
Figure 13: Land Zones Available for Development	32
Figure 14: Land Available for Future Urban Development	33
Figure 15: Urban Development Areas in Chomphet District	35
Figure 16: Business-as-Usual Scenario	39
Figure 17: Potential Growth Areas for Business-as-Usual Scenario	40
Figure 18: Polycentric Development Scenario	41
Figure 19: Potential Growth Areas for Polycentric Development Scenario	42
Figure 20: Luang Prabang 2040 Land Development Plan –	40
Alternative Scenario	48
Figure 21: Luang Prabang Spatial Plan	49

ABBREVIATIONS

ASCTF	ASEAN Australia Smart
DB	Asian Development Bar
SEAN	Association of Southeas
СМ	Cohort Component Me
ICT	Department of Informa
PWT	Department of Public W
a	hectare
ISR	high speed railway
m	kilometer
m²	square kilometer
ao PDR	Lao People's Democrati
PSUIS	Luang Prabang Smart a
ЛІСТ	Ministry of Information,
1 ²	square meter
нс	Population and Housing
RC	People's Republic of Ch
SMV	Conservation and Deve
EZ	special economic zone
EIIP	Urban Environment Imp
N-HABITAT	United Nations Human

NOTES:

- In this report, "\$" refers to US dollars.
- ADB recognizes "China" as the People's Republic of China and "Laos" as the Lao People's (ii) Democratic Republic (Lao PDR).
- All photos by Ramboll, unless stated otherwise. Cover photo is from Adobe Stock. (iii)

Cities Trust Fund st Asian Nations thod tion, Culture and Tourism Vorks and Transport

c Republic and Integrated Urban Strategy Culture and Tourism

g Census, Lao PDR ina lopment Plan, Luang Prabang

provement Investment Project Settlements Programme

INTRODUCTION 1



1.1 OVERVIEW

1.1.1 About the ASEAN Australia Smart Cities Trust Fund

The ASEAN Australia Smart Cities Trust Fund (AASCTF) is a single-donor trust fund supported by the Government of Australia through the Department of Foreign Affairs and Trade, managed by the Asian Development Bank (ADB) and implemented by Ramboll. The AASCTF assists cities of the Association of Southeast Asian Nations (ASEAN) in enhancing their planning systems, service delivery, and financial management by developing and testing appropriate digital urban solutions and systems. By working with cities, AASCTF facilitates their transformation to become more livable, resilient, and inclusive while in the process identifying scalable best and next practices for replication across cities in Asia and the Pacific.

The AASCTF is supporting the provincial government of Luang Prabang in the Lao People's Democratic Republic (Lao PDR) to prepare the Luang Prabang Smart and Integrated Urban Strategy.

1.1.2 Report Overview

This Urban Scenario Report describes:

- Existing and projected population, residential, and urban land use projections to 2040; (i)
- Existing and projected visitors and visitor accommodation projections to 2040; (ii)
- (iii) Land needs projection and urban scenarios to ensure sufficient land is identified for growth while protecting the integrity of the historic township.

This Urban Scenario Report should be read in tandem with the Urban Assessment Report¹ since both documents comprehensively assess the challenges and opportunities confronting Luang Prabang in 2023 and in 2040. Findings from the Urban Assessment and Urban Scenario technical reports were used to guide smart city strategies and priority projects. Figure 1 outlines the strategy's methodology, comprising the Urban Assessment (stage 1), Urban Scenario (stage 2), and Integrated Strategy (stage 3).

The Urban Assessment Report outlines Luang Prabang's existing urban management challenges, such as traffic congestion, overcrowding at tourist sites, illegal wastewater disposal, and poor waste management systems



PSMV = Plan de Sauvegarde et de Mise en Valeur, SWOT = strengths, weaknesses, opportunities, and threats. Source: Ramboll, 2023.

1.2 URBAN SCENARIO APPROACH

Step one calculates the urban land needs for 2040. This step involves projecting the population growth from 2022 until 2040. This population projection is used to determine household numbers, which is then translated into future land requirements for new homes. Besides housing, new urban land requirements for commercial and community purposes, roads, and other amenities are also identified.

Step two determines the amount of land needed by 2040 for visitor accommodations. This step involves projecting 2040 visitor numbers and the corresponding number of rooms required after accounting for the length of stay, seasonality, and accommodation development trends. The accommodation types required to support the projected number of visitors are also estimated using trend analysis of existing accommodation offerings. The identified accommodation types are then used to inform the projection of required visitor accommodation land.

Step three assesses the physical land available for future urban development within the city, which is identified using geospatial analytics.

Step four details two possible 2040 urban scenarios. Development implications of both scenarios are also analyzed, from which an alternative urban scenario is formulated.

Figure 2 outlines the systematic four-step approach used to craft the urban scenarios.



m = meter, sqm = square meter. Source: Ramboll, 2023.

1.3 STUDY AREA

The study area overlaps with the Lao People's Democratic Republic: Urban Environment Investment Improvement Project (UEIIP)² boundary, which includes the Luang Prabang City administrative boundary³ and special economic zone (SEZ) 1 in Chomphet District (Figure 3). However, as most of the city is rural and not urbanizing, this Urban Scenario Report focuses on the Luang Prabang World Heritage Site and its buffer zone, as defined in the 2012 Urban Planning Regulations for Luang Prabang, to prepare a detailed analysis of local urbanization patterns and trends (footnote 2). The Luang Prabang buffer zone includes:

- (i) up urban area (footnote 2).
- (ii) areas.

Figure 2: Urban Scenario Approach

Luang Prabang's core city – corresponding to around 3,000 hectares (ha) of contiguous built-

Fringe areas – the land surrounding the core city urban area, including future urban growth

² Asian Development Bank (ADB). Lao People's Democratic Republic: Urban Environment Improvement Investment Project. https://www.adb.org/projects/53203-001/main

³ Lao People's Democratic Republic Prime Minister Decree No. 126/PM. May 11, 2018. Vientiane



Figure 3: Study Area



Source: Ramboll, 2023.

5

URBAN LAND 2040 2



2.1 POPULATION PROJECTIONS

Data source. The projection of the 2040 Luang Prabang resident population was based on the following:

- (i) and Investment.
- (ii) The 2021 Statistical Yearbook published by the Lao Statistics Bureau.
- (iii) Supporting information extracted from the UEIIP feasibility study.

Methodology. The resident population projection methodology developed in 2022 under the UEIIP was adopted to ensure consistency between the strategy and the UEIIP. The population projection was computed using the Cohort Component Method (CCM), which required projecting three components (e.g., mortality, fertility, and migration) by age and sex groups. Base population and fertility rates at the district level were further calibrated to align with the national and provincial level projections (footnote 2).

Projections for the buffer zone were extracted from the larger district population projection. The population balancing equation used in the CCM and the details of the district-level-adjusted base population and fertility rate are highlighted in Appendix 1.

Consistent with the UEIIP-developed methodology, population projections were derived based on the following assumptions:

- (i) across the country.
- expectancy at birth.
- 10-year period from 2005 to 2015.

The population projection for 2040 does not consider the workforce required to support the 2040 tourism sector. An updated population projection that takes workforce growth projections into account will be conducted once a more detailed land use plan is established.

Luang Prabang 2040 resident population projections. Table 1 illustrates the projected 22% population increase (from 68,207 to 83,262) in Luang Prabang's buffer zone between 2020 and 2040 (footnote 2). This increase is likely to be the result of natural population growth and rural-urban migration. Appendix 2 provides historical and projected village-level population distribution data for Luang Prabang.

The 2015 Lao PDR Population and Housing Census (PHC) issued by the Ministry of Planning

Decreased fertility rate, with the ratio of male to female newborns pegged at the same level

(ii) Improved mortality conditions during the projection period, leading to a continuous rise in life

(iii) Net migration assumptions derived from the population movement between districts in the

Table 1: Luang Prabang Buffer Zone's Resident Population Projections

				Ye				
Item		Reported		Projected				
	1995	2005	2015	2020	2025	2030	2035	2040
Luang Prabang Buffer Zone's Population	37,006	53,438	64,508	68,207	72,591	75,496	79,496	83,262
Growth (%)		44.4%	20.7%	5.7%	6.4%	4.6%	4.7%	4.7%

Source: Population and Housing Census of Lao PDR (for 1995, 2005, and 2015 population data) and Asian Development Bank (for population projection from 2020 onward).

Luang Prabang 2040 household numbers. The 2040 household numbers were projected using the formula in Appendix 3. Official average household size records are available between 1995 and 2015. According to the 2015 Lao PDR Population and Housing Census, the average household size in 2015 was five persons per household. To derive the 2040 average household size, past average household sizes were extrapolated in the absence of updated average household size records. This resulted in the development of two scenarios for the 2040 average household size based on observed trends.

In the first scenario, given that household characteristics remained unchanged between 1995 to 2005 (5.9 persons per household), it was assumed that the average household size would also remain constant from 2015 to 2020. Thereafter, a decrease of 0.18 persons per household was applied to the period between 2020 and 2040, leading to a 2040 average household size of 4.28. The decrease of 0.18 persons per household was based on household sizes from 1995 to 2015. Based on this formula, the total number of households in 2040 will be 19,454, an increase of 5,813 households (43%) between 2020 and 2040. Table 2 illustrates the buffer zone's projected population and household numbers based on Scenario 1.

Table 2: Luang Prabang Buffer Zone's Projected Population and Household Numbers (Scenario 1 – Declining Average Household Size)

				Ye				
Item		Reported		Projected				
	1995	2005	2015	2020	2025	2030	2035	2040
Population	37,006	53,438	64,508	68,207	72,591	75,496	79,496	83,262
Average Household Size	5.90	5.90	5.00	5.00	4.82	4.64	4.46	4.28
Number of Households	6,272	9,057	12,902	13,641	15,060	16,368	17,824	19,454

Note: Projections were made using a scenario with an average household size of 4.28 in 2040. Source: Population and Housing Census of Lao PDR (for population and average household size for 1995, 2005, and 2015) and Ramboll (for projection of average household size and number of households from 2020 onward).

As the decrease in average household size may not always be consistent, a second scenario was developed, where the average household size in 2040 remained at five persons. Based on this assumption, the projected number of households in 2040 will be 16,652, an increase of 3,011 households (22% increase) between 2020 and 2040. Table 3 presents the projected population and household numbers for the buffer zone based on Scenario 2.

Table 3: Luang Prabang Buffer Zone's Projected Population and Household Numbers (Scenario 2 – Constant Average Household Size)

				Ye				
Item		Reported		Projected			Projected	
	1995	2005	2015	2020	2025	2030	2035	2040
Population	37,006	53,438	64,508	68,207	72,591	75,496	79,496	83,262
Average Household Size	5.90	5.90	5.00	5.00	5.00	5.00	5.00	5.00
Number of Households	6,272	9,057	12,902	13,641	14,518	15,189	15,899	16,652

Note: Projections were made using a scenario with an average household size of 5 in 2040. Source: Population and Housing Census of Lao PDR (for population and average household size for 1995, 2005, and 2015) and Ramboll (for projection of average household size and number of households from 2020 onward).

2.2 HOUSING LAND PROJECTIONS

The housing land requirements were derived using 2040 and 2020 household numbers and an average dwelling unit size of 300 square meters (m^2) , with the formula detailed in Appendix 3. Based on the two average household size scenarios, the housing land required would be between 0.903 square kilometers (km²) (with a larger average household size of 5 persons per household) to 1.744 km² (with a smaller average household size of 4.28 persons per household) (Table 4).

Table 4: Housing Land

Factor	2040 Scenario 1	2040 Scenario 2
Population (P ₂₀₄₀)	83,	262
Average Household Size (AHH ₂₀₄₀)	4.28	5.00
2020 Household Numbers (HH ₂₀₂₀)	13,641	13,641
2040 Household Numbers (HH ₂₀₄₀)	19,454	16,652
Number of Household Increase between 2020 and 2040	5,813	3,011
Housing Land Required (HL ₂₀₄₀)	1.744 km ²	0.903 km²

km² = square kilometer. Source: Ramboll, 2023.

