CHAPTER 4

A Development Master Plan for Urban Planning Area

CHAPTER 4: A DEVELOPMENT MASTER PLAN FOR URBAN PLANNING AREA

4.1 Land Use Plan

4.1.1 Land Evaluation

(1) Database of Vientiane Capital GIS (V-GIS)

Wide range of data and information have been collected from government agencies and relevant organizations in this study. In addition a variety of surveys were conducted by JICA Study Team. These collected data and information were compiled and integrated in the numerical and/or the geographical data format, or in other word, Geographic Information System (GIS) format, in order to carry out further and in-depth analyses.

In this study, GIS has not only been used for developing a database but also has been exploited as a planning tool. GIS provides a means of integrating information to understand issues and problems faced by Vientiane Capital such as uncontrolled urbanization. GIS is one of the tools to address and tackle these problems and to understand their spatial relationships.

GIS database of Vientiane Capital (hereafter called V-GIS) is developed by the study team. V-GIS consists of two types of data depending upon the covering area; first one covers entire Vientiane Capital, and the second covers only the central area of Vientiane Capital which corresponds to the core urban area.

V-GIS includes following information;

Vientiane Capital	Core Urban Area
- District boundary - Village - Flood - Conservation and protected area - Land suitability - Water supply - Electricity - River and waterbody - Road network - Land use (1995, 2005, and 2009)	- Urban land use (2009) - Road network (2009) - Land use master plan 2010

(2) Land Potential Evaluation

Land potential evaluation aims at identifying the urbanization process of Vientiane Capital. Through a series of evaluation analyses, JST attempts to figure out important factors which caused urbanization in Vientiane Capital. In general urbanization tends to be affected by natural conditions, location and current status of basic infrastructure. For taking account of these aspects, land potential evaluation was carried in terms of three categories; natural condition, accessibility, and convenience of living environment.

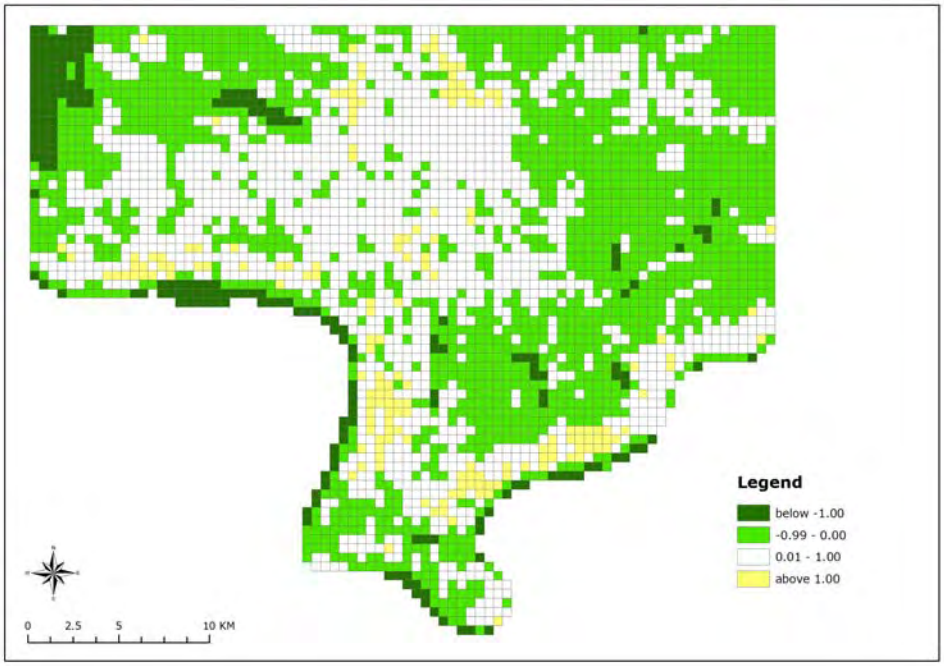
Natural Condition - Flood area - Swamp area - Conservation area - Land suitable area for paddy - Land suitable area for vegetable Accessibility - Availability of Road - Proximity to Urban Center	Convenience of Living Environment - Availability of Water Supply - Availability of Electricity - Proximity to water resource and Mekong River

The evaluation adopted a scoring system by 500 meter grid columns covering the core urban area in the urban planning area.

The results of land evaluation by category and comprehensive evaluation are illustrated in Figure 4.1.1 to Figure 4.1.4. With regard to the scored number, the small number such as negative number shows degree of unsuitability for urbanization, whilst positive number means that the area has potential for urbanization or urban development.

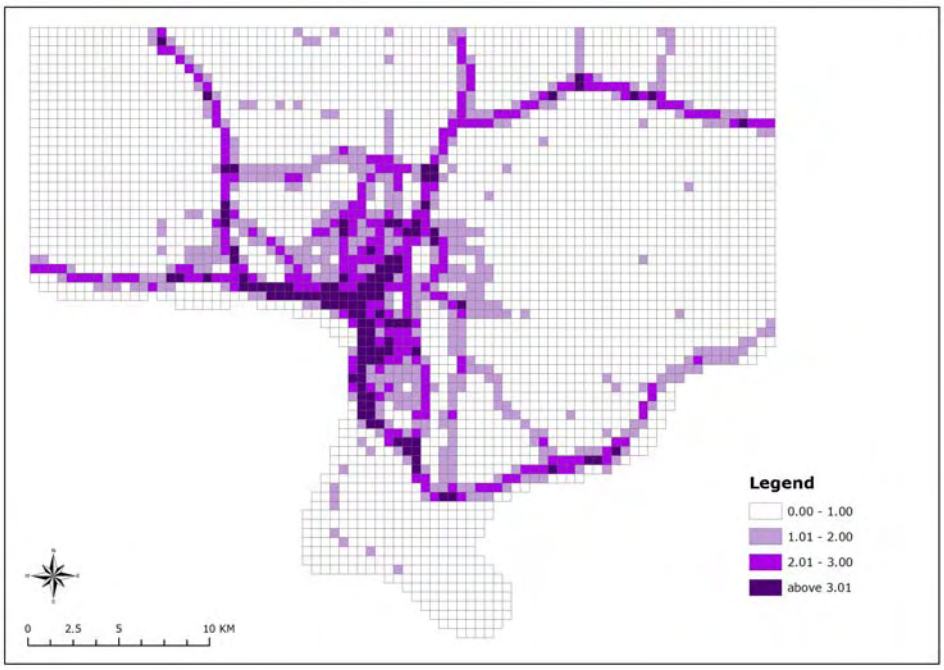
Figure 4.1.1 shows land potential evaluation in natural condition. The dark and light green shows unsuitable areas for urban development due to existence of natural reservation area and/or flood prone area. Whist the white and yellow colors show suitable areas for urbanization in terms of vulnerability and natural conservation.

Figure 4.1.2 shows a result of the evaluation which compiles data for service area of road network and proximity to the urban center. The dark color designates good accessibility, while the light and white colors indicate inconvenience.



Source: JST based upon the data of UNOSAT, NAFRI and Lao National Geographic Department

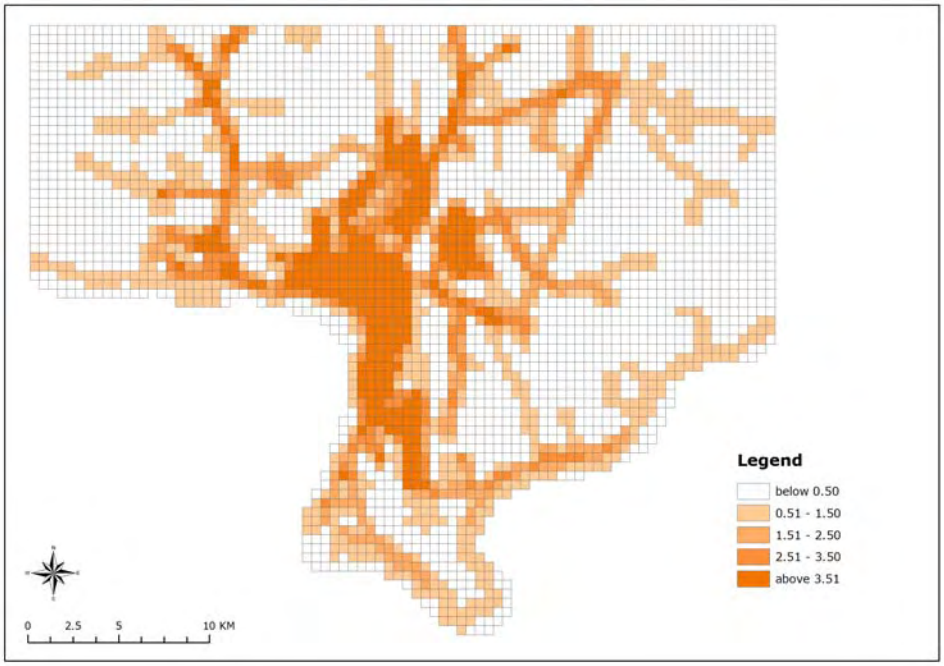
Figure 4.1.1: Land Potential Evaluation: Natural Condition



Source: JST

Figure 4.1.2: Land Potential Evaluation: Accessibility

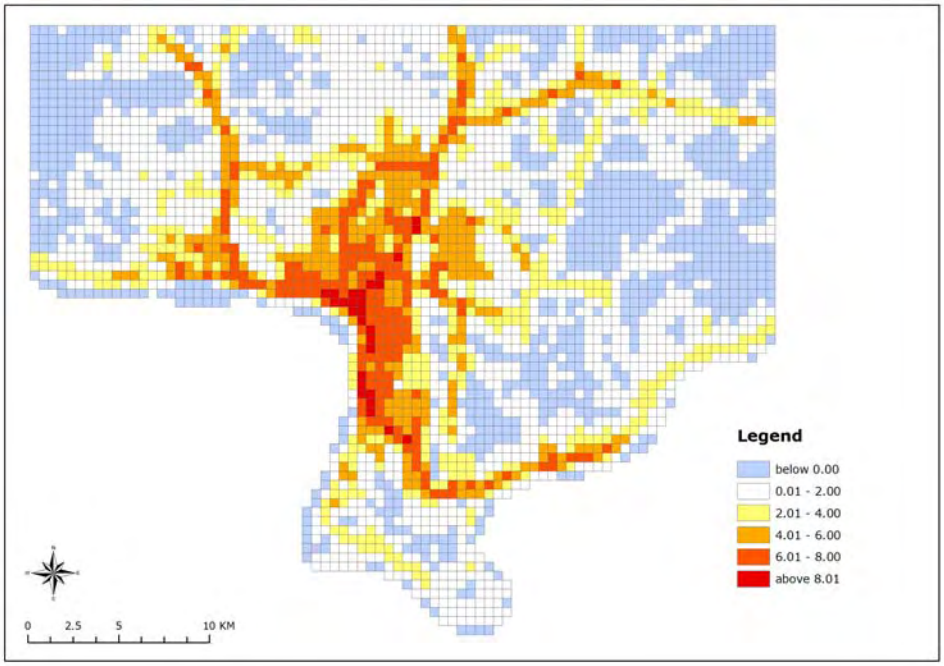
Figure 4.1.3 illustrates the result of evaluation on living comfort. The dark orange color represents the area which has the services of water supply and electricity. In the meantime, white color specifies the area which has neither basic infrastructure nor water resources.



Source: JST based upon the data of UNOSAT, NPVC and Lao National Geographic Department

Figure 4.1.3 Land Potential Evaluation: Convenience of Living Environment

Figure 4.1.4 shows the integrated result of land potential evaluation. Dark and light orange colors indicate the area which has large potential for urban development in current condition. In the meanwhile blue color identifies the area that is unsuitable for settlement and economic activities.



Source: JST

Figure 4.1.4: Land Potential Evaluation of Current Condition

4.1.2 Urbanization Simulation

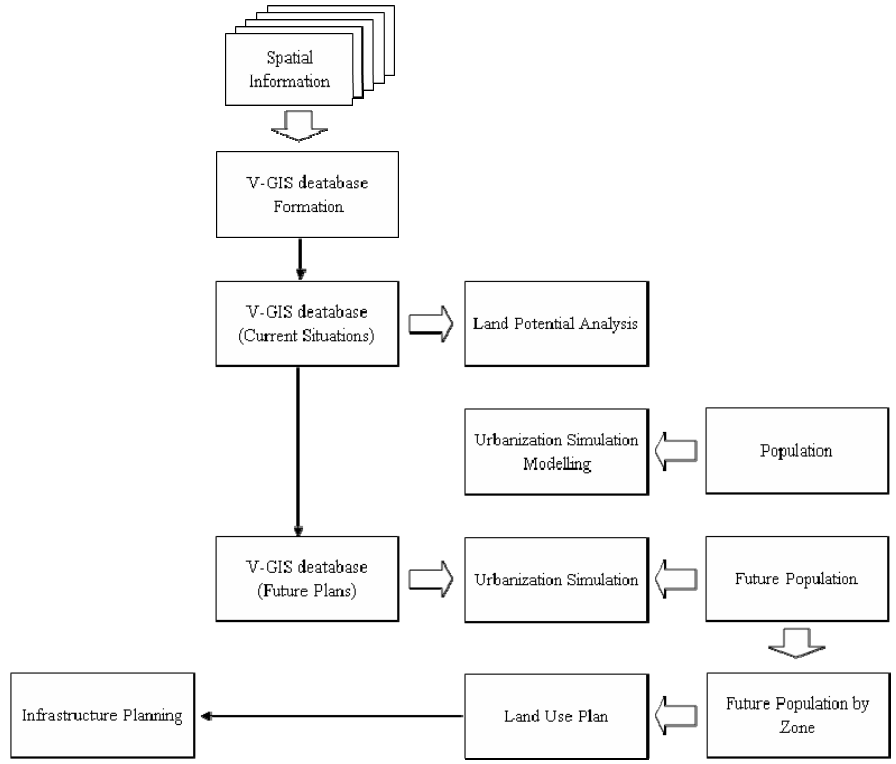
Development of urbanization simulation aims at identifying urbanization process of Vientiane Capital and thus estimating future urbanization direction. This model attempts to show dynamics of future land potential, future land use with and without policy intervention, and future population allocation.