Tak		auir	om	onto
IdK	еке	quii	eme	ents

2.3 URBAN LAND PROJECTIONS

To provide a more holistic measure of Luang Prabang's total land needs by 2040, projections must include the land required for housing and other land uses. These other land uses include infrastructure and amenities, like roads, shops, temples, and open spaces-all required to support a functioning and livable urban village or neighborhood.

2.3.1 Existing Urban Village Case Studies

Figure 4 illustrates the location of the villages of Ban Thongchaleune, Ban Aham, and Ban Viengxay, which were used to establish the urban land use needs for residential areas. These villages were selected as they are of a suitable scale (between 1.6 ha to 2.2 ha) and well-served by infrastructure and amenities that support livability objectives within their boundaries, such as community and religious facilities, commercial establishments, wetlands, and utilities. These villages are located near one another and are flanked by Kingkitsarath Road, Kitsalat Road, and Sisangvangvong Road. Newer suburban villages were deemed unsuitable case studies, as these lacked the essential services and amenities necessary to support an adequate livelihood and were therefore not considered representative in form and function. Appendix 2 shows a list of urban villages within the buffer zone.

Figure 4: Urban Village Case Studies (1) Ban Thongchaleune 2 Ban Aham ③ Ban Viengxay ASEAN AUSTRALIA SMART CITI TRUST FUN

Source: Ramboll, 2023.

Satellite imagery was used to deduce various types of land use, whether residential housing, commercial establishments, amenities, roads, open space, or ponds, as defined in Table 5. Fieldwork was also conducted to verify building usage, and land areas of each use were measured. Table 6 summarizes the average proportions of various land use types across the three villages.

Table 5: Land Use Definitions

Land Use	Definition
Residential Housing	Houses and open spaces at the front and back of the house. Areas are approximate, as fencing or walls denoting the property's boundaries were not always available.
Commercial Establishments	Shophouses with commercial activity on the ground floor, including restaurants, supermarkets, retail shops, markets, banks, souvenir shops, guesthouses, and laundromats.
Amenities	Community and religious facilities, including temples, schools, community centers, and sports facilities.
Open Space and/or Ponds	Open space around wetland ponds.
Road	Physical road space, including sidewalks, if any.

Source: Ramboll, 2023.

Table 6: Land Use Distribution Summary

	Propo	ortion of Total Village (%)	Average Proportion	
Land Use	Ban Thongchaleune	Ban Aham	Ban Viengxay	
Residential Housing	46.9	36.8	40.9	41.5
Commercial Establishments	36.2	27.1	27.6	30.3
Amenities	0	10.2	8.3	6.2
Open Space/Ponds	4.5	13.3	7	8.3
Road	12.4	12.6	16.2	13.7
Total	100	100	100	100

Source: Ramboll, 2023.

Ban Thongchaleune. Ban Thongchaleune village is flanked by three main roads, each lined with various commercial services, such as restaurants, laundromats, banks, and souvenir shops. A neighborhood road divides the village into two, along which hotels and guesthouses are more prevalent. Residential houses are located within each block and bordered by commercial areas. The village also has 2,500 square meters (m²) of green space. Figure 5 and Table 7 detail the land use distribution and proportion in the village.

Figure 6: Ban Aham Land Use Distribution

Figure 5: Ban Thongchaleune Land Use Distribution



Source: Ramboll, 2023.

Table 7: Proportion of Land Uses in Ban Thongchaleune

Land Use	Proportion of Total Village Area (%)
Residential Housing	46.9
Commercial Establishments	36.2
Amenities	0.0
Open Space/Ponds	4.5
Road	12.4

Source: Ramboll, 2023.

Ban Aham. Ban Aham village is home to the heritage temple of Wat Wisunarat to its east. The village's main roads feature commercial establishments (e.g., banks, hotels, restaurants), amenities (e.g., schools and community centers), and 6,000 m² of open space. The residential housing area is surrounded by commercial areas, with narrow neighborhood roads providing access. Figure 6 and Table 8 detail the land use distribution and proportion in the village.



Source: Ramboll, 2023.

Table 8: Proportion of Land Uses in Ban Aham

Land Use	Proportion of Total Village Area (%)
Residential Housing	36.8
Commercial Establishments	27.1
Amenities	10.2
Open Space/Ponds	13.3
Road	12.6

Source: Ramboll, 2023.

Ban Viengxay. Like the first two villages, Ban Viengxay is bordered by a variety of commercial establishments such as guesthouses, restaurants, and shops. The village also has a primary school and 2,000 m² of green space. Figure 7 and Table 9 detail the land use distribution and proportion in the village.

Figure 7: Ban Viengxay Land Use Distribution



Source: Ramboll, 2023.

Table 9: Proportion of Land Uses in Ban Viengxay

Land Use	Proportion of Total Village Area (%)
Residential Housing	40.9
Commercial Establishments	27.6
Amenities	8.3
Open Space/Ponds	7.0
Road	16.2

Source: Ramboll, 2023.

2.3.2 2040 Additional Urban Land

The two scenarios that project the land required for new villages by 2040 indicate that more land will need to be set aside to accommodate population growth, with a larger number of households. Comparing both scenarios, the land requirement for a smaller average household size of 4.28 persons is 436.0 ha, which is larger than the 225.8 ha of land required to accommodate the projected population assuming a larger average household size of 5 persons. However, due to the uncertainty of future household sizes, adopting a more conservative approach in land use planning is recommended. Thus, the estimate of **436.0 ha of new urban land under Scenario 1** will be used in the next phase of the urban scenario to ensure sufficient land allocation for future needs. Table 10 identifies a proportionate distribution of each land use type for future urban developments.⁴

Table 10: Proposed Land Use Distribution and Area for New Villages

	Distribution (%)	Area Required (hectare)		
Land Use		Scenario 1: Average Household Size (4.28 Persons)	Scenario 2: Average Household Size (5 Persons)	
Residential Housing	40	174.4	90.3	
Commercial Establishments	30	130.8	67.7	
Amenities	5	21.8	11.3	
Open Space/Ponds	10	43.6	22.6	
Road Infrastructure	15	65.4	33.9	
Total	100	436.0	225.8	

Note: Housing land use areas were derived from the land take required for future growth in the number of households in Section 2.3.2. Scenario 1 at 4.28 persons average household size is the preferred scenario. Source: Ramboll, 2023.

⁴ This is derived from the approximate average of land use percentages across the three case study villages. To project the 2040 housing land needs and the total new urban land required, housing requirements from each scenario were applied to this land use distribution

2040 PROJECTED LAND REQUIREMENTS 3 FOR VISITOR ACCOMMODATIONS



3.1 VISITOR GROWTH PROJECTIONS

Forecasting 2040 land requirements for visitor accommodations begins with projecting visitor growth for Luang Prabang. However, predicting the pace and trajectory of tourism recovery in the postcoronavirus disease (COVID-19) context is challenging, as the industry has never experienced such a severe disruption.

Flights and regional connections across Asia have not yet returned to pre-pandemic frequency. Additionally, economic shocks caused by the Russian invasion of Ukraine and global inflation persist. The People's Republic of China (PRC), a major source of tourists for Lao PDR, reopened its borders to tourism only in January 2023. Therefore, certain assumptions were made to facilitate the projections.

3.1.1 Projection Methodology

Projections were derived using data from the Ministry of Information, Culture and Tourism's (MICT) Tourism Statistical Report 2019⁵ and the Tourism Planning Division of the Luang Prabang Department of Information, Culture and Tourism (DICT). The data included 2022 tourist mode of travel arrival data; length of stay; average daily spending; and a survey of hotels, guesthouses, and resort rooms available in Luang Prabang District for the same year. Currently, only the airport collects reliable visitor nationality data, while accommodations do not systematically collect visitor passport details. Disaggregating tourist data by country of origin, transportation, length of stay, and spending is valuable for tourism planning and management, as outbound market segments have diverse behaviors and needs.

Pre-COVID-19 and COVID-19 visitor numbers. In 2019, Luang Prabang welcomed approximately 638,000 international and 222,000 domestic visitors,⁶ generating about \$266 million in revenue⁷ and making tourism a key driver of Luang Prabang's economy. Figure 8 illustrates international tourism arrival numbers between 2010 and 2019.



Source: Ministry of Information, Culture and Tourism. 2014 and 2019 Statistical Report on Tourism in Laos. Vientiane.

DICT. 2020. Annual Tourism Statistics Summary 2019. Luang Prabang.

MICT, 2020. 2019 Statistical Report on Tourism in Laos. Vientiane

MICT. 2021. 2020 Statistical Report on Tourism in Laos. Vientiane.

The COVID-19 pandemic led to the closure of Lao PDR's borders for travel and tourism, significantly impacting the city, its businesses, and residents.⁸ A May 2020 ADB report indicated that 78% of tourism enterprises in Luang Prabang closed, and over 80% had reduced their workforce by more than 50%.⁹ In 2020, international visitors to Luang Prabang decreased by 88% to around 78,000, while in 2021, there were no recorded international tourists (footnote 6).

Visitor growth. The growth of domestic, regional (primarily from the PRC and Thailand, the two largest tourism source markets pre-COVID), and long-haul visitor typologies was forecasted using growth data for all visitors to Luang Prabang from 2017 to 2019.¹⁰ During this period, the average annual growth rate was 9% for domestic visitors, 15% for regional travelers, and 11% for long-haul international visitors.¹¹ This forecast is based on historical patterns and assumed future trends for these markets.

Seasonality. Monthly visitor statistics from the Luang Prabang National Museum, a key city attraction with more stringent ticketing and record keeping systems, were used to model seasonality throughout the year. Figure 9 presents the number of monthly visitors to the National Museum in 2019, illustrating that peak months like February and December could attract three times as many tourists as other non-peak months.



Figure 9: National Museum Visitors Distribution, 2019

Source: Department of Information, Culture and Tourism, 2019.

¹¹ Government of Lao PDR, Ministry of Information, Culture and Tourism. 2020. Statistical Report on Tourism in Laos 2019. https://laos-dmn.com/e-library/laos-tourism-statis tic-report-in-2019_english,

Daily tourist population. The potential tourist population for peak days in peak months was estimated based on visitor seasonality by calculating that 75% of peak month visitors would visit within 10 peak days. This is due to concentrated visitation periods during peak months, such as Christmas (end of December), Lunar New Year (usually 10 days in February), and Lao New Year (mid-April). Identifying these peak periods is crucial for planning related to crowding, traffic management, and accommodation provision.

Tourism revenue. Table 11 presents the projections of average length of stay and daily spending for domestic, regional,¹² and long-haul travelers, based on data extracted from the Ministry of Information, Culture and Tourism's Statistical Report on Tourism in Laos 2019. For long-haul and regional travelers, it is estimated that their stays in Luang Prabang constitute half of their total time spent in-country based on common tour company and tour guide itineraries.¹³

Table 11: Visitors' Typical Length of Stay and Expenditure in Luang Prabang

Visitors' Origin	Average Length of Stay (days)	Daily Expenditure (\$)	Total (\$)
Domestic	3.0	40.00	120.00
Regional	1.5	66.00	99.00
Long-Haul	4.0	83.60	334.40

Note: For regional visitors, daily spending data for visitors from the People's Republic of China and Thailand were used as proxy for all regional tourists. Source: Ministry of Information, Culture and Tourism, 2020. Statistical Report on Tourism in Laos 2019. Vientiane.

3.1.2 Tourism Scenarios

Three tourism projection scenarios were developed using different assumptions of visitor demand and tourism management. Appendix 4 presents the visitor projections for each scenario, and the estimated revenue generated by market segment for each tourism scenario.

Scenario 1: Special Economic Zone-Driven Scenario. The first scenario assumes that planned SEZs and their tourism attractions will be the key drivers of tourism, leading to an increased length of stay in Luang Prabang (footnote 2). This scenario estimates 3.7 million tourists in 2040, an average daily tourist population of 65,699 visitors, and an average length of stay of 7 days for international tourists and 5 days for domestic tourists.

⁸ The COVID-19 pandemic refers to the period from 2020 to 2022.

ADB. 2020. The Impact of COVID-19 on Tourism Enterprises in the Lao People's Democratic Republic. Luang Prabang.

^o This period is chosen as tourism activities were fully opened. This is in comparison to 2020 to 2022, when Lao PDR and regional countries were closed due to COVID-19, which make the data collected not representative of tourism trends

² As only daily spending data for visitors from Thailand and the PRC were collected, the data was averaged and used as a proxy for all regional tourists, e.g., the PRC. Thailand, and Viet Nam

¹³ Based on review of tour company itineraries and informal discussions with tour guides and van drivers catering to Thai tour groups

However, the likelihood of SEZs being realized as planned is uncertain given their dependence on private investment, and it is debatable whether they will drive tourism growth. Moreover, it is uncertain if length of stay will increase, especially if the new Lao-China High Speed Railway (HSR) and the planned expressway between Vientiane and Luang Prabang will make Luang Prabang more attractive to regional tourists, who typically have shorter stays. As such, two alternative scenarios are being proposed. Using the average annual growth rate of travelers to Luang Prabang between 2017 and 2019, disaggregated by domestic, regional, and long-haul visitors, these alternative scenarios consider the HSR and the planned expressway between Vientiane and Luang Prabang as key growth drivers. In both scenarios, there will be a greater share of domestic and regional travelers, resulting in shorter but more frequently recurring tourist stays compared to long-haul international visitors. Travel peaks coincide with specific holiday periods.

Scenario 2: Typical Management Approach. Scenario 2 assumes a more "hands-off" approach to tourism management by the Luang Prabang local government, where no additional visitor management strategies are introduced beyond the business-as-usual context. Under this scenario, tourism will grow rapidly in the first 5 years post-COVID-19,¹⁴ but rates will plateau and eventually decline, particularly for higher-spending long-haul travelers.

In 2022, Luang Prabang recorded 442,370 train visitors, despite the Lao-China HSR starting operations only in December 2021 and the country reopening its borders on 9 May 2022.¹⁵ This growth is supported by train affordability and speed and augmented by pent-up travel demand post-COVID-19. In contrast, long-haul arrivals may lag in the short-term due to expensive air travel, lack of flights, and a preference for other ASEAN regional destinations.¹⁶

Over the long term, robust growth in the domestic and regional markets could overwhelm Luang Prabang, crowding out long-haul travelers. Regional and long-haul visitors often have divergent interests and behaviors, which may be incompatible or difficult to cater to concurrently. These include customer service expectations, group travel preferences, shopping behavior, types of experiences sought, and tolerance for noise and crowds.¹⁷ While these differing preferences may not be significant enough to be a contentious issue with low visitor numbers, a dramatic increase in visitor levels could lead to visitor experience degradation and an overall decline in visitor numbers.

In this scenario, regional and domestic tourists would be the dominant types of visitors, resulting in higher numbers in the short and medium term but plateauing in the long term. This would lead to higher overall visitor numbers in 2040, at around 3.2 million visitors annually, but with shorter stays and less spending per visitor. The peak daily tourist population would reach 36,166 persons in this scenario, compared to the 2019 estimated peak daily tourism population of 9,675 people.

Scenario 3: Proactive Management Approach. The third scenario assumes the same growth context as Scenario 2, but with proactive and smart management mechanisms adopted. Table 12 presents the comparison of tourist growth rates between Scenarios 2 and 3. To achieve steady growth in the long term, restrictions could be introduced on private and commercial vehicle entry to the city, a heritage fee or tax could be levied on each visitor, and timed ticketing systems could be implemented to moderate city growth. This approach could result in higher spending per tourist, but with fewer visitors overall, leading to less stress on the city, its residents, and its heritage. Scenario 3 projects nearly 3 million visitors per annum in 2040, with a peak daily tourist population of 33,261 people, compared to the 2019 estimate of 9,675.

Table 12: Established Tourist Growth Rates for Scenarios 2 and 3

Period	Scenario 2: 1	Scenario 2: Typical Management Approach (%)			Scenario 3: Proactive Management Approach (%)		
	DGR	RGR	LHGR	DGR	RGR	LHGR	
2022–2026	12	18	8	10	10	8	
2027–2030	12	12	8	10	10	9	
2031–2040	10	7	5	10	10	10	

DGR = domestic growth rate, RGR = regional growth rate, LHGR = long-haul growth rate. Source: Ramboll, 2023.

2

Comparison of tourist projections under the three scenarios. Table 13 presents the projected tourist numbers from 2022 until 2040 for each of the three scenarios. Given the uncertainty of the SEZdriven scenario, it is recommended that the typical and proactive management scenarios, which have 2040 projected tourist figures of 3.2 and 3 million visitors, respectively, be applied to the projections for land accommodation.

¹⁴ Post-COVID-19 refers to 2023 and beyond

¹⁵ China-Laos Railway opens up new path for Laos' development, prosperity. 2022. Xinhuanet. 26 December. https://english.news.cn/20221226/003f1111e9534f549f015dhe26h4d4da/chtm

¹⁶ Thailand's tourism industry: adapting to changing times. 2022. Economist Intelligence Unit. 6 October. https://www.eiu.com/n/thailand-tourism-industry-adapting-to-changing-times; World Tourism Organization. 2022. Tourism Enjoys Strong Start to 2022 While Facing New Uncertainties. 25 March. World Tourism Organization. https://www.unwto n-enjoys-strong-start-to-2022-while-facing-new-uncertainties; World Tourism Organization. 2023. Tourism Set to Return to Pre-Pandemic Levels in Some org/news/tou Regions in 2023. 17 January. https://www.unwto.org/news/tourism-set-to-return-to-pre-pande

¹⁷ R.W. Armstrong, et al. 1997. The importance of cross-cultural expectations in the measurement of service quality perceptions in the hotel industry. International Journal of Hospitality Management. 16(2). pp. 181-190. https://www.sciencedirect.com/se ience/article/abs/pii/S0278431997000042; H. Chang. 2017. Tourist-to-Tourist Encounter effect: more conflicts or less?. Travel and Tourism Research Association: Advancing Tourism Research Globally. https://scholarworks.umas context=ttra; S. Jia. 2020. Motivation and satisfaction of Chinese and U.S. tourists in restaurants: A cross-cultural text mining of online reviews. Tourism Management. Volume 78. https://doi.org/10.1016/j.tourman.2019.104071; E.J. Ruddell and J.H. Gramann. 1994. Goal orientation, norms, and noise-induced conflict among recreation area users. Leisure Sciences. 16(2). pp. 93-104. https://www.tandfonline.com/doi/abs/10.1080/01490409409513222; and J.J. Vaske, et al. 1995. Interpersonal versus social-values conflict. Leisure Sciences. 17(3). pp. 205–222. https://www.researchgate.net/publication/248981673_Interpersonal_versus_social-values_conflict

Year	SEZ-Driven Scenario 1	Typical Management Scenario 2	Proactive Management Scenario 3
2022	537,719	537,719	537,719
2025	1,007,835	799,884	712,591
2030	1,456,844	1,426,624	1,139,867
2035	2,313,933	2,135,302	1,835,768
2040	3,701,443	3,214,716	2,956,522

Table 13: Annual Visitor Arrival Projections for Tourism Scenarios

SEZ = special economic zone.

Source: Asian Development Bank and Ramboll estimates.

Scenario 1 assumes that the completion of the SEZ by 2030 will drive significant growth in international visitors, resulting in a significant increase in length of stay. However, as of 2023 there has been no progress developing the SEZ. Moreover, other SEZs in the Lao PDR have struggled to attract the needed investment levels.¹⁸ Given its uncertainty, Scenario 1 is unlikely. Instead, Scenarios 2 and 3, which project 3.2 and 3 million tourists in 2040, respectively, have been applied to project land required for visitor accommodations. Scenario 3, the Proactive Management Scenario, is preferred as it will result in higher sustained revenues compared to Scenario 2 and lower negative impacts on heritage, infrastructure, and the well-being and guality of life of the city's residents.

3.2 LAND PROJECTIONS FOR VISITOR ACCOMMODATIONS

3.2.1 Estimating Visitor Accommodation Demand

In estimating the demand for visitor accommodations, tourist projection figures were converted into person-night occupancy (assuming two persons per room). A contingency of 15% for room numbers was added to arrive at the total number of hotel rooms required. The resulting figure will need to be broken down by visitor accommodation type to determine land use. To accomplish this, the different accommodation typologies and their corresponding land requirements were assessed before determining the amount of land required for such visitor accommodations.

3.2.2 Existing Visitor Accommodation Case Studies

Table 14 presents an overview of the three predominant types of tourist accommodations and their distribution in Luang Prabang: guesthouses, hotels, and resorts. Guesthouses are typically locally owned properties located primarily within the World Heritage Site with 10 or fewer rooms. These are often residential properties that have been converted or expanded into tourist accommodations. Hotels refer to larger properties, including converted heritage properties within the World Heritage Site, with more than 10 rooms. Resorts are hotels that self-designate as such, generally have higher land requirements, and are located mainly in less densely populated city outskirts. In Luang Prabang, hotels average 29 rooms, resorts average 25 rooms, and guesthouses average 10 rooms.

Table 14: Accommodation Type Availability, 2022

Accommodation Type	Total Number of Accommodation Type	Total Number of
Hotels	78	2,268
Resorts	12	301
Guesthouses	276	2,700
Total	366	5,269

Source: Department of Information, Culture and Tourism.

Figure 10 shows the location of the six case studies identified from the hotel and resort typologies. Table 15 provides details of each case study, including their associated land takes, which were computed to derive the average hotel and resort room size. These case studies were chosen due to their characteristics (such as land area and number of hotel rooms), which allowed for a more representative average land take per room figure.

Guesthouses were not studied as case studies, as these are small in scale and do not substantially impact the need for land for accommodations.

Figure 10: Hotel and Resort Case Studies



Source: Ramboll, 2023

ype / Walability, 2022					
ooms	Distribution of Rooms (%)	Average Number of Rooms per Accommodation Ty			
	43.04	29			
	5.71	25			
	51.24	10			

¹⁸ For example, the That Luang Marsh development in Vientiane, which began in 2012 and is yet to be completed. Open Development Mekong. 2020. That Luang Marsh Specific Economic Zone expected to be completed by 2030. 1 September. https://www.action.com/actionality.co nected-to-h completed-by-2030/; Cohen, Muhammad. 2016. Sale Of Savan Vegas Shows All Bets Are Off In Laos' Murky Casino World. Forbes. 15 July. https://www.forbes.com en/2016/07/15/laos-is-the-house-so-all-bets-are-off/; Strangio, Sebastian. 2022. Golden Triangle Gambling Zone the World's 'Worst' SEZ, Group Says. The Diplomat. 30 March. https://thediplomat.com/2022/03/golden-triangle-gambling-zone-the-worlds-worst-sez-group-says/

Case Study	Number of Rooms ^a	Approx. Land Area ^ь (m²)	Average Land Take per Room (m ²)	Typology⁵	Average Land Take per Room (m ²)
Maison Dalabua	40	4,800	120	Hotel	
Luang Prabang View	80	17,700	221	Hotel	200
Le Bel Air Resort	66	14,750	223	Hotel	
Sofitel Luang Prabang	25	12,200	488	Resort	
Pullman Luang Prabang	123	80,000	650	Resort	675
The Grand Luang Prabang	75	59,000	787	Resort	

 Table 15: Hotel and Resort Case Studies – Details

approx. = approximate, m^2 = square meter.

Notes:

^a Obtained from each hotel's website.

^b Obtained by tracing each hotel's boundaries on Google Earth.