(1) Methodology

Urbanization simulation model is formulated with the V-GIS database and result of land potential analyses of current situation as described in the previous section. Major steps to develop the simulation model are as follows:

- To establish V-GIS
- To conduct land potential analysis in current condition based upon V-GIS with the grid and scoring systems.
- To develop urbanization simulation based upon the result of land potential analysis by changing indicators of the scoring system
- To coordinate the urbanization simulation with the estimated population and population density
- To decide current urbanization area on the simulation model
- To check the confidence of the model by conducting calibration
- To carry out future land potential analysis
- To run future urbanization simulation based upon the future land potential analysis
- To conduct the simulation for future urbanization and future population in 2020 and 2030

The methodology is briefly illustrated in Figure 4.1.5.



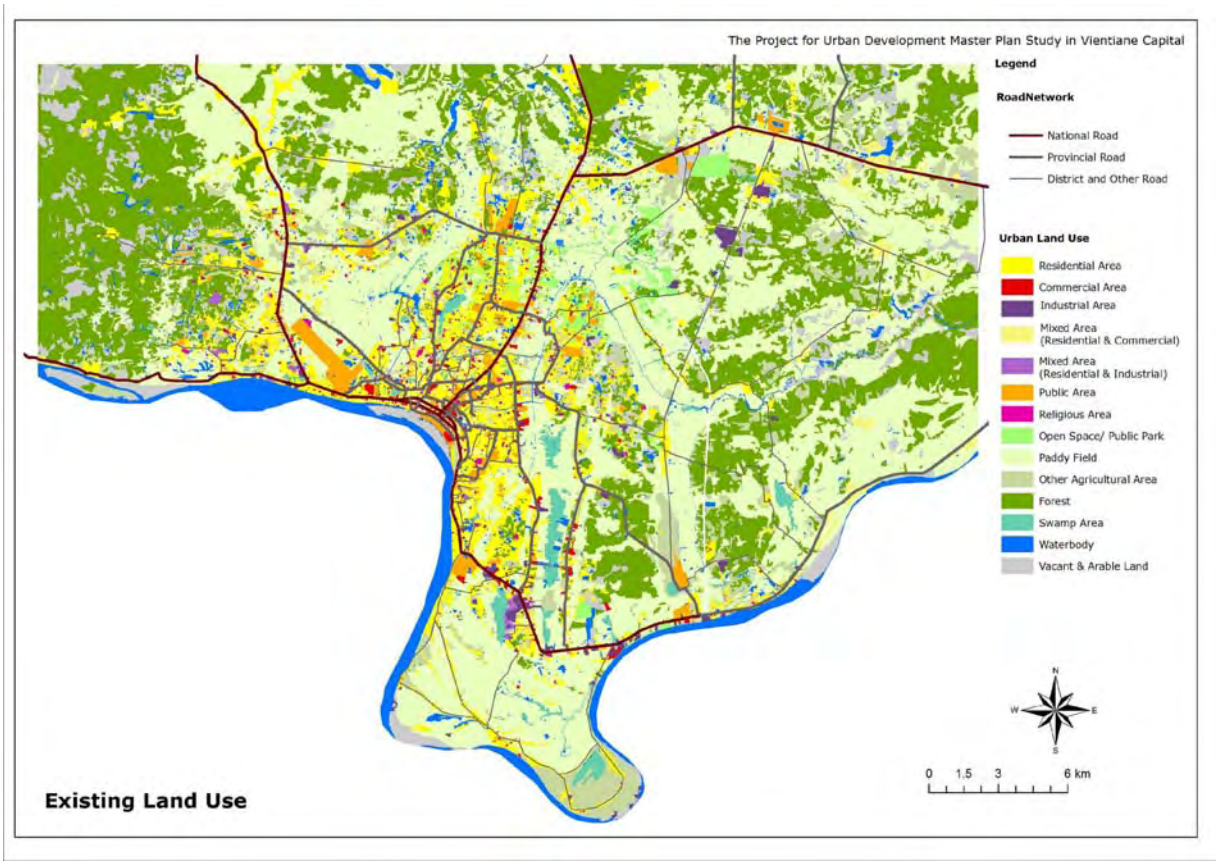
Source: JST

Figure 4.1.5: Methodology of Urbanization Simulation

(2) Calibration

Based upon the result of land potential analysis, the urbanization simulation model is developed. To confirm confidence of this simulation model, calibration is necessary, or otherwise, the validity of future urbanization estimation becomes uncertain. For the calibration the simulation model in current condition must fit with actual urbanization area as much as possible. The actual urbanization area is identified with a basis of existing land use as shown in Figure 4.1.6.

To obtain the high confidence rate of calibration, the scoring system of the potential analysis kept on changing through a try and error process until the urbanization simulation model fits with the actual urbanization area. The fitted scoring system is indicated in Figure 4.1.7.



Source: JST

Figure 4.1.6: Existing Land Use

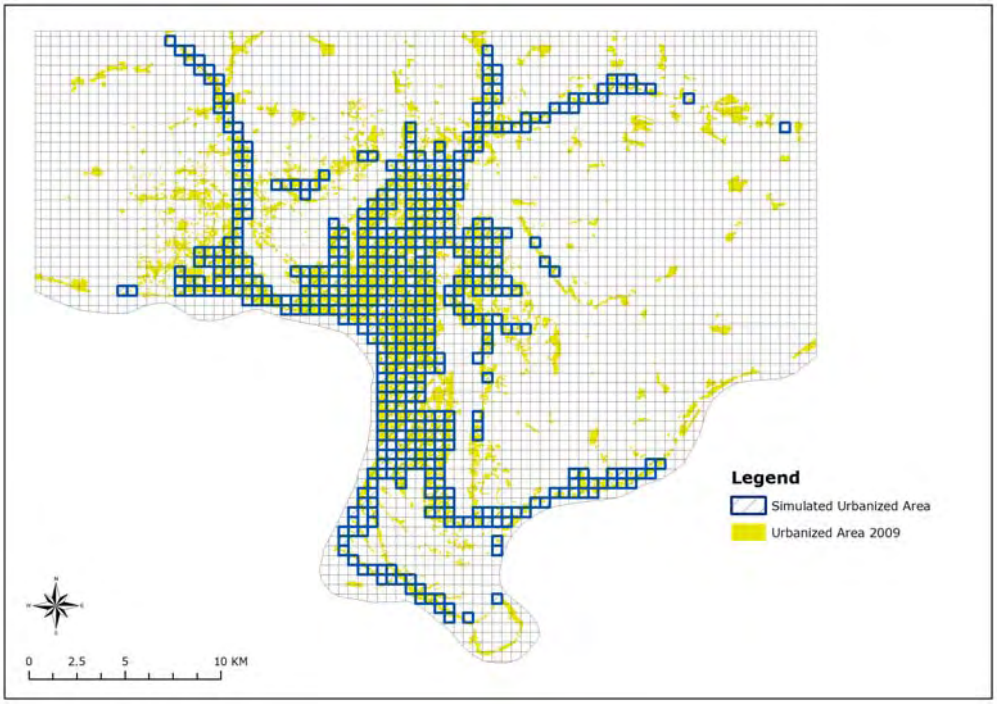
Indicator	-2	-1	0	1	2	3
Flood Area						
Swamp Area						
Conservation Area						
Land Suitable Area for Paddy						
Land Suitable Area for Vegetable						
Availability of Roads (National)						
Availability of Roads (Provincial)						
Availability of Road (District)						
Availability of Road (Urban)						
Availability of Road (Rural)						
Availability of Water Supply						
Availability of Electricity						
Proximity to Urban Center						
Proximity to Water Resource and Mekong River						

Source: JST

Figure 4.1.7: Scoring System of Urbanization Simulation Model

Strong factors which cause urbanization of Vientiane Capital in the model are accessibility to the road network, especially national road, and water supply service. The area which has an access to the road network and water supply tends to be urbanized in central Vientiane Capital.

Finally the confidence rate becomes 83 % at the highest. The result of calibration is illustrated in Figure 4.1.8. The yellow color as urbanization area in 2009 includes residential, commercial, public, industry, mixed use and religious areas selected from the land use.



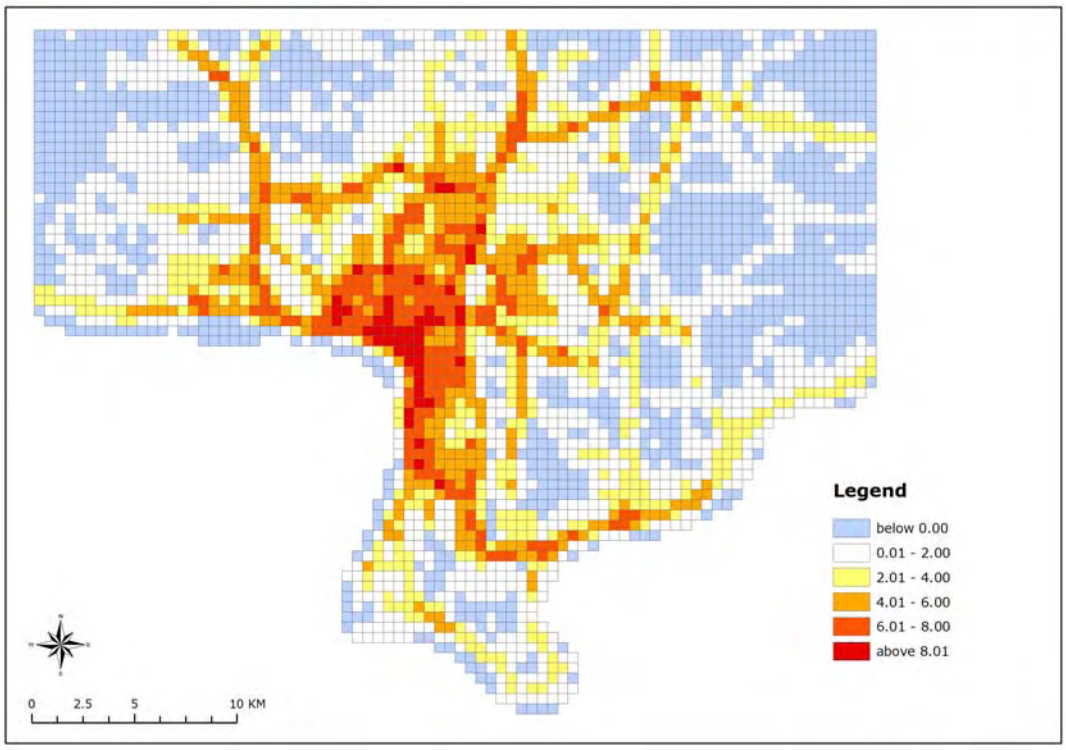
Source: JST

Figure 4.1.8: Result of Calibration on Urbanization Simulation

(3) Future Land Potential Evaluation

Future land potential evaluation attempts to show the future urbanization pattern in Vientiane Capital. This evaluation was carried out in same manner as the land potential analysis in the current condition. Some indicators however have to be modified in order to take account of future plans such as expansion of road network, service of water supply and electricity by 2030. The result of integrated land potential analysis in 2030 is depicted in Figure 4.1.9.

As shown in Figure 4.1.9, the dark and light orange colors indicate future urbanization area. This area tends to expand from the center of Vientiane Capital stretching outward along the main roads.