^c Each hotel's typology was verified by the Department of Information, Culture and Tourism. Source: Ramboll, 2023.

3.2.3 Future Visitor Accommodation Types

It is assumed that current accommodation typologies-hotel (low-density), resort, and guesthouseswill continue to house tourists and short-term visitors, as they fit Luang Prabang's low-rise and rustic character. Guesthouses are assumed to not require new land, as they are usually located on converted residential properties rather than purpose-built ones, or infill small urban plots.

As land becomes scarcer, newer accommodations could become taller and denser, particularly near the HSR station. While such hotels are not yet present in Luang Prabang, a fourth typology was introduced: "hotel (mid-density)," characterized by more hotel rooms per unit land area, to cater to the mass tourist market. Table 16 illustrates this fourth typology using data from Crowne Plaza Vientiane, which requires only 25 m² of land take for each room—26 times less than that of Pullman Luang Prabang. However, as the 10-story height of Crowne Plaza Vientiane would exceed Luang Prabang's 20-meter height restriction, a maximum of five stories is assumed for such hotel typologies in Luang Prabang, requiring an average of about 50 m² of land take per room.

Table 16: Crowne Plaza Vientiane Details

Development	Number of Rooms ^a	Approx. Land Area (m²)	Average Land Take per Room (m ²)	Typology⁵	Expected Average Land Take per Room in Luang Prabang (m ²)
Crown Plaza Vientianeª	200	5,000	25	Hotel	50 ^b

approx. = approximate, m^2 = square meter. Notes:

^a Typology in this study depends on the land take per room of the development. ^b The 50 m² of Crown Plaza Vientiane is a 10-story development. If a similar hotel opens in Luang Prabang, it is assumed that the number of rooms will be half of that in Vientiane due to a height limit of 20 meters or a maximum of five stories. Hence, average land take per room is double that of the current land take per room of the hotel in Vientiane. Source: Ramboll, 2023.

to guide accommodation land projections.

Table 17: Accommodation Type Breakdown

Accommodation Type		Max. Building Height (m)	Average Land Take Per Room (m ²)	Average Number of Rooms per Hotel/ Resort
Crown Plaza Vientiane	Hotel (Mid-Density)	20	50	200
	Hotel (Low-Density)	20	100	80
Resort		12	200	35

m = meter, max. = maximum, m^2 = square meter. Source: Ramboll, 2023.

Table 17 presents the different accommodation type parameters developed based on the above data

3.2.4 2040 Land Requirements for Visitor Accommodations

Based on predicted tourism market trends, it is possible to anticipate the growth in accommodation typologies. The number and types of hotels, resorts, and guesthouses needed in 2040 were influenced by three factors: (i) the 2022 proportions of the accommodation typologies as a baseline, presented in Table 14; (ii) anticipated demand for rooms disaggregated by market segment and peak tourism periods; and (iii) the assumption that with constrained land availability and shorter stays in 2040 due to affordable rail travel, mid-density hotels will become more common and be promoted to ensure sufficient short-term accommodation for tourists. These factors were applied to both the Typical Management and Proactive Management scenarios.

In both scenarios, the proportion of guesthouses will decrease significantly from 51% in 2022, due to limited availability of buildings in the World Heritage Site for conversion and local authorities introducing stricter urban management mechanisms. Resorts will remain at 6% of total hotel stock, like 2022. The difference between the two scenarios will be the mid-density and low-density hotels provided to cater to the different visitor types anticipated. Table 18 presents the Typical Management Scenario, where mid-density hotels will be developed more aggressively to capture the increased regional, short-stay visitors, given the decrease in land availability. Table 19 presents the Proactive Management Scenario, where hoteliers will continue to build mid-density hotels, but not as much as the Typical Management Scenario, as there will be fewer regional, short-stay visitors. More low-density hotels will cater to the increased international visitors, who are more willing to spend on better accommodation types.

Table 18: 2040 Visitor Accommodation Needs in Typical Management Scenario

Accommodation Type	Total Number of Accommodation Type	Total Number of Rooms	Room Distribution (%)	Average Number of Rooms per Accommodation
Hotel (Mid-Density)	60	11,913	56	200
Hotel (Low-Density)	53	4,255	20	80
Resort	36	1,276	6	35
Guesthouse	383	3,829	18	10
Total	532	21,274		

Note: The Typical Management Scenario has a maximum of 21,274 x 30 days = 638,220 visitor nights a month. Source: Ramboll, 2023.

Table 19: 2040 Visitor Accommodation Needs in Proactive Management Scenario

Accommodation Type	Total Number of Accommodation Type	Total Number of Rooms	Room Distribution (%)	Average Number of Rooms per Accommodation
Hotels (Mid-Density)	48	9,587	49	200
Hotels (Low-Density)	61	4,891	25	80
Resorts	34	1,174	6	35
Guesthouses	391	3,913	20	10
Total	534	19,565		

Note: The Proactive Management Scenario has a maximum of 19,565 x 30 days = 586,950 visitor nights a month. Source: Ramboll, 2023.

Table 20 presents the land requirements for visitor accommodations for both the Typical Management and Proactive Management scenarios. The Typical Management Scenario projects an additional 99 ha of land for visitor accommodations by 2040, while the Proactive Management Scenario projects approximately 92 ha by the same year. Although the Typical Management Scenario estimates a slightly higher land requirement of 7.4 ha, it is recommended to adopt the Proactive Management Scenario's projections for tourist accommodation land. This will result in a more sustainable and livable Luang Prabang in the long term, with fewer resource and resident pressures, and higher benefits. It should be noted that this projection excludes all ancillary services required to support hotels, which were already considered in the previous calculation of urban land needs.

Table 20: 2040 Projected Land Requirements for Visitor Accommodations

			Typical Management Scenario		Proactive	Management	Scenario	
Accommodation Type	Avg. Land Take Per Room (m ²)	No of Rooms in 2022	Number of Rooms in 2040	Increase in No. of Rooms	Total Land Require- ment (ha)	Number of Rooms in 2040	Increase in No. of Rooms	Total Land Require- ment (ha)
Hotels (Mid-Density)	50	0	11,913	11,913	59.6	9,587	9,587	47.9
Hotels (Low-Density)	100	2,268	4,255	1,987	19.9	4,891	2,623	26.2
Resort	200	301	1,276	975	19.5	1,174	873	17.5
Guesthouses ^a		2,700	3,829	1,129		3,913	1,213	
Total					99.0			91.6

avg = average, ha = hectare, m² = square meter, no = number. ^a Guesthouses are excluded from additional land projections, as they convert existing buildings or infill, and do not require new greenfield land. Source: Ramboll, 2023.

4 LAND AVAILABILITY



4.1 APPROACH

A geospatial analysis approach was used to determine the feasibility of new urban development in Luang Prabang. A satellite image from February 2022 was analyzed to identify the existing built-up areas in the city. The 2012 Urban Planning Regulations for Luang Prabang was superimposed on the map to determine the available land allotments for new urban development based on the current zoning regulations. The computed land quantity was compared with the anticipated 2040 urban and accommodation land requirements as shown in Tables 10 and 20. By undertaking these steps, an accurate assessment of the actual land availability in Luang Prabang can be determined, allowing for appropriate measures to manage and plan for future urban development.

4.2 EXISTING BUILT AREA

The core city is located along the south bank of the Mekong River. Figure 11 shows the built area as of February 2022. The built area toward the west is more dispersed due to a large golf course and mountains. There are also dispersed urban developments to the south and north of the core city.

Figure 11: Existing Built Area, as of February 2022



Source: Ramboll, 2023.

Chomphet District has poor utilities and physical connectivity to the core city, which limits urban development and the area's ability to support growth in the short to medium term.

4.3 2012 URBAN PLANNING REGULATIONS FOR LUANG PRABANG

The 2012 Urban Planning Regulations for Luang Prabang was used to identify the land permitted for urban development (Figure 12). The Mountainous and Forestry Preservation Zone covers 57% (7,096 ha) of the total buffer zone and is designated as off-limits to urban development. This means that only 43% (5,464 ha) of the area is available for urban development, with vacant land sites only available in two zones (Figure 13 and Table 21)-the first is the Peri-Center Zone, which allows suburban development, including hotels and commercial activities, and is along the Nam Khan River and to the west of the World Heritage Site. The second, the Urban Development Zone, also permits hotels and commercial activities but has a higher building height allowance than the Peri-Center Zone. The Urban Development Zone is in Chomphet District, in the northeastern part of Luang Prabang, close to the airport where the city is expected to grow.





Source: Department of Public Works and Transport. 2012. Urban Planning Regulations for Luang Prabang. Luang Prabang Province.

Figure 13: Land Zones Available for Development



Source: Ramboll, 2023.

Table 21: Regulations for the Peri-Center and Urban Development Zones

Zone	Land Use Class	Land Use Regulations	Building Height Regulations
Peri-Center Zone	Suburb	 Hotel construction with more than 50 rooms must submit a proposal to the National World Heritage Office, for consideration and approval. Permissible uses for individual residents or groups of people include service buildings such as a shop, restaurant, handicraft, or workshop that do not create pollution; religious building; public amenities such as cultural, education, public health, sports and recreation; public administrative buildings; small and medium warehouses; and gas stations. 	12 meters (not higher than 340 meters above sea level). Religious buildings and public amenities are exempted from building height limits.
Urban Development Zone	Urban Development Area	Hotel construction with more than 50 rooms must submit a proposal to the National World Heritage Office, for consideration and approval. Permissible uses for individual residents or groups of people include service buildings such as a shop, restaurant, handicraft, or workshop that do not create pollution; religious building; public amenities such as cultural, education, public health, sports and recreation; public administrative buildings; small and medium warehouses; and gas stations.	20 meters (not higher than 340 meters above sea level). Religious buildings and public amenities are exempted from building height limits.

4.4 LAND AVAILABLE FOR DEVELOPMENT

4.4.1 Land Zoned for Urban Development

A total of 785 ha of vacant land zoned for urban development purposes were deemed available overlaying the two land zones where urban development is permitted onto the existing built-up area. These vacant land tracts comprise three areas in Chomphet District, covering 437.4 ha, and another three areas in Luang Prabang covering 347.6 ha (Figure 14 and Table 22).

Figure 14: Land Available for Future Urban Development



C = Chomphet District, L = Luang Prabang. Source: Ramboll, 2023.

Table 22: Land Available for Future Urban Development

Area Code	District	Area (hectare)
L1	Luang Prabang	103.7
L2	Luang Prabang	220.3
L3	Luang Prabang	23.6
Subtotal Land Available at Luang Prabang	347.6	
C1	Chomphet District	10.5
C2	Chomphet District	21.2
C3	Chomphet District	405.7
Subtotal Land Available at Chomphet Dist	437.4	
Total Land Available for Urban Developme	785.0	

Source: Ramboll, 2023.

4.4.2 Land Excluded from Future Urban Development

Chomphet District is mostly composed of rural villages lacking basic amenities, despite the area being identified for urban development in the 2012 Urban Planning Regulations for Luang Prabang (Figure 15). Therefore, vacant land found in Chomphet District was excluded from the computation due to the financial commitment required to support infrastructure and any substantial new community development. Any market-driven urban development, aside from investors with significant investment capabilities, would likely take place south of the Mekong. However, any future planning for Luang Prabang must include and integrate development opportunities in Chomphet District.





Source: Ramboll, 2023.

4.4.3 Total Land Available for Urban Development

A total of 347.6 ha of land is available for new urban development in Luang Prabang, south of the Mekong River. The land required for urban development and visitor accommodations by 2040 is projected to be 527.6 ha (Table 23). Hence, to meet Luang Prabang's 2040 growth needs, an additional 180 ha of vacant land suitable for urban development must be identified south of the Mekong.

Table 23: 2040 Land Requirements (Scenario 3 – Proactive Management Approach)

Land Type	Land Required (hectare)
Urban (based on average household size of 4.28 in 2040)	436.0
Visitor Accommodation (based on Scenario 3 – Proactive Management)	91.6
Total	527.6
Land Available and Zoned for Urban Development in Luang Prabang	347.6
Land Shortfall	180.0

Source: Ramboll, 2023.



5 **URBAN SCENARIOS**



5.1 APPROACH

Given the insufficient vacant land available within the planned urban development areas of the buffer zone (according to 2012 Urban Planning Regulations for Luang Prabang) to meet the 2040 growth projections, additional urban land must be identified.

Two spatial development scenarios aligned with Business-as-Usual and Polycentric Development were assessed to determine optimal locations for accommodating the additional required urban land (footnote 2). These two scenarios proposed different developmental approaches for the city, focusing on new urban development corridors in the buffer zone:

- (i) urban sprawl.
- (ii) development corridors along other growth nodes.

Both scenarios were evaluated based on the 2040 land requirement of 527.6 ha, using sound urban planning principles. The purpose was to determine the impact of each scenario and make informed decisions regarding the ideal location of new urban areas in Luang Prabang.

5.2 BUSINESS-AS-USUAL SCENARIO

Figure 16 illustrates the Business-as-Usual Scenario, where Luang Prabang's urban development would continue to expand rapidly along current road connections. The city would extend to the southwest, taking over existing rice fields and open green spaces, and extend toward the northeast, beyond the area near Souphanouvong University, where a proposed bridge to Chomphet District will be constructed, and along the Nam Khan River in the direction of the Luang Prabang HSR station.

The SEZs currently being pursued by individual real estate investors in Chomphet District, Kuangsi Waterfalls, and the HSR station areas would develop independently from Luang Prabang. Each district would pursue its own development goals and objectives and build its own road network, water supply, drainage systems, and other necessary infrastructure. The SEZs are envisioned as new towns outside Luang Prabang and may have little incentive to improve Luang Prabang's current urban conditions.

Business-as-Usual – Continuation of current development approach with limited enforcement of regulation and plans and new urban development driven by the market. New urban growth will take place at the city fringe, encroaching onto agricultural and forested land, resulting in

Polycentric Development – Direct growth toward multiple urban centers that have synergetic functions, which would enable more sustainable growth of the urban core enhancing potential

Figure 16: Business-as-Usual Scenario



Source: ADB. 2022. Lao People's Democratic Republic: Urban Environment Improvement Investment Project. https://www.adb.org/projects/53203-001/main.

Applying 2040 land needs to the Business-as-Usual Scenario. As only 347.6 ha of zoned land are vacant and available within the existing urban area for development, an additional 180.0 ha of land beyond the current buffer zone boundaries would be required. To minimize infrastructure and development costs, new urban development is likely to expand outward from the existing urban area and into existing rice fields, open green spaces, and hillside slopes, despite existing land zoning regulations that restrict urban development in some of these places (Figure 17).



Source: Ramboll, 2023.

5.3 POLYCENTRIC DEVELOPMENT SCENARIO

In this scenario, the Luang Prabang urban area would continue to expand along the main road corridors following a stringent urban structure. This would allow urban development to take place in new growth nodes suitable for mixed-use and economic development, while protecting existing natural and heritage areas around the city (Figure 18).

The main difference between this and the Business-as-Usual Scenario is the relationship between Luang Prabang and the SEZs. In this scenario, the SEZs are complementary (as opposed to standalone) urban centers that support and mutually reinforce Luang Prabang's urban development. Each new center would have different uses, such as commercial, educational, residential, and logistics, to meet residents' daily needs, which can contribute toward supporting economic growth, enhancing livability, and promoting sustainable transportation. This scenario considers Luang Prabang as adopting a "polycentric urban structure" with multiple peripheral smaller centers or nodes integrated with and supporting the main central urban core (the World Heritage Site).

Figure 17: Potential Growth Areas for Business-as-Usual Scenario



MLITT = Japanese Ministry of Land, Infrastructure, Transport and Tourism, SEZ = special economic zone. Source: ADB. Lao People's Democratic Republic: Urban Environment Improvement Investment Project. https://www.adb.org/projects/53203-001/main.

Figure 19 illustrates the potential growth areas for the Polycentric Development Scenario. This scenario is designed to oppose urban sprawl by directing development toward specific areas. Based on this scenario, new urban development would cease in Luang Prabang, and most of the land required to meet 2040 land needs would be in Chomphet District and around the railway station.

💢 Future bridge over the Mekong

ADB (eqis

Figure 19: Potential Growth Areas for Polycentric Development Scenario



Source: Ramboll, 2023.

5.4 SCENARIO ASSESSMENT

The potential impacts of each scenario were analyzed to determine the best approach to guide the city's growth. However, due to limited data and the speculative nature of the scenarios, this assessment is more high-level and aimed at providing a plausible outcome of the city's development. When creating a more detailed master plan, these scenarios and assessment frameworks may be adjusted.

Using specific urban planning criteria, a framework was developed to assess the high-level impacts of both scenarios (Appendix 5). The results indicate that the Polycentric Development Scenario performs slightly better than the Business-as-Usual Scenario, particularly regarding the clearance of natural areas and the opportunity to introduce mixed land uses (Table 24). This scenario also avoids the development of protected forested land around Luang Prabang to preserve the city's natural and rustic environment, which is consistent with the observations made in the UEIIP (footnote 2).

However, there is concern regarding the potential for residents in the new nodes to have to travel farther to access jobs.¹⁹ Post-COVID-19, jobs in Luang Prabang are likely to require physical presence, particularly in service-oriented roles. Thus, to reap the benefits of the Polycentric Development Scenario, new nodes should be mixed-use, with tourism services requiring human resources. To facilitate urban development, forested land surrounding Luang Prabang, such as around the HSR station, would need to be cleared.

41

¹⁹ UN-Habitat. 2012. Leveraging Density: Urban Patterns for a Green Economy. Nairobi. https://unhabitat.org/leveraging-density-urban-patterns-for-a-green-economy

Table 24: continued

	Table 24: Urban Scenario Asso	essment	
Criteria	Business-as-Usual Scenario	Polycentric Development Scenario	
Natural area loss	Natural areas lost: 180 hectare (ha)	Natural areas lost: approximately 160 ha	
	The Business-as-Usual Scenario would address the land shortfall by acquiring nearby natural areas that are protected under Forest and Mountainous Preservation Zone to facilitate urban expansion. Under this scenario, it is assumed that all of the 180 ha required for development will be met through encroachment onto these nature areas.		
	In the Polycentric Development Scenario, the land shortfall is addressed by developing three new urban areas outside the buffer zone, including the HSR area, the northeast, and southwest of the city, with a potential fourth new node in Chomphet District. These areas are still largely covered by forests.		
	Comparing the lands maps in Figure 15 with satellite imagery, there is about 20 ha of land, mostly around the HSR, already cleared. To meet the 180 ha required for development, the size of natural areas lost is estimated to be around 160 ha.		
	Both scenarios involve clearing forests to accommoda Development Scenario resulting in fewer natural areas affected in the Polycentric Development Scenario are hilly regions are part of the city's heritage landscape, less direct impact on Luang Prabang's landscape herit	te future urban growth, with the Polycentric s lost. While the difference is slight, the natural areas located farther from the city center. As the natural urban expansion under this scenario would have a rage.	
Urban nodes	Number of urban nodes beyond the existing urban areas: 0	Number of urban nodes beyond the existing urban areas: 1–2	
	The Business-as-Usual Scenario does not include new nodes outside the existing urban area.		
	In the Polycentric Development Scenario, one or two new urban nodes may be outside the existing urban area, at the HSR station, and possibly in Chomphet District.		
	Introducing new urban nodes would help move people and services farther away from the World Heritage Site—supporting the crucial concern to decongest the core heritage area. In addition, the introduction of an urban node in the HSR area could support transit-oriented development by locating homes, hotels, and attractions near a railway station.		
Urban density	Gross population density of Luang Prabang buffer	Within buffer zone	
	Net residential density: 16.7 dwelling units/ha	Gross population density of Luang Prabang buffer zone (excluding new urban nodes): 2,490 persons/ km ²	
		Net residential density: 12.4 dwelling units/ha	
	Luang Prabang's buffer zone is estimated to cover 27.4 km ² . This is derived from aggregating all urban areas – UA, UB, UC, UD zones, and the World Heritage Site (Figure 12). Under this scenario, the city will grow by 180 ha. ^a This land shortfall is resolved by expanding the current built-up area and acquiring nearby forest areas. As such, the total area will be 29.2 km ² in 2040. In 2040, Luang Prabang's population is projected to reach 83,262, which will be accommodated in a total area of 29.2 km ² . Thus, the expected 2040 density will be approximately 2 850 persons per	In 2040, the population density and the residential density of the buffer zone are expected to remain like those in 2020, with most of the projected 15,055 new residents occupying the new urban nodes. Hence, the gross population density for the Luang Prabang buffer zone is calculated by dividing the total population of 68,207 by the urban area of 27.4 km ² as computed previously. This results in a population density of approximately 2,490 persons/ km ² .	

1

2

3

Continued on next page.

Scenario	Polycentric Development Scenario
r of households is projected 040, if one household occupies 17th the new total area of 29.2 d area used for residential area for residential use would 8 ha. This will result in a net f 16.7 dwelling units/ha.	The net residential density is determined by dividing the total number of households (13,641) by the total residential land, which is assumed at 40% of the entire buffer zone land area. This translates to approximately 10.96 km ² or 1,096 ha. This will result in a net residential density of roughly 12.4 dwelling units per hectare.
	Within urban nodes
	Gross population density of new urban nodes: 2,850 persons/km ²
	Net residential density: 33.3 dwelling units/ha
	The new nodes are expected to take 527.6 ha of land and accommodate an additional 15,055 residents and 5,813 new households. A total of

dwelling units/ha. elopment Scenario is expected to result in slightly lower density in the buffer zone Business-as-Usual Scenario. This is because any new population growth will be urban nodes outside the core city in the Polycentric Development Scenario, unlike al Scenario, which involves extending the core city. As a result of the polycentric I, the new urban nodes in the Polycentric Development Scenario are expected to be net residential density due to how land is allocated and planned for these nodes.

211 ha^b of the new urban villages will be used for housing. As such, the population density in these new nodes will be about 2,850 persons/km², and the net residential density will be about 27.5

arios do not meet the suggested optimal urban density proposed by UN-Habitat. cenarios fall within the "low" range for residential density. Nonetheless, given that aracter takes on a more rustic, semi-rural feel, and there are height restrictions, overe city may be detrimental, as it can worsen the feelings of overcrowding, stress urban nentally alter its distinct sense of place.

Continued on next page.

Table 24: continued

No.	Criteria	Business-as-Usual Scenario	Polycentric Development Scenario
4 Mixed-	Mixed-use	The World Heritage Site has a mixed-use nature.	The World Heritage Site retains its mixed-use nature. ^b
		Using existing case studies, the proportion of land uses within the World Heritage Site is 40% housing, 30% commercial, 5% amenities, 10% open spaces, and 15% road. However, toward the urban fringes, the area becomes fairly single use, with a higher concentration of primarily residential land use. This is likely because the commercial and amenity spaces in the city center primarily cater to tourists, while there are fewer tourist destinations in the urban fringes, resulting in less foot traffic and lower demand for commercial or amenity spaces.	The new urban nodes at the HSR station and potentially Chomphet are designed to accommodate multiple functions, such as commercial areas, amenities, and open spaces, resulting in a more mixed-use typology.
		The Polycentric Development Scenario with new urba land uses potentially providing more employment and	n nodes is expected to result in a more diverse set of d service opportunities.

HSR = high speed railway, km² = square kilometer, UA = Former Village Zone, UB = Peri-Center Zone, UC= Peripheries Zone, UD = Urban Development Zone, UN-Habitat = United Nations Human Settlements Programme. ^a See Table 23 of this report. ^b See Table 6 of this report.
 Source: Ramboll, 2023.