Source: JST

Figure 4.1.9: Land Potential Evaluation in 2030

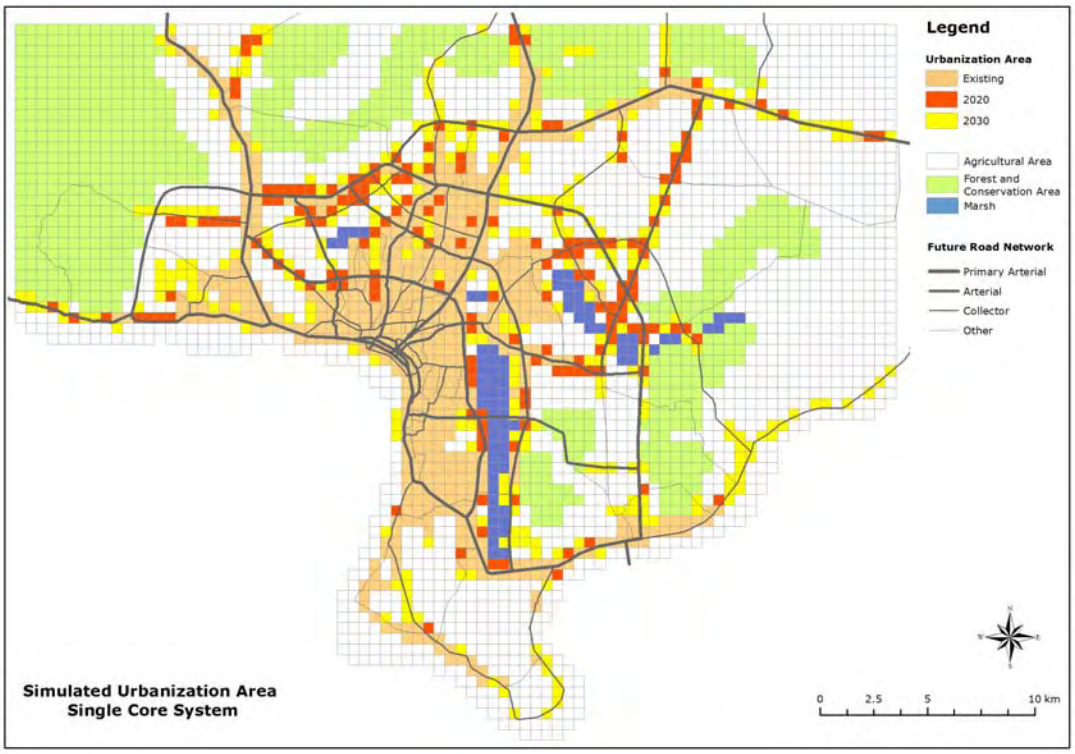
(4) Future Urbanization Simulation

Based upon the future land potential analysis, future urbanized areas in 2020 and 2030 are simulated in accordance with future population. In order to accommodate the future urban population of 610,000 in 2020 and 895,000 in 2030 which include inner urban zone and outer urban zone, the urbanized area needs to be 17,430 ha in 2020 and 25,570 ha in 2030 with a basis of population density of 25 person/ha which is almost the same level as the present urban population density. The newly built-up areas are calculated to be 4,230 ha between 2009 and 2020, and 8,140 ha between 2020 and 2030.

In this simulation, the size of one grid is 25 ha which is equivalent to accommodating 875 person by using the same population density. This model therefore shows not only the direction of urbanization but also the necessary area for urban development corresponding to the future population growth.

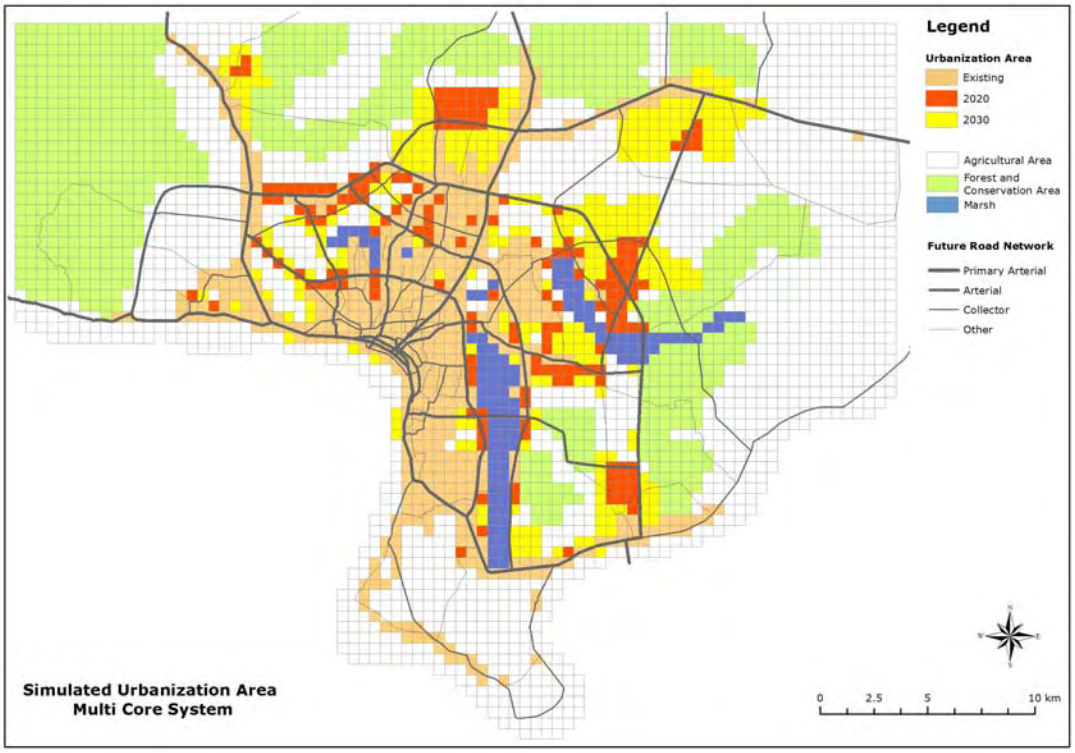
The future urbanization simulation is demonstrated into two patterns along the alternatives of future urban structure; one is single-core structure and the other is multi-core structure. The single-core structure defines that urbanization would naturally expand without any land development policies. The future urbanization of single-core structure is anticipated as shown in Figure 4.1.10. The expansion area in this output does not consider the importance of natural resources. Besides, the urban expansion tends to be influence by development of the major roads. The spreading pattern therefore can be said to be like a ribbon development.

On the other hand, the multi-core structure defines that urbanization would proceed with land development policies which will guide in formulation of one urban center, and a few sub-centers while protecting natural environment. The urbanization pattern of multi-core structure is illustrated in Figure 4.1.11. This type of development is capable of avoiding a ribbon development scheme.



Source: JST

Figure 4.1.10: Urbanization Simulation in Single-Core Structure



Source: JST

Figure 4.1.11: Urbanization Simulation in Multi-Core Structure

(5) Comparison of Alternatives

Looking at the results of simulation, the unique characters of the two development patterns are clarified. Future urbanization of single-core structure, say a ribbon development pattern, stretches out from a single urban center along the roads which radiate out in all direction. The expansion of urbanization is capable of keeping the accessibility to all residence equally. Besides this development scenario needs neither land use control nor large capital investment. The basic urban function is not necessary to change. However this urbanization pattern will be difficult to achieve infrastructure efficiency due to its dispersed shape. Eventually to improve infrastructure in a ribbon development pattern will require considerable cost. Furthermore this could encourage motorization and vehicle ownership. As the result, it is easily imagined that traffic congestion would fill up all over the road network sooner or later. Through the urbanization pattern in Vientiane Capital, the land use is predicted to be affected by population growth and population inflow. Protection of natural conservation and potential agricultural area tends to be considered less for urban development, and consequently urbanization development of the single-core structure would decrease efficiency in terms of economy and environment.

In the meanwhile, future urbanization of multi-core structure needs to command land use control in order to protect natural environment such as NE zone with strong initiative by government. For establishment of sub-centers, large capital investment including public and PPP investments schemes will be necessary. These intensive efforts could realize urban agglomerations, namely, an inner urban, outer urban, sub-centers and urban clusters. This urban development pattern tends to improve urban infrastructure easily and will save costs compared to ribbon development. Distribution of urban function, settlement and workplace in each agglomeration could contribute to decrease of overall commuting distance and time, or in other word, will discourage further motorization and make the introduction of public transport easier. In terms of land use, to protect natural conservation and agricultural area is not only good for keeping sustainability and enhancement of agricultural industry but also be a buffer zone to prevent against urban sprawl. Table 4.1.1 describes further comparison between the two urbanization patterns.

Table 4.1.1: Comparison of the Alternatives

		Single-core Structure	Multi-core Structure
Urban System		Centralizing all urban functions to single urban centre to fully utilize existing urban accumulation with minimal capital investment and public intervention	Decentralizing certain urban functions from existing urban center to newly developing sub-centers in order to avoid disordered expansion and urban sprawl in suburban.
Size of Urban Centre		35,000 ha for new urbanized area linked to urban centre Large expansion of existing urban centre to accommodate all necessary urban functions and population into the single existing urban centre	10,000ha for Sub-centers 20,000ha for residential areas in outer urban zone and outskirts zone Limited expansion of existing inner urban and to distribute urban function and population to sub-centers
Density (Spatial Extent)	Historic Conservation Inner Urban	Historic Conservation zone: low density Mix used area: middle density Residential area: low density	Historic Conservation zone: low density Inner Urban zone: limited high density Residential area: low density
	Outer Urban Outskirts		Sub-centers: high density Residential area: low density
	Other	Same as present Urban development occurs naturally	Urban clusters: middle density Agricultural and residential area scattered in the remote area: low density
Conservation Nature		By definition of land use zoning, natural and agricultural land need to be maintained in an urban planning area	By designation of urban planning areas including urban center, sub-centers and urban clusters, other area shall be protected as important natural environmental area.
Public Role	Intervention against development	Same as present	Designation of international development areas for sub-centre and urban clusters is necessary for development and control
	Conservation Method	Designation of agricultural zone and conservation zone to the areas to be maintained/ conserved in current land use	Principally, development prohibition except for urban centre, sub-centre and urban cluster. Minimum development by dwellers could be accepted.
	Investment	Minimum investment same as present is necessary	Large investment is necessary to construct sub-centre and urban cluster by means of either public investment or PPP scheme

Source: JST

4.1.3 Land Use Plan of Core Urban Area

(1) Zoning Concept

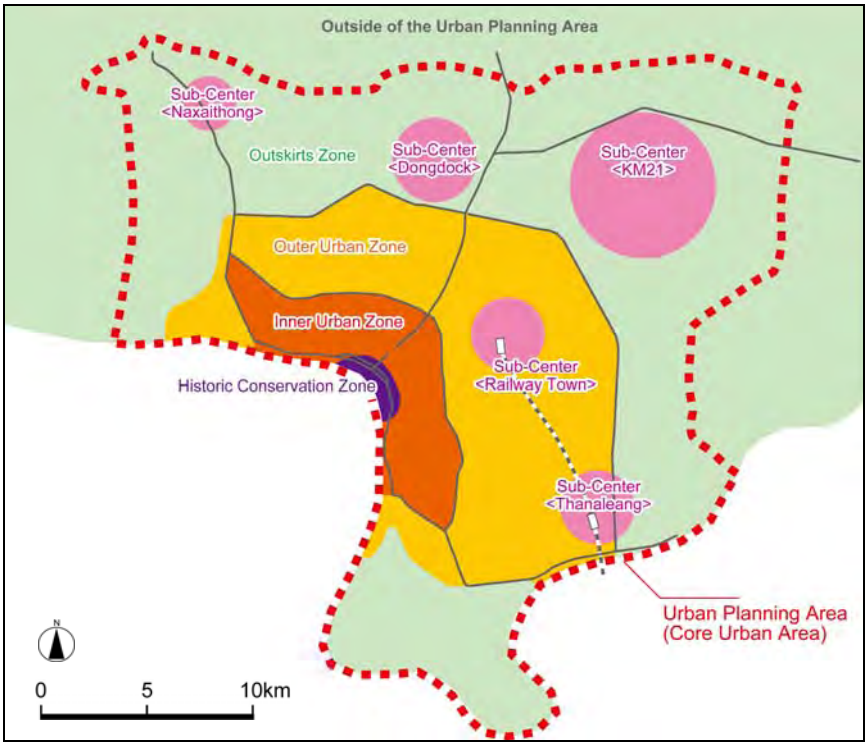
Based upon the comparison of alternatives, the multi-core structure is adopted as appropriate for sustainable development in Vientiane Capital. This will require large public interventions as necessary such as controlling development and the need for attracting large capital investment. The concept of land use plan is illustrated in Figure 4.1.12.

In the land use plan, zoning concept which consists of three major classification is defined; 1) inner urban zone, 2) outer urban zone, and 3) outskirts zone and urban clusters. Each zoning concept is described in followings.

First, the inner urban zone is located in the heart of Vientiane Capital surrounded by the inner ring road. This area represents areas for historic conservation and central business. The major functions are center of administration, business, services, and tourism. Land use policies in this area is to strictly protect the historic conservation zone, and define special district to attract business and commerce in CBD. Middle density is appropriate for the inner urban zone.

Second, the outer urban zone extends outside of the inner urban zone and is surrounded by the outer ring road. Major role of this area is residential area mainly for the increasing urban population. The area includes settlement, sub-centers, and natural conservation area. With regard to the density, middle density for the outer urban and middle to high density for sub-centers will be appropriate. The basic land use policy in the outer urban zone is to concentrate development of newly residential areas and establishment of sub-centers.

Third, the outskirts zone with agricultural and conservation area encloses the inner and outer urban areas, and urban clusters. This area contains three sub-centers and three urban clusters, and the other areas are represented basically by agricultural land and natural conservation area such as national protection area, forest, swamp and marsh. The role of this area is to avoid urban sprawl, that is to provide a green belt for central Vientiane Capital. Intensive urban development shall be allowed only inside of the sub-centers and urban clusters. The density will be low except in sub-centers. The nature of major concept and corresponding land use zoning are shown in Table 4.1.2.