6 ALTERNATIVE URBAN SCENARIO



6.1 APPROACH

Based on the two spatial scenarios—Business-as-Usual and Polycentric Development—the projected 2040 land requirement of 527.6 ha was evaluated. The Business-as-Usual Scenario results in further urban development of natural areas around the fringes of the city, whereas the Polycentric Development Scenario results in a mixed-use urban fabric and excludes DPWT plans to develop Ban Done Keo (Section 5.4). Given this, an alternative urban scenario was created by combining elements from both scenarios. A land development plan illustrating how the 527.6 ha of land can be accommodated is provided in Figure 20.

Figure 20: Luang Prabang 2040 Land Development Plan – Alternative Scenario



HSR = high speed railway. Source: Ramboll, 2023.

6.2 ALTERNATIVE URBAN SPATIAL CONCEPT

The alternative urban spatial concept proposed in Figure 21 and Table 25 suggests that commercial and tourism activities will continue within the World Heritage Site, which is home to many residential villages. To increase urban densities within the city's existing boundaries, new urban development should prioritize vacant land that is already designated for urban development in the 2012 Urban Planning Regulations for Luang Prabang (as identified in Chapter 4). To preserve the mountainous and forested areas, the city should not expand beyond its current limits.

To accommodate additional urban land required, new mixed-use nodes should be established outside the city. Four new primary urban nodes were identified: Ban Done Keo, around Souphanouvong University (referred to as the "Northeast Hub"), around the HSR station, and near Kuangsi Waterfalls (the "Southwest Hub"). Ban Done Keo is already zoned for urban development and has been identified by the DPWT as a priority new urban area.²⁰ The Northeast Hub comprises urban infill sites around an existing urban area, whereas the Southwest Hub and the area around the HSR station are new SEZs that were also identified in the Polycentric Development Scenario.²¹

Each node has a specific land use focus, such as the HSR station being planned as a Transit Development Mixed-Use Hub to capitalize on its proximity to the railway station, and the Southwest Node envisioned as a lower-density node catering to new resorts. Chomphet District was identified as a potential fifth node but is only likely to be activated once connectivity over the Mekong River is addressed through a bridge.



Figure 21: Luang Prabang Spatial Plan

HSR = high speed railway, SEZ = special economic zone. Source: Ramboll, 2023.

Table 25: Luang Prabang Development Focus Areas, 2040

Zone	Primary Functions	Land Take Required (hectare)
Southwest	Low-density mixed-use development area	103.7
Northeast	Community-focused neighborhood development area	23.6
Ban Done Keo	Community-focused neighborhood development area	220.3
High-Speed Rail Station	Transit development mixed-use hub	180.0
Total		527.6

Note: Chomphet District (437.4 hectares) will not be included in future development due to a lack of existing facilities and amenities and expected financial constraints (Chapter 4.4). Source: Ramboll, 2023.

Southwest Hub (around Kuangsi Waterfalls). The proposed Southwest Hub is on the road between the World Heritage Site and Kuangsi Waterfalls. As this area is adjacent to a golf course and primarily rural, the Southwest Hub could cater to low-density housing, tourist attractions, and hotels and resorts. This hub could also introduce activities that are geared toward wellness and recreation. About 104 ha of land available in this area could be developed to support the growth of this mixed-use development node in the future.

Northeast Hub (around Souphanouvong University). The area around Souphanouvong University, one of the country's leading tertiary educational institutions, is currently primarily residential. Therefore, 23.6 ha of the new area will be developed to continue supporting this neighborhood with amenities such as schools, hospitals, and community centers. This hub could also leverage the university's presence through related services, such as increasing the number of on-campus student accommodations and increasing the number of youth-oriented spaces, such as sports complexes and open fields.

Ban Done Keo. Located to the south of Luang Prabang Airport, this area is being planned as a new housing village by the DPWT. Given that there is still 220 ha of land available within Ban Done Keo for new urban development, new housing in this hub should be accompanied by amenities such as schools, markets, community centers, and health care facilities to provide more holistic services to residents. Hotels would also be developed in this hub.

High-Speed Rail Station. Capitalizing on the HSR station, a new 180 ha tourism hub around this HSR station is being proposed, which could cater to mid-density hotels for the mass market and reduce development pressure on the World Heritage Site to convert existing houses and buildings into new guesthouses and commercial establishments. Other commercial uses, such as retail stores, restaurants, and souvenir shops, would complement the hotels in this hub and ensure that the area becomes an attractive and bustling tourist area. The hub should also include housing for tourism workers.

²⁰ Discussion with DPWT on 7 September 2022.

Government of Lao PDR, Lao National Committee for Special Economic Zone. 2010. Decree on Special Economic Zone and Specific Economic Zone in the Lao PDR. Decree No. 433. Vientiane. https://data.opendevelopmentmekong.net/lo/dataset/5db9e21e-b6b6-4190-9c9a-b0dab564d909/resource/d41c7adc-cb7f-42df-926e-2f2b1d544e0f/download/ ncsez-443-en.pdf; Government of Japan, Ministry of Land, Infrastructure and Transport. 2022. *Master Planning Study for Smart City Development in Luang Prabang City, Lao PDR – Final Report.*

CONCLUSIONS AND NEXT STEPS 7



7.1 KEY FINDINGS AND RECOMMENDATIONS

The urban scenario stage was undertaken using a four-step methodology: (i) urban land demand projection, (ii) land demand projection for visitor accommodations, (iii) land availability study, and (iv) urban scenario preparation, considering existing projections developed by the UEIIP feasibility study.

Demand for urban land and visitor accommodations. The amount of land needed to accommodate the additional number of residents and visitors between now and 2040 is 527.6 ha, of which 436 ha is required for urban villages and 91.6 ha is for visitor accommodations. This land demand was derived through calculations that considered factors such as population, household size, visitor numbers, and accommodation demand. To determine the impact of the land requirement, a study of the various scenarios for two average household sizes (4.28 and 5) and two tourism growth approaches (typical management and proactive management) was conducted.

Land available for development. The land availability analysis identified 785 ha of land available for future development in Chomphet District (437.4 ha) and Luang Prabang (347.6 ha). However, as the development of Chomphet District would require significant financial and infrastructure investment, any future development is assumed to take place entirely within Luang Prabang. To meet the 527.6 ha of land required to support Luang Prabang's growth and tourism needs by 2040, an additional 180 ha of vacant land must be identified south of the Mekong.

Urban scenarios. After accounting for the 2040 projected land needs, two scenarios-Businessas-Usual and Polycentric Development—were explored as urban development trajectories for the city. The Polycentric Development Scenario slightly outperforms the Business-as-Usual Scenario as it allows for the opportunity to introduce mixed land uses. This scenario also avoids the development of protected forested land around Luang Prabang to preserve the city's natural and rustic environment, although forested land around the HSR station would need to be cleared to facilitate urban development. However, the Polycentric Development Scenario does not factor in DPWT's plans to develop Ban Done Keo as a new urban extension to meet housing needs.

An alternative urban scenario that consolidates aspects from both scenarios was then prepared, which identified four possible locations for the future development of Luang Prabang: (i) Southwest, (ii) Northeast, (iii) Ban Done Keo, and (iv) the HSR station area. The alternative urban scenario channels new urban growth to specific nodes within the built-up area already zoned for urban development, thereby minimizing the impact to forested areas. Building on the Polycentric Development Scenario, this scenario also seeks to create mixed-use urban nodes, each with a specific primary focus, that are nearer to World Heritage Site, thereby maximizing the benefits that a polycentric development model confers.

There is also potential for a fifth area in Chomphet District, provided connectivity improvements across the Mekong River are implemented. The spatial scenario and corresponding land development plan provide a basis for developing a more detailed urban land use plan that sets out the different land uses, such as residential, commercial, and roads for the city.

7.2 NEXT STEPS

The Urban Scenario Report lays out an alternative scenario that integrates parts of the Business-as-Usual Scenario with the Polycentric Development Scenario to meet Luang Prabang's future demands, needs, and challenges, while preserving the heritage and character of the World Heritage Site. This alternative scenario is conceptual and requires further work to turn it into a plan to guide urban development. A clearer policy framework needs to be established to inform the selection of smart city strategies and projects, to address the urban challenges and opportunities highlighted in the accompanying Urban Assessment Report.

The next step will be to craft clear smart city strategies and to support the alternative urban scenario outlined in this report. These strategies will cover urban subsectors of transport, water supply and sanitation, solid waste management, heritage management, climate change and disasters, and tourism management. The strategy will also prioritize proposed smart city interventions for further detailed assessment, design, and implementation. Concurrently, the alternative urban scenario could inform future detailed spatial planning efforts, which would include the drafting of a new structure plan and accompanying growth policies and regulations.



APPENDIX 1: DETAILED POPULATION PROJECTION METHODOLOGY



Photo: Adobe Stock

The Cohort Component Method (CCM) was used to forecast the provincial and district population, which required projecting three components (e.g., mortality, fertility, and migration) by age and sex groups.²² The CCM uses the population balancing equation:

where n is the length of the interval for which the projection is made and where the births, deaths, and migration are the total number of events occurring during the interval. The equation (1) above can be written as:

where (Po - deaths) refers to the survivors of the living population during the initial period and (Inmigrants - out-migrants) refers to net migrants.

In the Cohort Projection Method, the equation can be applied to any age and sex cohort, except that the cohort of birth does not come into play. Hence, the equation that applies is:

where x stands for age and s stands for sex. This means that the projected population of a given age and sex cohort is equal to the initial population of the death cohort when they were n years younger, less the number of deaths among them, and the net migrants. Meanwhile, the survivors of the births that occur during the interval become the youngest age and sex cohort of the total population (Pn).

District population projections were derived from the national and provincial population projections but were adjusted to reflect the total Lao population in mid-2015.²³ The base population of the district projections was adjusted to align with the national and provincial projections using the following formula:

$$P'_{m,n,x} = R_{m,x} \times P_{m,x}$$
$$R_{m,x} = \frac{P'_{m,x}}{P_{m,x}}$$

 P'_{max} = Mid-year base population Provincial (m) District (n) and age group (x) $P_{m,n,x}$ = Population from population and Housing Census, Provincial (m) District (n) and age group (x) R_{mx} = Adjusted population Provincial (m) and age group (x) P'_{mx} = Base population from provincial projection Provincial (m) and age group (x)

(1) Pn = Po + Births - Deaths + In-migrants – Out-migrants

grants – Out-migrants) + Births

(3) Pn(x+n,s) = Po(x,s)- deaths (x,s) + net-migrants (x,s)

(1)
(2)

 P_{m_x} = Population from Population and Housing Census Provincial (m) and age group (x)

²² ADB. 2022. Lao People's Democratic Republic: Urban Environment Infrastructure Improvement Project. https://www.adb.org/projects/53203-001/mair ²³ The 2015 Population and Housing Census (PHC) contains errors; hence, the projection adjustment

Fertility rates at the district level were also adjusted as follows:

- Use of unadjusted data from the fourth PHC 2015 to calculate the fertility rates by age group for each district.
- Use of adjusted total provincial fertility rate to calculate the rate of childbirth in the province based on the proportion of births in each age group.
- Project the number of childbirths from women of childbearing age in each district to calculate fertility rates by age, as follows:

$$B'_{p,i} = K_i \times B_{p,i}$$
(3)

$$ASFR_{p,i} = \frac{B'_{p,i}}{W_{p,i}}$$
(4)

 B'_{pi} = Adjusted child births of district (p) and age group (i)

 $B_{p,i}$ = Unadjusted child births of district (p) and age group (i)

$$K_i \frac{\text{Adjusted child births of province by age group (i)}}{\text{Unadjusted child births of province by age group (i)}}$$

 $ASFR_{pi}$ = age-specific fertility rates of district p and age group

 W_{pi} = number of women of district p and age group i

• Add the adjusted ASFR from each district and multiply by 5 equals the provincial TFR and the TFR in 2015 for each district. These correspond with the number of district-adjusted childbirths.

The base population data projected was for the 2015 midyear population, and all projections were aimed at the midyear population to ensure consistency with other population projections. The district population projections were conducted after the provincial population projections, so the results were adjusted to match the sum of the provincial-level population projections. The adjustment was made using the following formula:

$$P_{i}^{\prime\prime} = r \times P_{i}^{\prime} \tag{5}$$

$$r \frac{P}{\Sigma P'_i}$$
 (6)

 P''_{i} = Adjusted projection result of the district (i)

- P'_{i} = Unadjusted projection result of the district (i)
- *P* Provincial population projection result
- *r* Adjusted provincial population ratio





APPENDIX 2: HISTORICAL AND PROJECTED POPULATION FOR LUANG PRABANG CITY



Photo: Adobe Stock.

ID	Village	Cluster Name	1995	2005
1	Aham	Visoun	503	371
2	Aphay	Visoun	545	459
3	Bor Heah	Kok Wan	451	514
4	Deansavang	Phou Xuang	189	550
5	Done Kang	Phou Mork	184	371
6	Done Kao	Pha Khom	640	1,084
7	Done Mai	Pha Khom	374	522
8	Donkeo	Visoun	210	271
9	Hat Hien	Meung Nga	737	1,253
10	Houy Euat	Sangkhalok	271	649
11	Houy Leuk	Kok Wan	174	216
12	Houythong	Xiengmuak	241	359
13	Huaxieng	Wat That	658	620
14	Jome Ngua	Sangkhalok	140	155
15	Joum Khong	Xiengthong	449	377
16	Kham Yong	Xiengthong	394	355
17	Khok Wa	Pha Khom	218	1,340
18	Khokmane	Meung Khai		825
19	Khokya	Xeankhalok		302
20	Khomekhuang	Pha Khom	427	1,249
21	Khoy	Phou Mork	560	1,085
22	Khuan Thi 1	Phou Mork	919	1,946
23	Kok Ngiew	Phou Xuang	625	894
24	Kork Wan	Kok Wan	564	664
25	Lak Ped	Sangkhalok	430	549

	Ye				
2015	2020	2025	2030	2035	2040
348	313	282	282	282	282
318	286	258	258	258	258
387	359	333	341	350	359
510	473	438	450	461	473
453	500	552	595	641	690
1076	1,188	1,312	1,379	1,449	1,523
1167	1,288	1,423	1,495	1,571	1,652
360	397	439	473	509	549
1467	1,620	1,788	1,926	2,075	2,236
959	1,059	1,169	1,259	1,357	1,462
200	185	172	176	181	185
302	280	260	266	273	280
392	353	317	317	317	317
127	140	155	163	171	180
291	262	236	236	236	236
354	319	287	287	287	287
1454	1,605	1,772	1,863	1,958	2,058
864	954	1,053	1,135	1,222	1,317
293	272	252	258	265	271
1746	1,928	2,128	2,237	2,351	2,471
1255	1,386	1,530	1,608	1,690	1,776
2328	2,570	2,838	2,983	3,135	3,295
1033	1,141	1,259	1,357	1,461	1,574
727	803	886	955	1,028	1,108
550	607	670	722	778	838

						Ye	ar			
ID	Village	Cluster Name	1995	2005	2015	2020	2025	2030	2035	2040
26	Lak Sib	Phou Mork	307	492	484	449	416	427	437	448
27	Longlanh	Kok Wan	448	448	412	382	354	363	372	382
28	Longlao 1	Xiengmuak		355	411	454	501	540	581	626
29	Longlao 2	Xiengmuak		650	551	511	474	486	498	511
30	Maa	Phou Mork	468	628	754	832	919	966	1,015	1,067
31	Mano	Mano	1,089	1,087	997	897	807	807	807	807
32	Meuang Khai	Meung Khai	622	574	589	650	718	773	833	898
33	Muang Nga	Meung Nga	1,172	1,878	1708	1,537	1,383	1,383	1,383	1,383
34	Munna	Visoun	604	694	452	407	366	366	366	366
35	Na Deua	Sangkhalok	294	318	314	347	383	412	444	479
36	Na Uan	Meung Khai		343	372	376	380	462	562	683
37	Nadonekhoun	Kok Wan	123	188	182	169	156	160	164	169
38	Naluang	Mano	674	1,361	1880	2,076	2,292	2,409	2,531	2,661
39	Napho	Meung Khai	381	444	433	437	442	537	654	796
40	Nasamphane	Mano	570	1,238	1507	1,664	1,837	1,931	2,029	2,133
41	Nasangweuy	Visoun	591	3,166	2729	3,013	3,327	3,496	3,675	3,862
42	Natane	Kok Wan	440	434	416	386	358	367	376	385
43	Naviengkham	Mano	966	1,454	1425	1,282	1,154	1,154	1,154	1,154
44	Naxang	Phou Mork	131	340	794	877	968	1,017	1,069	1,124
45	Naxao	Meung Khai	348	387	383	387	391	475	578	704
46	Naxay	Xiengmuak	214	388	472	521	575	620	668	719
47	Nonesaad	Meung Khai		158	241	266	294	316	341	367
48	Nongheaw	Meung Khai		325	304	282	261	268	275	282
49	Nongkham	Phou Mork	421	1,097	1324	1,462	1,614	1,696	1,783	1,874
50	Nongtook	Xiengmuak	179	392	390	362	335	352	370	389

ID	Village	Cluster Name				Ye	ar			
10	village	Cluster Name	1995	2005	2015	2020	2025	2030	2035	2040
51	Nongxai	Pha Khom	727	709	661	730	806	847	890	935
52	Nongxai	Xeankhalok		215	246	272	300	323	348	375
53	Noonsawath	Phou Xuang	509	548	602	608	614	747	909	1,106
54	Oou	Meung Khai	425	278	284	314	346	373	402	433
55	Paa Noh	Xiengmuak	321	386	307	285	264	271	277	284
56	Pakham	Xiengthong	941	752	643	579	521	521	521	521
57	Pakpa	Pakxeung	249	315	319	352	389	419	451	486
58	Pakphor	Xeankhalok		389	211	196	181	186	191	195
59	Pakxi	Meung Khai	965	767	710	658	610	626	642	658
60	Pakxueng	Pakxeung	425	510	1198	1,323	1,460	1,573	1,695	1,826
61	Pha Oh	Pakxeung	177	186	1371	1,514	1,671	1,800	1,940	2,089
62	Phabath	Wat That	1,228	1,303	1176	1,058	952	952	952	952
63	Phadeng	Kok Wan	270	430	331	307	285	292	299	307
64	Phakhome	Pha Khom	248	621	685	756	835	878	922	969
65	Phanhluang	Meung Nga	1,034	1,663	1935	2,136	2,359	2,479	2,606	2,738
66	Phanom	Visoun	1,035	1,632	1489	1,644	1,815	1,908	2,005	2,107
67	Phasouk	Meung Nga	540	987	3663	4,044	4,465	4,693	4,932	5,184
68	Phavieng	Kok Wan	147	475	395	366	340	348	357	366
69	Phik Noy	Phou Xuang	305	334	334	369	407	439	473	509
70	Phik Yai	Phou Xuang	326	391	331	307	285	292	299	307
71	Phone Ngam	Pakxeung	159	145	187	206	228	246	265	285
72	Phonesaad	Meung Nga	357	812	917	1,012	1,118	1,175	1,235	1,298
73	Phonesavath	Phou Xuang	258	570	463	429	398	408	418	429
74	Phonexay	Phou Lek Cha Leun	308	343	332	367	405	425	447	470
75	Phonexay	Sangkhalok	369	455	910	1,005	1,109	1,195	1,287	1,387

						Ye	ar			
ID	Village	Cluster Name	1995	2005	2015	2020	2025	2030	2035	2040
76	Phonheuang	Xiengthong	624	673	467	420	378	378	378	378
77	Phonpheang	Mano	647	785	963	1,063	1,174	1,234	1,297	1,363
78	Phosy	Wat That	974	1,530	1551	1,712	1,891	1,987	2,088	2,195
79	Phoumork	Phou Mork	140	819	1527	1,686	1,861	1,956	2,056	2,161
80	Pong Wane	Sangkhalok	870	1,538	2044	2,257	2,492	2,684	2,892	3,115
81	Ponkham	Mano	1,265	1,697	1162	1,046	941	941	941	941
82	Sangkhalok	Sangkhalok	1,073	1,324	1538	1,698	1,875	1,970	2,071	2,177
83	Saylom	Wat That	700	817	745	670	603	603	603	603
84	Seansouk	Pakxeung	347	419	469	518	572	616	663	715
85	Sing	Meung Khai	319	305	275	278	281	341	415	505
86	Tha Uy	Kok Wan	216	212	141	131	121	124	127	131
87	Thapean	Meung Khai		465	539	595	657	708	763	821
88	That Luang	Wat That	1,687	1,138	934	841	756	756	756	756
89	Thatbosoth	Visoun	711	750	818	903	997	1,048	1,101	1,158
90	Thinkeo	Meung Khai		261	464	512	566	609	656	707
91	Thinxoum	Meung Khai	586	530	533	588	650	700	754	812
92	Thongchaleun	Wat That	488	363	320	288	259	259	259	259
93	Tinpha	Xiengmuak	234	256	255	236	219	225	230	236
94	Viengkeo	Mano	627	494	487	438	394	394	394	394
95	Viengmay	Visoun	1,238	1,761	2170	2,396	2,645	2,780	2,922	3,071
96	Viengxay	Mano	448	496	358	322	290	290	290	290
97	Viengxsavanh	Pakxeung	339	579	974	1,075	1,187	1,279	1,378	1,484
98	Visoun	Visoun	919	789	597	537	483	483	483	483
99	Wat Nong	Xiengthong	614	476	357	321	289	289	289	289
100	Wat Sean	Xiengthong	445	418	169	152	137	137	137	137

ID	Millowe	Cluster Name				Ye	ar			
	village	Cluster Name	1995	2005	2015	2020	2025	2030	2035	2040
101	Wat That	Wat That	395	420	273	246	221	221	221	221
102	Xangkhong	Pha Khom	244	533	645	712	786	826	869	913
103	Xath	Xiengmuak	560	649	622	577	535	548	562	576
104	Xeankhalok	Xeankhalok		588	544	504	468	480	492	504
105	Xiengkeo	Sangkhalok	355	685	795	878	969	1,044	1,125	1,212
106	Xienglek	Pha Khom	239	280	428	473	522	548	576	606
107	Xienglome	Phou Xuang	653	782	795	803	811	987	1,201	1,461
108	Xiengmuak	Xiengmuak	594	674	634	588	545	559	573	587
109	Xiengmuan	Xiengthong	557	399	355	319	287	287	287	287
110	Xiengthong & Khili	Xiengthong	607	602	356	320	288	288	288	288
111	Yaang	Meung Khai		497	433	401	372	382	391	401
112	Nongbuakham	Xeankhalok		849	132	1,460	1,612	1,736	1,870	2,015
113	Phoulekchaleun	Phou Lek Cha Leun			2,229	2,461	2,717	2,856	3,001	3,155
114	Phouxangkhame	Phou Lek Cha Leun			2,840	3,136	3,462	3,639	3,824	4,019
115	Houyhaan	Airport		379	0	0	0	0	0	0
116	Houyjia	Golf Course		271	0	0	0	0	0	0
117	Houysiew			199						
118	Huanglor			169						
119	Hailuang		157							
120	Houyfean		99							
121	Houynokpid		211							
122	Houysala		257							
123	Kaxia		425							
124	Longkood		133							
125	LongNgao		136							

ID	Village	Cluster Name		Year						
UD.	village	Cluster Name	1995	2005	2015	2020	2025	2030	2035	2040
126	Longwaikao		228							
127	Longwaimai		155							
128	Phoukhuang		160							
129	Phousong		517							
130	Tinpha		242							
131	Yakhaluang		97							
Total			53,800	77,057	90,313	94,711	99,991	105,414	111,263	117,588

... = Data excluded or not available, = Villages within Luang Prabang Buffer Zone. Source: Asian Development Bank. 2022. *Lao People's Democratic Republic: Urban Environment Improvement Investment Project feasibility study*. https://www.adb.org/projects/53203-001/main.