Source: JST

Figure 4.1.12: Planning Zone of Core Urban Area

Table 4.1.2: Zoning Concept of Land Use Plan

Major Zoning	Function	Land Use Policy	Laud Use Zone
Inner urban zone (including Historic Conservation zone)	● Center of Administration ● Regional hub of business and service ● Commerce ● Urban residence ● International gateway and tourism hub ● Cultural heritage of Lao people	● Conservation of historical landscape and buildings ● Specialization of land use for business and commerce in CBD ● Mid density development within inner ring road (except for conservation areas)	● Historical landscape and buildings conservation: [ZPPa] and [ZPPb] ● Natural conservation: [NE] ● More Higher density for accelerating redevelopment for business and commerce: [UA] ● Housing oriented area in the inner urban area : [UB]
Outer urban zone (including Sub-center zone)	● Sub-centers ● Residential area ● Conservation of lower land, swamp land and paddy fields for flood control and recreation	● Sub-center development; Railway town and Thanaleang ● Urbanization control within the outer ring road except for the sub-centers ● Conservation of environmentally important areas	● Sub-centers: [UEb] and [UEa] ● VIP: [I] and VLP: [T] etc ● Residential oriented area in outer urban area: [UD] ● Conservation of forest and water areas: [NE] ● Conservation for agricultural area: [NA] (accepting minimum housing development for existing settlements)
Outskirts zone (including Sub-center zone)	● Conservation of naturally important areas and agricultural land with higher yield ● Sub-centers	● Conservation of environmentally important area ● Sub-center development; KM21, Dongdock, and Naxaithong	● Conservation of forest and water areas: [NE] ● Conservation of agricultural area: [NA] (accepting minimum housing development for existing settlements)

Source: JST

(2) Land Use Plan of Core Urban Area

Taking in account of the basic policies for the future urban structure as explained above, the future land use plan of the core urban area in 2030 was established (see Figure 4.1.13). This land use plan is based upon "Urban Development Master Plan 2000-2010", satellite image analysis, existing land use and other plans of relevant projects. The land use plan of the inner urban zone principally respects to "Urban Development Master Plan 2000-2010". The land use plan for the outer urban zone, outskirts zone and sub-centers follows the concept of multi-core structure. Therefore, the land use plan of this area is coordinated spatially not only with the existing land use but also with the expected urbanization as tested in simulation model of multi-core structure (see Figure 4.1.11). The land use of agricultural and conservation areas follows the current land use conditions without much modification.

The detailed zoning categories basically comply with the current land use master plan as well. One category, "UEb", is however added to the zoning system to take account of necessity of higher dense development in sub-centers in accordance with growth of population and business activities in future.

Area of future land use plan in 2030 by category is calculated in Table 4.1.3. Future urbanization area achieves approximately 48.0% of the total land in urban planning area, whilst agricultural and conservation areas comprise approximately 52.0%. There are still adequate rooms for further development to accommodate population growth and enlarge economic activities after 2030.

Table 4.1.3: Area by Land Use Category

Category		Area (ha)	%
Urbanized Area			
	Zpp-Ua	250	0.4%
	Zpp-Ub	80	0.1%
	UAa	540	0.9%
	UBa	890	1.4%
	UBb	2,920	4.7%
	UCa	480	0.8%
	UCb	390	0.6%
	UDa	50	0.1%
	UDb	11,510	18.7%
	UEa	4,960	8.0%
	UEb	3,670	5.9%
	UF	560	0.9%
	I	2,640	4.3%
	T	400	0.6%
	Ef	290	0.5%
	sub-total	29,630	48.0%
Agricultural and Conservation Area			
	NA	20,460	33.2%
	NE	11,610	18.8%
	sub-total	32,070	52.0%
Total		61,700	100.0%

Source: JST

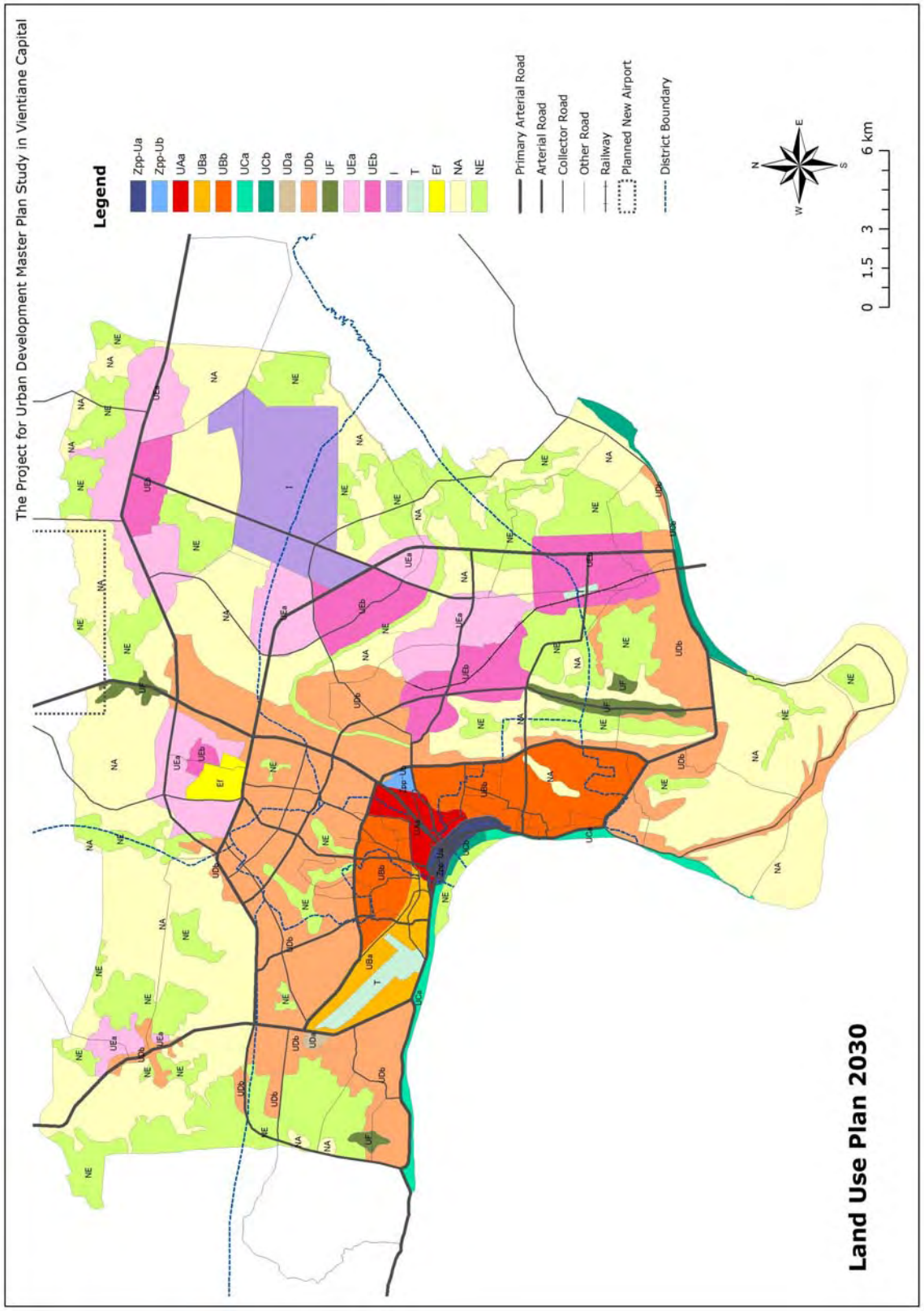


Figure 4.1.13: Land Use Plan of Core Urban Area 2030

Source: JST

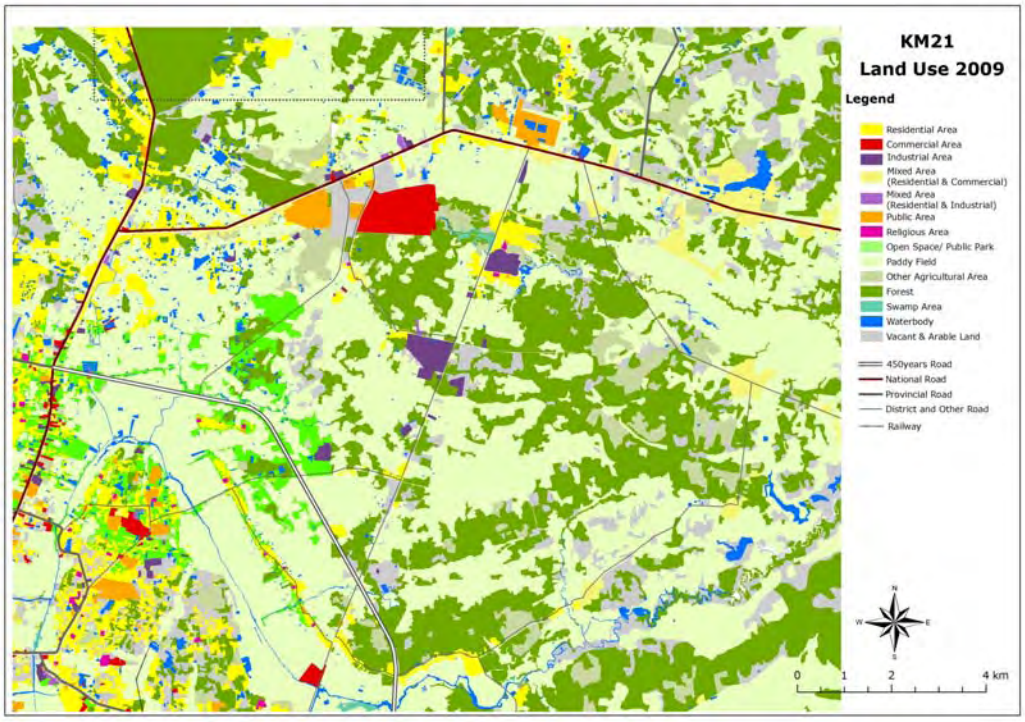
4.1.4 Land Use Plan of Sub-centers

(1) KM21 Sub-center

1) Current Conditions

KM21 area is the area around Xaisettha District and Xaithany District. KM21 area is located eastern suburban area of Vientiane. The area is relatively flat land with 170 to 180 m height from the sea level. The land is slightly elevated from southern part to the northern part. The land is covered mainly with low bush forest limited areas of paddy filed and upland crop area. There is Huay Makhiao River at the south edge of the terrace at Nakhouay Village, which functions flood control area in the rainy season. The area is inundated during the rainy season. Villages are scattered at the edge of terrace along small rivers and along local roads.

KM21 area is currently utilized mainly as paddy land, vacant (uncultivated paddy) land, and grass land. In the area, uncultivated paddy land supposes to increase due to expansion of salutation and seasonal migrant work. Young generation goes out to be seasonal migrant workers in Thailand, so that limited number of residents lives in the area.



Source: JST

Figure 4.1.14: Current Land Use of KM21

The KM21 area currently has industrial zone, which is 60 ha of land owned by Vientiane Capital. Out of 60 ha, 54 ha is utilized for leasing land, while the remaining land is for roads. All of the 54 ha of the public owned lands are leased out to the 12 factories such as Chinese (silicon), Vietnam (iron and steel recycle), local enterprises (furniture), and so on. In 2009, SEA Game was held at the northern part of the KM 21 area. Many sports facilities and utilities were developed. The area will be utilized as sports complex with planed golf course.

The development potential of the area is improved with 450 years road as an important truck transport network as well as improved local road (DR-109).

Table 4.1.4: Current Conditions of Infrastructures of KM21

Items	Current Conditions
Road and Transport	Major transport network here is road. There are two major arterial roads passing through KM21 Area: NR-13S and 450 Years Road. However, there is no truck road passing through the area in north-south direction, so that the area has a few non-paved roads such as DR-108, DR-109 and DR-111for north-south direction of transport.
Water Supply	Currently nearest water supply pipeline is developed along NR-13S, but the pipeline network of water supply does not extend to the inside of the area. So, the existing factories use underground water, of which well is 40m in depth. There seems to still have adequate volume of underground water. A water filtration plant, the capacity of water supply is 2,000m^3/day, is constructed in Namgum River, which is in the north-west from the area. The water from this plant plans to supply to the area via SEA Game Stadium area. The existing water supply can adequately cover the water demand of current urbanized area and must be adequate with natural urbanization, however it will be indispensable to increase water supply volume in accordance with the future population of sub-center existing water supply.
Drainage and Sewerage	The area does not have any drainage system, sewerage system. The existing factories engage uncontrolled treatment, and the existing villages leave natural treatment. Since there is little risk to damage surrounding environment with current accumulation of factories and residents, current situation may be within a normal practice. The rainwater in the northern part of the area currently stocked in pond and paddy land, but the rainwater in the southern port of the industrial zone drain to Hoei Makheao River, which flows at the south of the industrial zone. A wastewater treatment plant is available at the river-mouth of Hoei Makheao River or flowing point to Mekong River.
Solid Waste	District Office provides with soils waste disposal service as paid service. Villagers have to individually contact with district office to receive the service.
Electricity Supply	There exists transmission facility having capacity of 44 MW in the area. The power source of this transmission facility is hydro power plant located in Nam Ngum River. Existing electricity transmission can be easily extended to supply electricity to the area, however it is necessary to confirm adequacy of supply capacity with future electricity demand in the area. In case the demand will be beyond the existing transmission capacity, additional transmission facility would have to be taken into account
Telecommunications	The transmission center of communication, named KM21, owned by the state enterprise of Lao communication, is located at 3 km north-earthen area from the area. The KM21 still has enough margins to add additional communication terminal facility to connect to the area. The existing water supply can adequately cover the water demand of current urbanized area and must be adequate with natural urbanization, however it will be indispensable to increase water supply volume in accordance with the future population of sub-center existing water supply.

Source: JST

2) Development Framework

KM21 area has been long time recognized as a sub-center area to relocate government offices. The area, which currently increases its development potential with several development projects with 450 Years Road as an important truck transport network, has several

development projects such as Vientiane Industrial Park (VIP), development of university and industrial estates and large residential area. These development projects will be a suitable development seed to be a sub-center. The following projects shall be major development plans of KM21 area, which must be considered as the core activities/ urban functions in the KM21 sub-center:

- New government center development plan
- Vientiane Industrial Park (VLP) and Chinese industrial estate development
- Residential new town development plan
- Chinese university development plan
- Sports complex with golf course development plan
- Construction of 450 Years Road

KM21 area has approximately 18,701 persons of population in 2005. Population distribution plan (Table 4.1.5) based on the availability of land and urbanization potential analysis indicates that KM21 sub-center shall accommodate 48,000 persons of population in 2020 and 150,000 persons of population in 2030. Necessary area to accommodate those population is 625 ha in 2020 and 3,150 ha in 2030.

Table 4.1.5: Population Projection of KM21

Items	2005	2020	2030
Population	18,701	48,000	150,000
Anticipated Area	-	625 ha	3,150 ha

Source: JST

3) Development Concept and Land Use Plan

Development of KM21 Sub-center is conceptually and preliminarily delineated with the following points of view:

Table 4.1.6: Development Concept of KM21

Items	Concepts
Function and Role	- Sub-center to decentralize urban functions in CBD of Vientiane - New administration center, industrial zone - Suburban residential area for working at Sub-center
Core Facilities	- Vientiane Industrial Park (VIP) and Chinese industrial estate - Sports Complex area - Chinese university
Arterial Transport Network	- NR-13S - 450 Years Road
Utility Development by Public Sector	- Center area in sub-center - Local arterial roads in sub-center - Local truck system of water supply, drainage, electricity and telecommunications under/ along the local arterial roads in sub-center

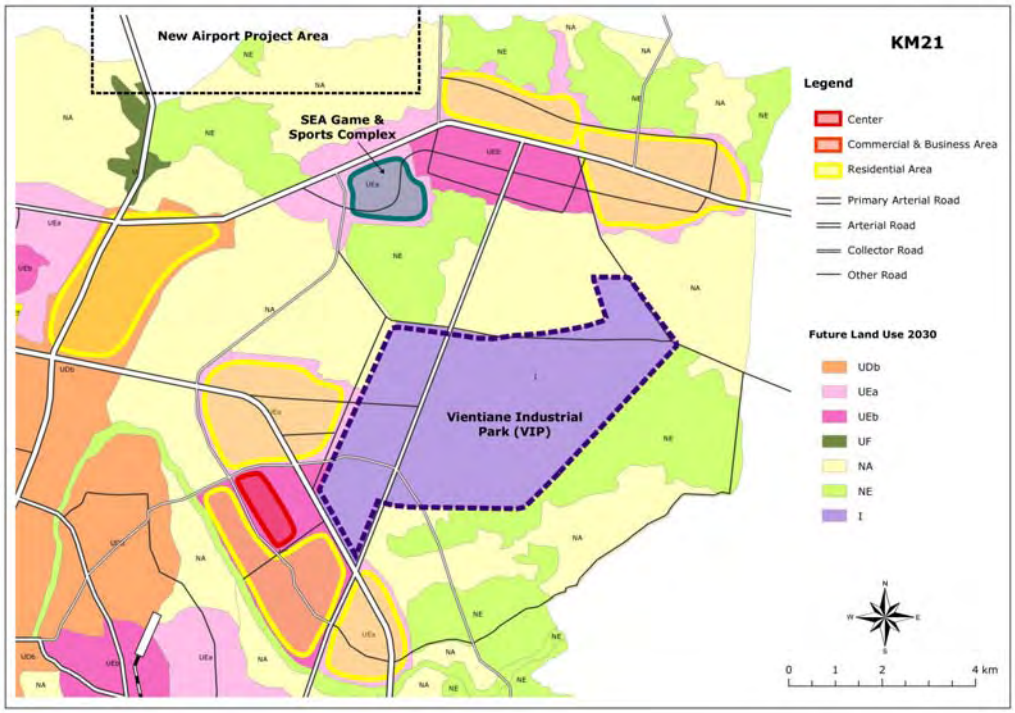
Source: JST

Sub-center development should be based on location of existing and planed core facilities in the area such as VIP. It is indispensable for the development of KM21 Sub-center area to carefully and widely utilize improved land development potentials due to development of those facilities. It is wise way to fully utilize private sector in the sub-center development.

Minimum infrastructure provision is also important to improve land development potential of the area to invite private investor to the sub-center.

The area shall be roughly divided into three compact zones: residential zone, new administration zone and Industrial zone to avoid disordered and sprawl development. The new administration zone and the industrial zone shall be a self-sufficient zone with balance working and residential areas. Center zone is planned to locate at west side of the industrial zone to access all three zones but mainly service to industrial zone which expects more living and working populations. The surrounding area of the industrial zone shall be reserved as buffer zone and natural conservation area.

The land use plan of KM21 Sub-center is conceptually illustrated in Figure 4.1.15.



Source: JST

Figure 4.1.15: Land Use Plan of KM21

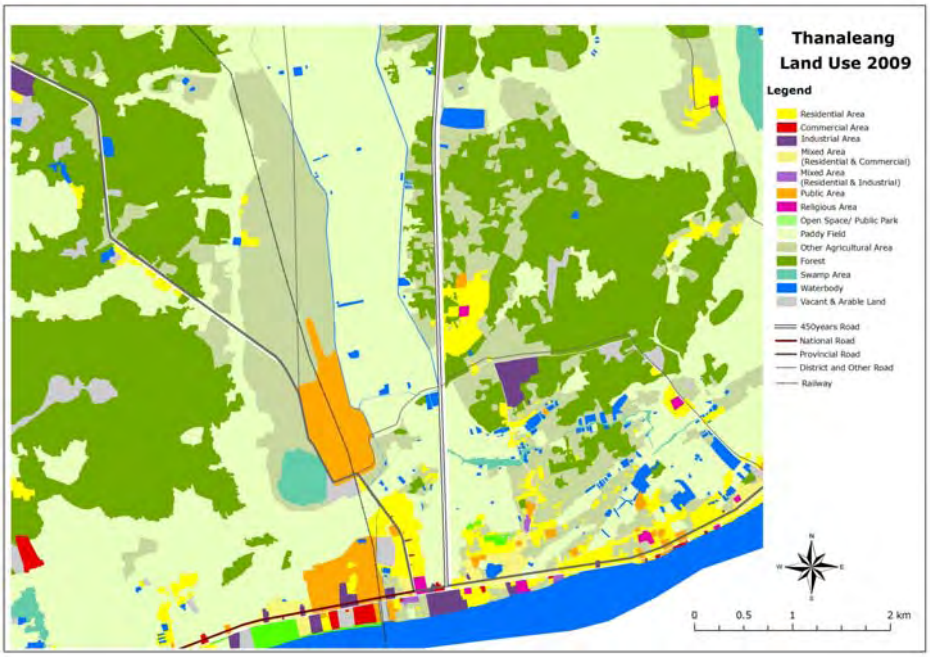
(2) Thanaleang Sub-center

1) Current Conditions

Thanaleng area is the area around Xaisettha District and Hadxaifong District. The area faces to Mekong River and is a border area to Thailand with bridge, border points and trade facilities.

Thanaleng area is a flat land along riverbank of Mekong River. Lower flat land spread over at southern part of Thanaleng area, where the area faces Mekong River. The land is, in generally, gradually elevated to be terrace in the north. Lower flat land is well cultivated as paddy field. Paddy filed play as retention area. Villages are scattered at terrace or highland areas to avoid inundation in the rainy season as well as to cultivate up-land crops and tree crops. Dongphosy forest, which is located near to Mekong River, is designated as Reserve Forest.

Thanaleang is traditionally developed as the river crossing point to/from Nong Khai of Thailand and is currently connected to Thailand with Friendship Bridge and Railway. The area along the Mekong River has been densely populated with trade business and transport activities and urbanization occurs surrounding areas and the areas along NR-1, so that non-farming workers commuting to Vientiane are gradually increased in this area. The hinterland of river-front area mainly is covered with paddy field and bush-forest areas.



Source: JST

Figure 4.1.16: Current Land Use of Thanaleang

The area consists of two villages such as Nakhay Tai Village and Hadxaifong Village, which have approximately 1,600 persons and 2,200 persons of population in 2005, respectively.

The development potential of the area is improved with 450 years road as an important truck transport network as well as several development projects such as Vientiane Logistics Park (VLP) and Thanaleang Commercial Complex. Thanaleang area will take care of logistics and trade center functions of Vientiane Municipality.

Table 4.1.7: Current Conditions of Infrastructures of Thanaleang

Items	Current Conditions
Road and Transport	Thanaleng area has NR-1 passing through east-west direction at southern part of the area as a main truck road with Friendship Bridge across Mekong River. However, there is no truck road passing through the area in north-south direction, so that the area has a few non-paved roads such as DR-108, DR-109 and DR-111for north-south direction of transport. In addition, there is the first railway line from the Friendship Bridge to Thanaleng Station, which connects with Thailand. Currently passenger trains operate twice a day between Thanaleng station and Nong Khai station.
Water Supply	Most Households use water from shallow and deep well. There are minor households use water from streams and ponds. Dongmakkhai Water supply project also supply water for households, and industry in this area. Main water pipeline of the project is under the NR 1 road and extents to center of Dongphosy Village along DR-109. Water supply is distributed from main pipeline to villages along the road. The existing water supply can adequately cover the water demand of current urbanized area and must be adequate with natural urbanization, however it will be indispensable to increase water supply volume in accordance with the future population of sub-center existing water supply.
Drainage and Sewerage	Drainage system is available only along roads in Thanaleng area, but there are some irrigation channels substituting as drainage in the area. Sewage disposal is done with septic tank.
Solid Waste	District Office provides with soils waste disposal service as paid service. Villagers have to individually contact with district office to receive the service.
Electricity Supply	Electricity supply system is completed in Thanaleng area. The area has already installed 1 main electricity station at Saphankkanong Village. At Thakokhai Village will be constructed 1 main electricity station for export. High voltage (115kV) transmission line come from north and substation is located behind the Thanaleng CIQ office at the border. 22 kV of electricity is distributed to the areas from the substation after step-down of voltage by transformers at electric poles.
Telecommunications	Telecommunications system has not been available in Thanaleng area except for a part of Dongphosy Village. Telephone lines of ETL extents along NR 1 road up to CIQ office at Friendship Bridge and currently extents to Thanaleng railway station.

Source: JST

2) Development Framework

Many projects are on-going/under-planning in the area due to rise of development potentials, especially, there are several private investment projects observed as well, for example Dongphosy Commercial SEZ project and Golf Course project. The following projects shall be the core functions of Thanaleang area in future, which must be considered as the core activities/ urban functions in the Thanaleang sub-center:

- Vientiane Logistics Park (VLP) Project
- Dongphosy Commercial Special Economic Zone Project
- Golf Course Project
- Railway Extension
- Construction of 450 Years Road

Thanaleang area has approximately 3,800 persons of population in 2005. Population distribution plan (Table 4.1.8) based on the availability of land and urbanization potential analysis indicates that Thanaleang sub-center shall accommodate 16,000 persons of population in 2020 and 35,000 persons of population in 2030. Necessary area to accommodate those population is 325 ha in 2020 and 575 ha in 2030.