APPENDIX 3: CALCULATION OF 2040 HOUSEHOLD NUMBERS AND HOUSING LAND REQUIREMENTS



Photo: Adobe Stock.

The 2040 household numbers were projected from the population data using the following formula:

Where,

HH₂₀₄₀ = Luang Prabang 2040 household numbers P_{2040} = Luang Prabang 2040 population projection AHH_{2040} = Luang Prabang 2040 average household size

The following formula was used to determine the housing land needed:

Where,

HL₂₀₄₀ = Luang Prabang housing land required HH₂₀₄₀ = Luang Prabang 2040 household numbers HH₂₀₂₀ = Luang Prabang 2020 household numbers

ADU = Average dwelling unit size of 300 square meters, as quoted from the Department of Public Works and Transport (DPWT) officers.²⁴

²⁴ Interview with DPWT officers conducted on 7 September 2022

$HH_{2040} = P_{2040} / AHH_{2040}$

$HL_{2040} = (HH_{2040} - HH_{2020}) \times ADU$

APPENDIX 4: TOURISM PROJECTIONS



Table A4.1: Likely Projection of Typical Management Scenario

Year	Domestic Tourists	Regional Tourists	Long-Haul Tourists	Total	Receipts (\$)
2022	280,823	213,224	43,672	537,719	69,411,928
2023	314,522	251,604	47,166	613,292	78,423,747
2024	352,264	296,893	50,939	700,096	88,698,230
2025	394,536	350,333	55,015	799,884	100,424,195
2026	441,880	413,393	59,416	914,689	113,820,204
2027	494,906	463,001	64,169	1,022,076	126,683,884
2028	554,295	518,561	69,302	1,142,158	141,027,626
2029	620,810	580,788	74,847	1,276,445	157,023,951
2030	695,307	650,482	80,834	1,426,624	174,865,676
2031	764,838	696,016	84,876	1,545,730	189,068,759
2032	841,322	744,737	89,120	1,675,179	204,489,338
2033	925,454	796,869	93,576	1,815,899	221,236,317
2034	1,018,000	852,650	98,255	1,968,904	239,428,658
2035	1,119,800	912,335	103,167	2,135,302	259,196,335
2036	1,231,779	976,199	108,326	2,316,304	280,681,372
2037	1,354,957	1,044,533	113,742	2,513,232	304,038,991
2038	1,490,453	1,117,650	119,429	2,727,532	329,438,860
2039	1,639,498	1,195,885	125,401	2,960,785	357,066,469
2040	1,803,448	1,279,597	131,671	3,214,716	387,124,636

Source: Ramboll, 2023.

Photo: Adobe Stock.

Year	Domestic Tourists	Regional Tourists	Long-Haul Tourists	Total	Receipts (\$)
2022	280,823	213,224	43,672	537,719	69,411,928
2023	308,905	234,546	47,166	590,617	76,061,040
2024	339,796	258,001	50,939	648,736	83,351,698
2025	373,775	283,801	55,015	712,591	91,346,185
2026	411,153	312,181	59,416	782,749	100,112,866
2027	452,268	343,399	64,169	859,836	109,726,780
2028	497,495	377,739	69,302	944,536	120,270,296
2029	547,245	415,513	74,847	1,037,604	131,833,831
2030	601,969	457,064	80,834	1,139,867	144,516,639
2031	662,166	502,770	88,918	1,253,854	158,968,303
2032	728,383	553,047	97,810	1,379,239	174,865,134
2033	801,221	608,352	107,591	1,517,163	192,351,647
2034	881,343	669,187	118,350	1,668,880	211,586,812
2035	969,477	736,106	130,185	1,835,768	232,745,493
2036	1,066,425	809,717	143,203	2,019,345	256,020,042
2037	1,173,067	890,688	157,523	2,221,279	281,622,046
2038	1,290,374	979,757	173,276	2,443,407	309,784,251
2039	1,419,412	1,077,733	190,603	2,687,748	340,762,676
2040	1,561,353	1,185,506	209,664	2,956,522	374,838,943

Table A4.2: Likely Projection of Proactive Management Scenario

Table A4.3: Likely Projection of Special Economic Zone-Driven Scenario

Year	Domestic Tourists	Regional Tourists	Total
2022	280,823	256,896	537,719
2023	354,539	365,063	719,602
2024	372,266	474,582	846,848
2025	390,879	616,956	1,007,835
2026	410,423	672,482	1,082,905
2027	430,944	733,005	1,163,950
2028	452,492	798,976	1,251,468
2029	475,116	870,884	1,346,000
2030	498,872	957,972	1,456,844
2035	699,694	1,614,239	2,313,933
2040	981,357	2,720,086	3,701,443

Source: Asian Development Bank. Lao People's Democratic Republic: Urban Environment Improvement Investment Project. https://www.adb.org/projects/53203-001/main.

Source: Ramboll, 2023.

APPENDIX 5: URBAN PLANNING ASSESSMENT FRAMEWORK



Photo: Adobe Stock

Each criterion was developed by referencing the best practices outlined in the Urban Patterns for a Green Economy. Leveraging Density by the United Nations Human Settlements Programme (UN-Habitat) (footnote 20). In assessing both scenarios, four of seven physical planning principles were used. Given the high-level nature of both scenarios, not all principles can be assessed at this stage. Principles related to infrastructure integration, sustainable transport, and street design can only be evaluated once a more detailed urban plan is drawn up.

No.	Criteria	Assessment Metric(s)	
1	Natural area loss	Natural areas converted into urban development areas (in square kilometers [km ²])	Pro As imp Thi nat
2	For assessment at a more detailed land u transport planning, v this high-level scena	later stage, as this requires use, infrastructure, and which are not included at rio stage.	Int Infi tele to is c sha
3	For assessment at a more detailed land u transport planning, w this high-level scena	later stage, as this requires use, infrastructure, and which are not included at rio stage.	De Tra hel the alo dev tra
4	Urban nodes	Number of new urban nodes beyond the existing urban areas	Ide No citi mix
5	Urban density	Gross population density (persons/km ²) Net residential density ^a (dwelling units/hectare [ha])	Inc (CF Urb the der The 450 or 1 cer cos

Table A5: Urban Planning Assessment Framework

omote, preserve, and open up natural spaces (Chapter 4.1)

cities impact natural areas, they should reduce their ecological pact and maximize benefits derived from natural systems.

is includes retaining green spaces, promoting an interconnected tural space network, and providing quality open spaces.

tegrate and retrofit infrastructure (Chapter 4.2)

frastructure such as water, electricity, sewerage, and ecommunication cables have long lifespans, which commit cities certain development trajectories once implemented. Therefore, it crucial to integrate spatial and infrastructure planning to facilitate ared corridors.

evelop a sustainable urban transport strategy (Chapter 4.3)

ansport is an integral aspect of any city's spatial structure, as it lps shape the city. Urban transportation serves as the "veins of e city," carrying people and generating economic opportunities ong its paths. Hence, cities should promote transit-oriented velopments prioritizing pedestrians, cyclists, and public insportation.

entify and intensify urban nodes (Chapter 4.4)

odes refer to urban growth districts, including potential satellite ies, to accommodate urban expansion. These nodes should be xed-use with higher residential densities.

crease built area and residential population densities hapter 4.5)

ban practitioners in each city should decide the ideal density for eir city based on its specific context. What may be considered high nsity in one city may not be acceptable or appropriate in another.

ere could be an optimum gross density range of between 150 to 0 people per ha (approximately 15,000 and 45,000 people per km² 30 to 90 dwelling units per ha) that is recommended to facilitate rtain urban services, such as public transport viability, services sts, facilities provision and distribution, and local employment.

Continued on next page.

Table A5: continued

No.	Criteria	Assessment Metric(s)	Planning Principles Referenced					
			Factors Influencing Den	sity and	Implications on Density			
			Influence on Density		Influenced by Density			
			 Cultural perceptions Zoning regulations Planning & building standards Housing demand Location Land cost Building cost Affordability to end users Policy environment & policy instruments Building design, plot layout & plot size Public transport system 	Density	 Cost of services Provision & distribution of facilities in terms of standards Social dynamics (overcrowding social interaction, safety, health) Creation of threshold for public transport Creation of threshold for local economic development Building form & housing layout 			

Source: Development Action Group. 2008. *Sustainable Medium-Density Housing: A Resource Book*. Cape Town.

Concentrating urban density should be done in the following areas:

- Along public transport trunk routes to support public transport thresholds.
- In and around urban nodes and modal interchanges/public transit stops.
- On the periphery of open spaces to increase surveillance.
- Within areas of focused public sector investments.
- In selected areas of high private sector investments (e.g., around commercial hubs).

Introducing urban densities is suggested in selected urban contexts. The table illustrates the net residential density ranges for developing countries.

Residential Densities for Developing Countries

Range	Residential density: dwelling units/hectare (net)
Low	< 15
Low to Medium	15 - 40
Medium	40 - 20
High	120 - 500
Very high	> 500

Note: Net residential density is measured by the number of dwelling units divided by residential area only and excludes areas set aside for other uses, such as schools. Source: UN-Habitat.

The report also recommends undertaking planned urban extensions (e.g., greenfield developments) at higher densities.

Continued on next page.

Table A5: continued

No.	Criteria	Assessment Metric(s)	
6	For assessment at a more detailed land u transport planning, v this high-level scena	later stage, as this requires use, infrastructure, and which are not included at rio stage.	Enhan The re at the to cor follow • Cru an • Th fur • Th str
7	Mixed-use	Opportunity for mixed-use programs (residential, commercial, and amenities)	Prom activi A mix sustai econc aspec • Ph de • So sou

^a Net residential density is measured by the number of dwelling units divided by residential area only and excludes areas set aside for other uses, such as schools. See UN-Habitat. 2012. *Urban Patterns for a Green Economy: Leveraging Density*. Nairobi. https://unhabitat.org/leveraging-density-urban-patterns-for-a-green-economy.
 Note: This framework references the *Urban Patterns for a Green Economy. Leveraging Density* by the United Nations Human Settlements Programme (UN-Habitat).
 Source: Ramboll, 2023.

Planning Principles Referenced

ance the role of the street (Chapter 4.6)

report suggests creating nodes and new commercial activity he intersection of activity corridors or streets, as people tend congregate where there is movement. It also recommends the owing street design principles:

- Creating a street network on a human scale to slow traffic down and encourage walking and cycling.
- The level of street activity is relative to the number of street functions, such as land use.
- The design of buildings that "interface" with the street affects the street's pedestrian-friendliness.

mote mixed-use development and intensification of ivities (Chapter 4.7)

nixed-use and mixed-income city is crucial in promoting social tainability and inclusion through equal access to facilities, promic opportunities, and transport options. There are two sects to urban diversity:

- Physical diversity: Different land uses or income groups within a delineated area.
- Socioeconomic diversity: Physical proximity of different socioeconomic groups in an area to create a cohesive community that provides access to homes, workplaces, and services.

ABOUT THE ASEAN AUSTRALIA SMART CITIES TRUST FUND

The ASEAN Australia Smart Cities Trust Fund (AASCTF) assists ASEAN cities in enhancing their planning systems, service delivery, and financial management by developing and testing appropriate digital urban solutions and systems. By working with cities, AASCTF facilitates their transformation to become more livable, resilient, and inclusive while in the process identifying scalable best and next practices to be replicated across cities in Asia and the Pacific. The Trust Fund is supported by the Government of Australia through the Department of Foreign Affairs and Trade, managed by the Asian Development Bank, and implemented by Ramboll.



ASEAN AUSTRALIA SMART CITIES TRUST FUND Asian Development Bank



Department of Foreign Affairs and Trade