Table 4.1.8: Population Projection of Thanaleang

Items	2005	2020	2030
Population	3,809	16,000	35,000
Anticipated Area		325 ha	575 ha

Source: JST

3) Development Concept and Land Use Plan

Development of Thanaleang Sub-center is conceptually and preliminarily delineated with the following points of view:

Table 4.1.9: Development Concept of Thanaleang

Items	Concepts
Function and Role	- Sub-center to decentralize urban functions in CBD of Vientiane - Border trade, logistics and commerce - Suburban residential area for working at Sub-center
Core Facilities	- Thanaleang Railway Station - Vientiane Logistics Park (VLP) - Thanaleang Commercial Complex (SEZ) - Thanaleang Border Point
Arterial Transport Network	- NR-1 - 450 Years Road - Railway
Utility Development by Public Sector	- Center area in sub-center - Local arterial roads in sub-center - Local truck system of water supply, drainage, electricity and telecommunications under/ along the local arterial roads in sub-center

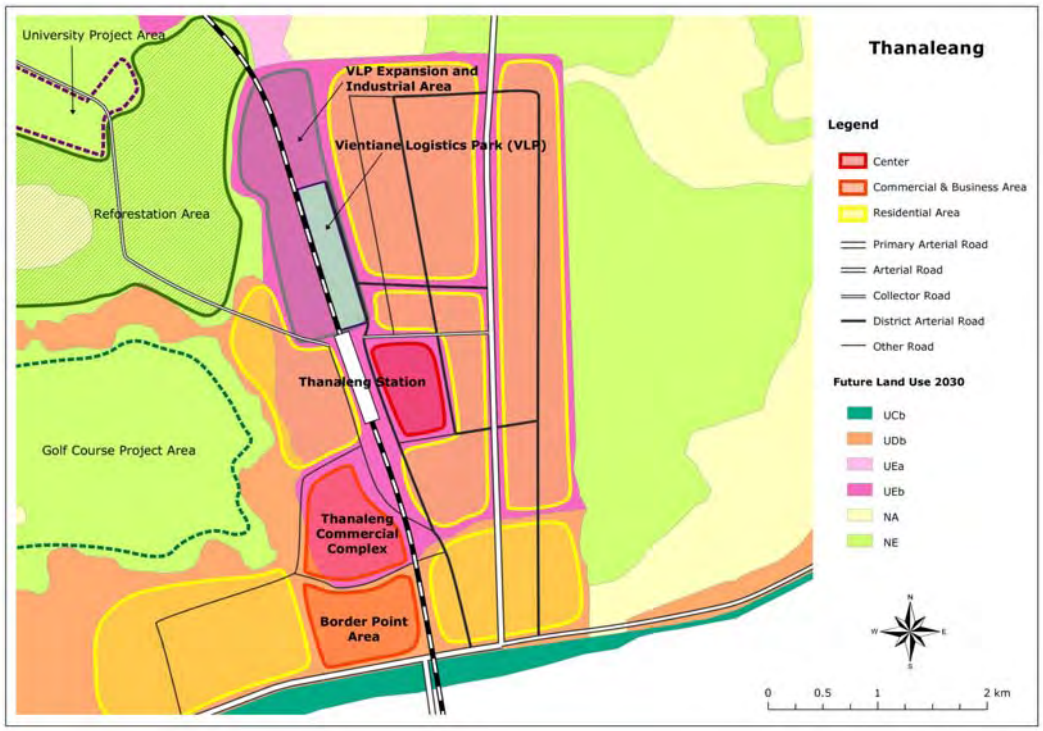
Source: JST

Sub-center development should be based on location of existing and planed core facilities in the area such as VIP. It is indispensable for the development of KM21 Sub-center area to carefully and widely utilize improved land development potentials due to development of those facilities. It is wise way to fully utilize private sector in the sub-center development. Minimum infrastructure provision is also important to improve land development potential of the area.

Sub-center development should be based on location of existing and planed core facilities in the area such as VLP, railway and 450 Years Road. Sub-center development should carefully and widely utilize land development potentials to be rise due to development of those facilities.

Center zone is planned to locate at east side of Thanaleang railway station to keep good access to railway station and 450Years Road. VLP and surrounding area shall be reserved to expand VLP and to concentrate logistics businesses and distributive processing factories in near future.

Residential area locates around the center zone and along 450 Years Road to keep good accessibility to the core facilities and the arterial transport network. The land use plan of Thanaleang Sub-center is conceptually illustrated in Figure 4.1.17.



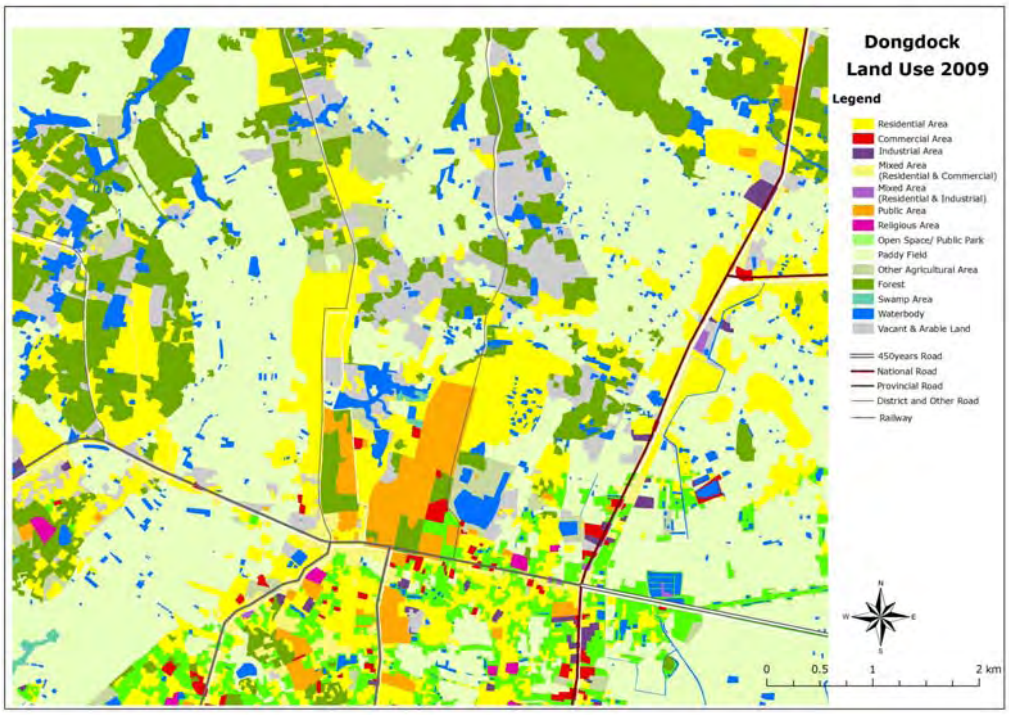
Source: JST

Figure 4.1.17: Land Use Plan of Thanaleang

(3) Dongdock Sub-center

1) Current Conditions

Dong Dock area is in Xaithany District. Dong Dock area is located north-eastern suburban area of Vientiane. The area is flat land and is traditionally covered with paddy filed and upland crop areas however, the area is currently quickly urbanizing.



Source: JST

Figure 4.1.18: Current Land Use of Dongdock

Dong Dock area is well known as academic town with National University of Lao and many research institutes. Currently, residential development occurs in the area due to proximity to the downtown with relatively good living environment. The area has 19,163 persons of population in 2005.

Table 4.1.10: Current Conditions of Infrastructures of Dongdock

Items	Current Conditions
Road and Transport	Major transport network here is road. There are two major arterial roads passing through Dong Dock area: NR-10 and Dong Dock Road. Dong Dock Road is supposed to form northern part of Outer Ring Road connecting to the 450 Years Road.
Water Supply	Currently Dong Dock area has water supply service. Major water supply pipeline is developed along NR-10 and Dong Dock road. Dong Dock area has 2 water tanks: one ground tank with 1,000 m2 of capacity and one elevated tank with 660m3 of capacity. The existing water supply can adequately cover the water demand of current urbanized area and must be adequate with natural urbanization, however it will be indispensable to increase water supply volume in accordance with the future population of sub-center existing water supply.
Drainage and Sewerage	The area does not have any drainage system, sewerage system. The existing villages leave natural treatment. Since there will be certain risk to damage surrounding environment with current accumulation of residents and office buildings, sewerage treatment should be taken into account in the near future.
Solid Waste	District Office provides with soils waste disposal service as paid service. Villagers have to individually contact with district office to receive the service.
Electricity Supply	There exists transmission facility having capacity of 44 MW in the area. The power source of this transmission facility is hydro power plant located in Nam Ngum River. Existing electricity transmission can be easily extended to supply electricity to the area, however it is necessary to confirm adequacy of supply capacity with future electricity demand in the area. In case the demand will be beyond the existing transmission capacity, additional transmission facility would have to be taken into account.

Source: JST

2) Development Framework

Dong Dock area is the new urban agglomeration of academic and reach functions of Vientiane. It is also a newly developing suburban residential area. However, there is currently no large development project.

Dong Dock area has approximately 19,000 persons of population in 2005. Population distribution plan (Table 4.1.11) based on the availability of land and urbanization potential analysis indicates that Dong Dock sub-center shall accommodate 56,000 persons of population in 2020 and 80,000 persons of population in 2030. Necessary area to accommodate those population is 550 ha in 2020 and 1,200 ha in 2030.

Table 4.1.11: Population Projection of Dongdock

Items	2005	2020	2030
Population	19,163	56,000	80,000
Anticipated Area	-	550 ha	1,200 ha

Source: JST

3) Development Concept and Land Use Plan

Development of Dong Dock Sub-center is conceptually and preliminarily delineated with the following points of view:

Table 4.1.12: Development Concept of Dongdock

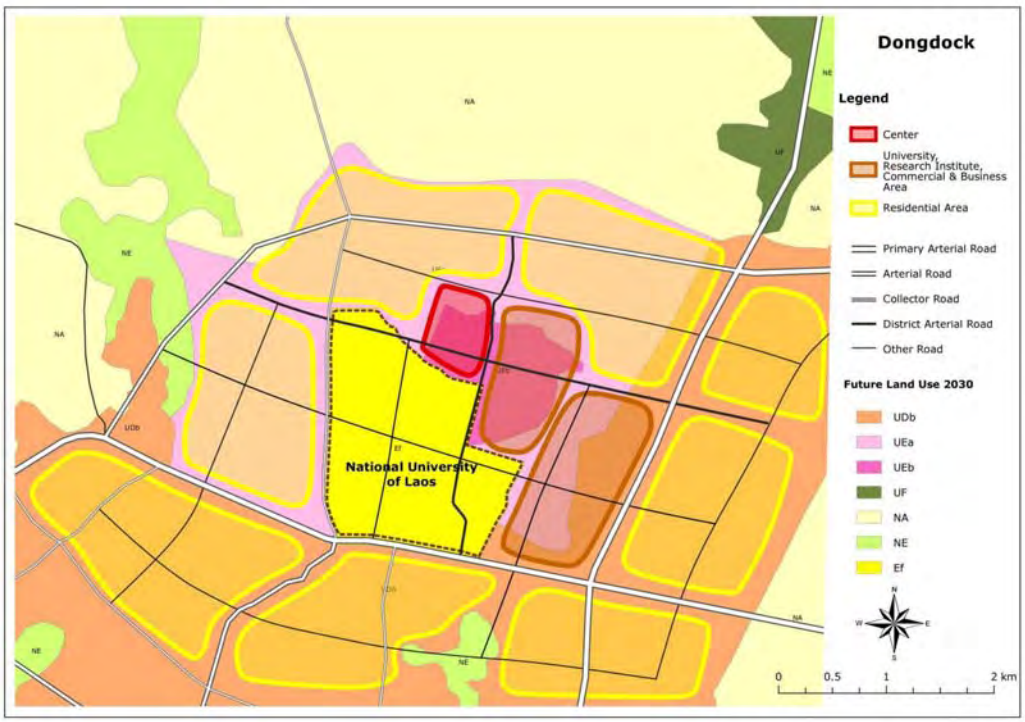
Items	Concepts
Function and Role	- Sub-center to decentralize urban functions in CBD of Vientiane - Relocation and concentration of academic and research institutes - Suburban residential area for working at Sub-center
Core Facilities	- National University of Lao - Public research institutes
Arterial Transport Network	- NR-10 - Dong Dock Road (as a part of the Outer Ring Road)
Utility Development by Public Sector	- Center area in sub-center - Local arterial roads in sub-center - Local truck system of water supply, drainage, electricity and telecommunications under/ along the local arterial roads in sub-center

Source: JST

The area naturally has higher development potential without public intervention, comparing to the other sub-center areas. It is accordingly important to utilize and well control natural urbanization pressure at the area. Minimum infrastructure provision is also important for inviting private investor to take care of a part of sub-center development.

The core facility of the area is existing National University of Lao. There area several research institutes and offices nearby the university. With utilizing existing those facilities, center zone shall be located at the northern part of the university to rise centrality of the sub-center. The center zone should have commercial, local public service functions. The new residential areas shall be developed surrounding the center area by utilizing development potentials.

The land use plan of KM21 Sub-center is conceptually illustrated in Figure 4.1.19.



Source: JST

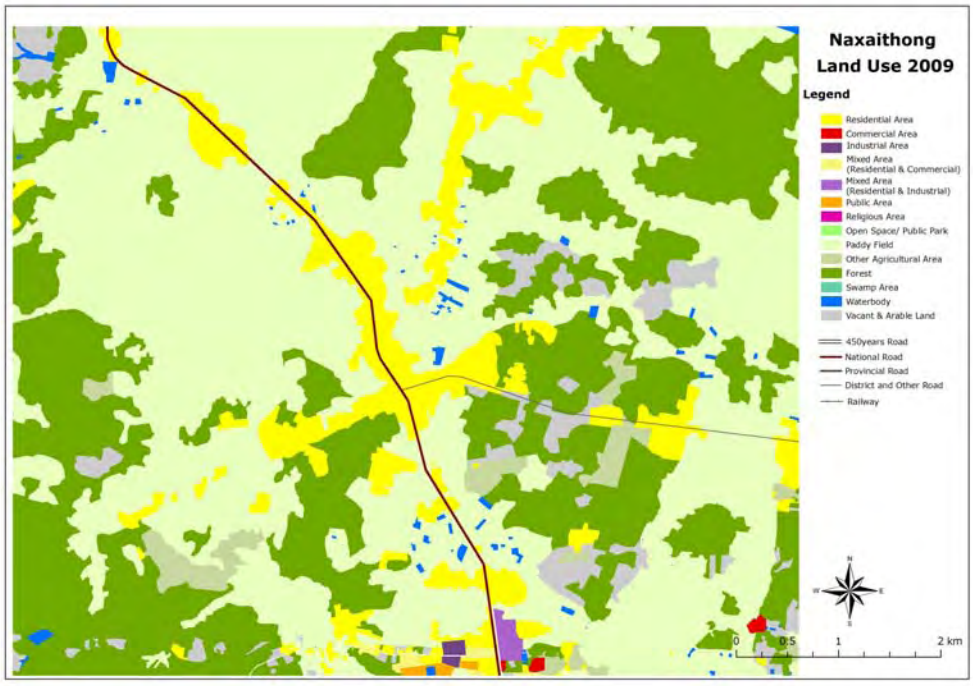
Figure 4.1.19: Land Use Plan of Dongdock

(4) Naxaithnong Sub-center

1) Current Conditions

Naxaithong area is in Naxaithong District. The site is the area of district center of Naxaithong district, which is approximately 15 km from the Downtown of Vientiane.

Naxaithong area is located north-western suburban area of Vientiane. The area is agricultural area mainly with paddy filed and upland crop area. It is recently observed some built-up areas with shop-houses at the area along NR-13N and Dong Dock Road, but the development does not reach the inside of the area, so that there are still plenty of vacant lands.



Source: JST

Figure 4.1.20: Current Land Use of Naxaithong

Naxaithong area has small accumulation of shop-houses and offices as a district center of Naxaithong district. The area is also a center of agricultural areas to tale area of daily consumptions of the farmers in surrounding areas. But, there is no significant modern industry, commerce and business in the area.

The area will have a development potential to be residential satellite town centering local public and commercial service functions in the suburban Vientiane based on the good accessibility, existing small urban accumulation.

Although, urbanization gradually occurs as mentioned, the population is still limited. The area has approximately 2,500 persons of population in 2005.

Table 4.1.13: Current Conditions of Infrastructures of Naxaithong

Items	Current Conditions
Road and Transport	Naxaithong area is in good accessibility in road transport, especially, the area is located at inter-cross section of two major arterial roads in Vientiane. One is NR-13N and the other is Dong Dock Road, which is the northern portion of the Outer Ring Road.
Water Supply	Current urban extent of Naxaithong has water supply service. Major water supply pipeline is developed along NR-13N and Dong Dock road. Naxaithong area has one elevated tank with 1,000 m3 of capacity. The capacity of water supply is adequate with natural urbanization, however it will be indispensable to increase water supply volume in accordance with the future population of sub-center existing water supply.
Drainage and Sewerage	The area does not have any drainage system, sewerage system. The existing villages leave natural treatment. Since there will be certain risk to damage surrounding environment with current accumulation of residents and office buildings, sewerage treatment should be taken into account in the near future.
Solid Waste	District Office provides with soils waste disposal service in urban area as paid service. Villagers have to individually contact with district office to receive the service.
Electricity Supply	There exists transmission facility having capacity of 44 MW in the area. The power source of this transmission facility is hydro power plant located in Nam Ngum River. Existing electricity transmission can be easily extended to supply electricity to the area, however it is necessary to confirm adequacy of supply capacity with future electricity demand in the area. In case the demand will be beyond the existing transmission capacity, additional transmission facility would have to be taken into account.

Source: JST

2) Development Framework

It is recently observed active land development along NR-13N and Dong Dock Road in Naxaithong area. However, there is currently no large development project.

Naxaithong area has approximately 2,500 persons of population in 2005. Population distribution plan (Table 4.1.14) based on the availability of land and urbanization potential analysis indicates that Naxaithnong sub-center shall accommodate 7,000 persons of population in 2020 and 20,000 persons of population in 2030. Necessary area to accommodate those population is 75 ha in 2020 and 400 ha in 2030.

Table 4.1.14: Population Projection of Naxaithong

Items	2005	2020	2030
Population	2,531	7,000	20,000
Anticipated Area	-	75 ha	400 ha

Source: JST

3) Development Concept and Land Use Plan

Development of Naxaithong Sub-center is conceptually and preliminarily delineated with the following points of view:

Table 4.1.15: Development Concept of Naxaithong

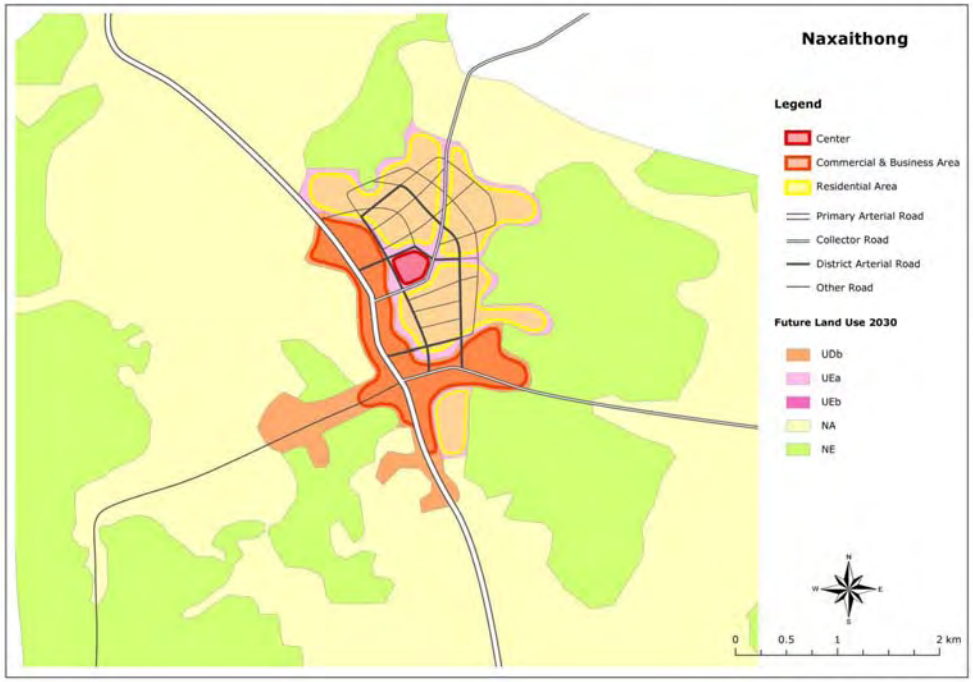
Items	Concepts
Function and Role	- Sub-center to decentralize urban population of inner urban area of Vientiane - Suburban residential town for commuters to Vientiane
Core Facilities	- Existing local center functions - Suburban commercial center
Arterial Transport Network	- NR-13N - Dong Dock Road (as a part of the Outer Ring Road)
Utility Development by Public Sector	- Center area in sub-center - Local arterial roads in sub-center - Local truck system of water supply, drainage, electricity and telecommunications under/ along the local arterial roads in sub-center

Source: JST

Sub-center development should be based on location of existing local town. It is indispensable for the development of Naxaithong Sub-center area to carefully and widely utilize improved land development potentials due to development of those facilities. Since there is limited attractiveness to Naxaithong due to limited size of town, it is of great important to develop center area with core shopping facilities to gather more peoples in the sub-center as well as to improve image of the Naxaithong area to be higher standard residential area. Minimum infrastructure provision is also important for inviting private investor to take care of a part of development of the sub-center.

The center zone should have commercial, local public service functions. The new residential areas shall be developed surrounding the center area by utilizing development potentials.

The land use plan of Naxaithong Sub-center is conceptually illustrated in Figure 4.1.21.



Source: JST

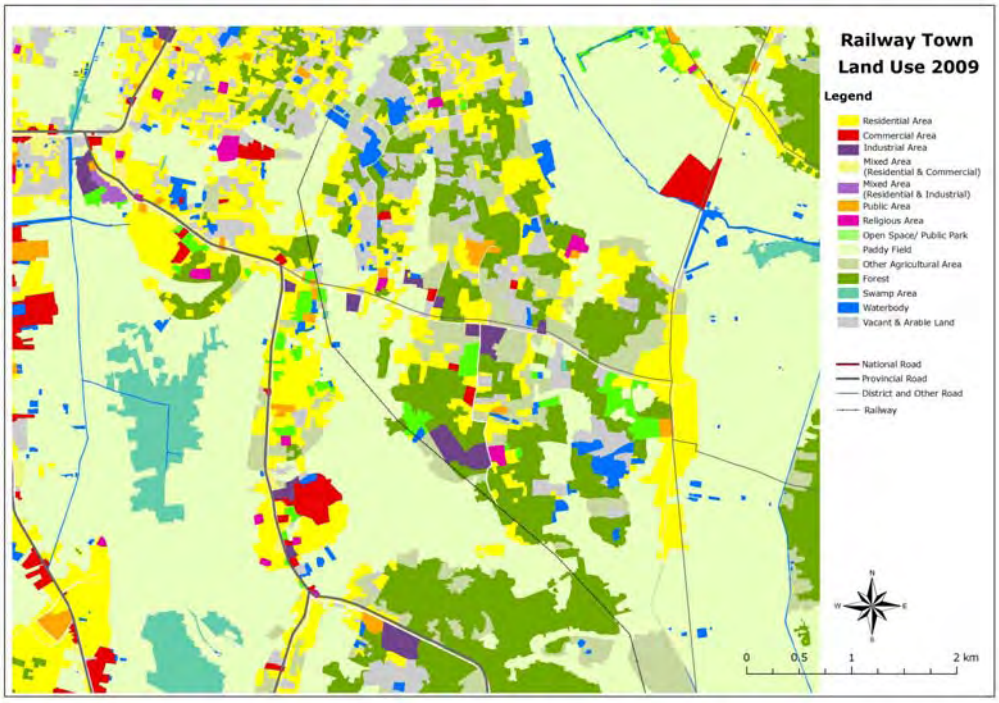
Figure 4.1.21: Land Use Plan of Naxaithong

(5) Railway Town Sub-center

1) Current Conditions

Railway Town area is in Xaysetha District. The site is the area to be Vientiane Central Station. Railway Town area is located eastern suburban area of Vientiane. The area is currently a sort of fringe area mixing urbanized area with agricultural area, so that the area has suburban residences and traditional village landscape with local settlements, paddy filed and upland crops. Local settlements is scattered along small river and cannels.

The area is agricultural area with mainly paddy production. Although there are some parts of suburban residential area in the area, the population is still limited. The area has approximately 3,800 persons of population in 2005.



Source: JST

Figure 4.1.22: Current Land Use of Railway Town

It is noted that the area has a plan to locate Vientiane Central Station, which is expected to work as a railway transport hub/ gateway connecting to Thailand. The station will be a key facility of new economic activities in the area, in particular commercial development and residential development should be expected based on such transport hub functions.

Table 4.1.16: Current Conditions of Infrastructures of Railway Town

Items	Current Conditions
Road and Transport	Railway Town area does not have arterial road in the area, so that it is necessary to access the arterial road through secondary roads.
Water Supply	Railway Town area is currently a limit of water supply service in eastern part of Vientiane. The western part of the area has water supply service but the other part (estern part of the area) is out of the service. Major water supply pipeline is developed along NR-13S. Railway Town area has one elevated tank with 2,000 m3 of capacity, namely Xamkha Elevated Tank. The service area and capacity of water supply is required to be expanded to develop sub-center area.
Drainage and Sewerage	The area does not have any drainage system, sewerage system. The existing villages leave natural treatment. Since there will be certain risk to damage surrounding environment with current accumulation of residents and office buildings, sewerage treatment should be taken into account in the near future.
Solid Waste	District Office provides with soils waste disposal service in urban area as paid service. Villagers have to individually contact with district office to receive the service.
Electricity Supply	Electricity supply service is completed in the area. The power source of this transmission facility is hydro power plant located in Nam Ngum River. Existing electricity transmission can be easily extended to supply electricity to the area, however it is necessary to confirm adequacy of supply capacity with future electricity demand in the area. In case the demand will be beyond the existing transmission capacity, additional transmission facility would have to be taken into account.

Source: JST

2) Development Framework

As earlier mentioned, there is a railway extension project from Thanaleaang station to Vientiane Central Station, which passes through the area with the central station.

Railway Town area has approximately 3,800 persons of population in 2005. Population distribution plan (Table 4.1.17) based on the availability of land and urbanization potential analysis indicates that Naxaithnong sub-center shall accommodate 16,000 persons of population in 2020 and 30,000 persons of population in 2030. Necessary area to accommodate those population is 350 ha in 2020 and 550 ha in 2030.

Table 4.1.17: Population Projection of Railway Town

Items	2005	2020	2030
Population	3,796	16,000	30,000
Anticipated Area	-	350 ha	550 ha

Source: JST

3) Development Concept and Land Use Plan

Development of Railway Town Sub-center is conceptually and preliminarily delineated with the following points of view:

Table 4.1.18: Development Concept of Railway Town

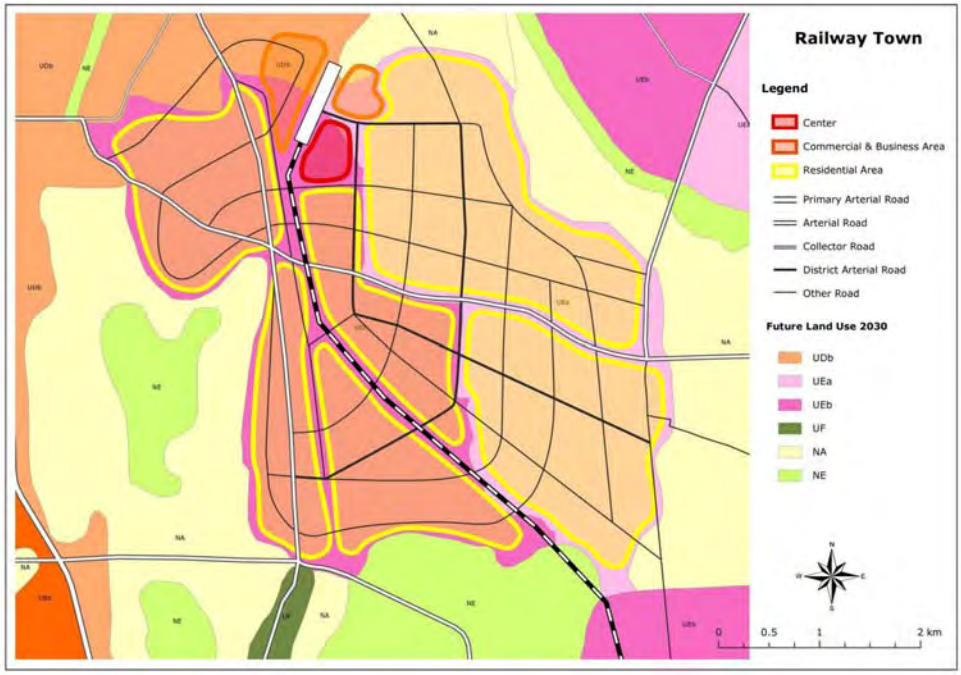
Items	Concepts
Function and Role	- Sub-center to decentralize population of inner urban area of Vientiane - Gateway and transport center of Vientiane
Core Facilities	- Vientiane Central Railway Station
Arterial Transport Network	- Railway - New secondary road connecting to Inner Ring Road and 450 Years Road
Utility Development by Public Sector	- Center area in sub-center - Local arterial roads in sub-center - Local truck system of water supply, drainage, electricity and telecommunications under/ along the local arterial roads in sub-center

Source: JST

Sub-center development should be based on location of existing local town. It is indispensable for the development of Railway Town Sub-center area to carefully and widely utilize improved land development potentials. Since the area is currently a fringe area of urbanization in the eastern Vientiane, the construction of railway, especially central railway station and station plaza will accelerate urban development potential here. Minimum infrastructure provision must be useful to guide urban development by private investor.

The core facility of the area is Vientiane Railway Station and station plaza. With utilizing them, center zone shall be located at nearby area with commercial, local public service functions. The new residential areas shall be developed surrounding the center area by utilizing development potentials.

The land use plan of Railway Town Sub-center is conceptually illustrated in Figure 4.1.23.



Source: JST

Figure 4.1.23: Land Use Plan of Railway Town

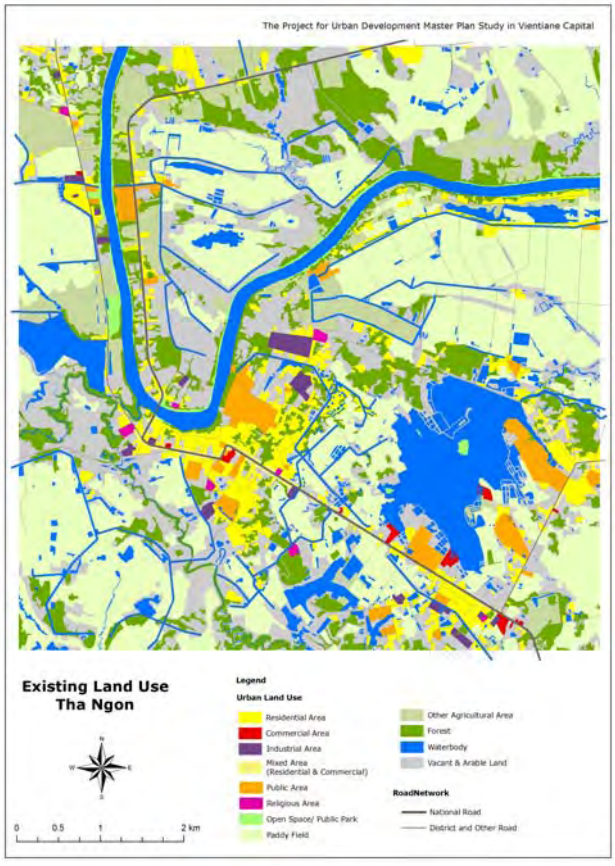
4.1.5 Land Use Plan of Urban Clusters

(1) Tha Ngon Urban Cluster

1) Current Conditions

Tha Ngon is a capital city of Xaythany district. The population of Tha Ngon was approximately 5,100 in 2009. Tha Ngon is located in a northern part of Vientiane Capital roughly 20 km from the central Vientiane Capital. Tha Ngon lies on a fertile plain beside the Nam Ngum River and Nong Seuam lake. To exploit these rich water resources and improve agricultural productivity, a network of irrigation channels have been established. Owing to the geographical advantage, Tha Ngog and surrounding area enjoy agriculture and related industries such as rice and commercial crops industries. Additionally there are forests such as Venekham preservation forest, Prabatouekan and Hatxainkao outside of Tha Ngon. These natural resources are considered to be attractive for national and foreign tourists.

National road No.10 crosses the center of Tha Ngon linking between central Vientiane Capital and national road No.13 at Phonhong. The urbanization pattern of Tha Ngon is characterized by the development along the national road No.10, and along the Nam Ngum River and Nong Seuam Lake. Figure 4.1.24 shows existing land use in Tha Ngon. In this figure, a large river shows the Nam Ngum River, and a lake southeast of the river is Nong Seuam Lake.



Source: JST

Figure 4.1.24: Existing Land Use in Tha Ngon

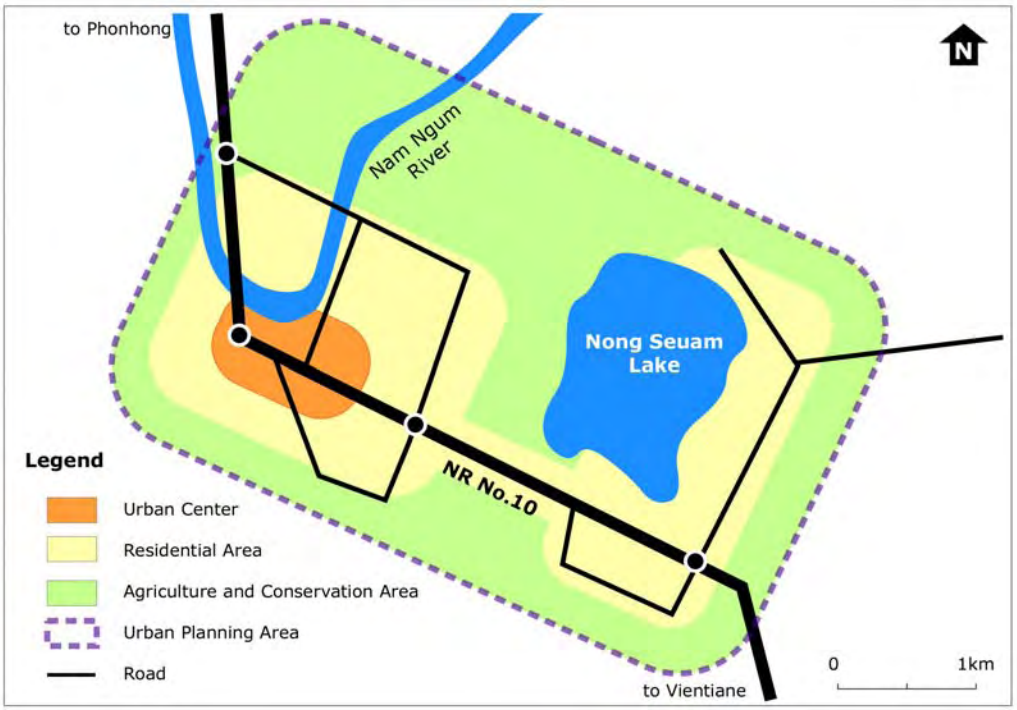
2) Development Framework

Tha Ngon is expected to be one of three urban clusters. The future population is estimated to be 13,000 in 2020 and 20,000 in 2030. In accordance with the population growth, urban functions need to be improved and expanded. In terms of provision of public services, the service facilities such as administrative center, education institutions and medical treatment facilities including clinics and hospitals need to be upgraded. In the meantime staple industries such as agriculture, commercial and tourism need to be strengthened in order to encourage the local economy and increase job opportunities. Based on these functions of Tha Ngon, land use policy has been formulated as follows:

- urbanization area is concentrated mainly along the national road No.10 in consideration of high mobility of people and commodities
- a centre of urbanization is formulated near the Nam Ngum river in consideration of current condition and proximity to water resource and landscape
- middle to low density is appropriate in the urbanization area
- agricultural area and natural resource shall be conserved as much as possible in order to encourage the agricultural and tourism industries

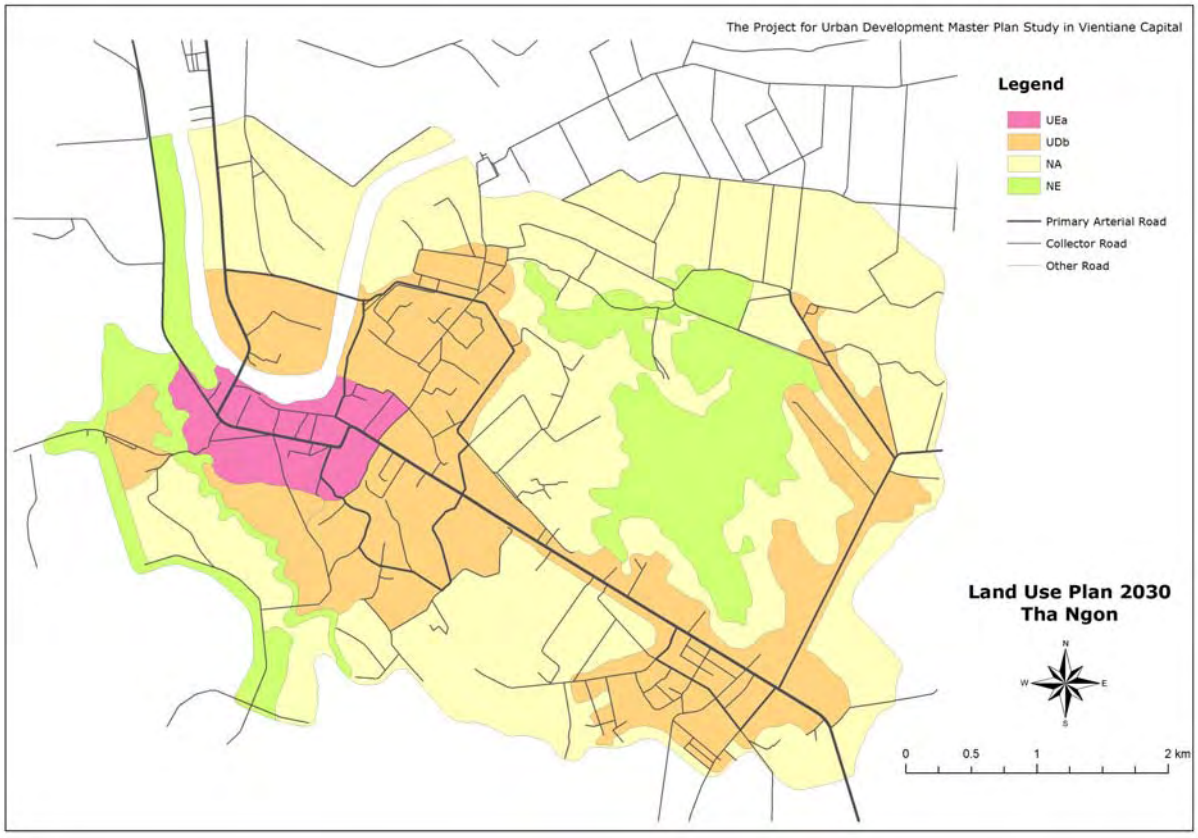
3) Development Concept and Land Use Plan

The zoning concept of land use in Tha Ngon is illustrated in Figure 4.1.25. The "urban area" shall have a major function as a service center, the "residential area" aims at accommodating current and future population, and the "agriculture and conservation area" plays a role of keeping the current land use intact and providing a green belt in Tha Ngon. Based upon this concept, the land use plan of Tha Ngon in 2030 is shown in Figure 4.1.26.



Source: JST

Figure 4.1.25: Land Use Concept of Tha Ngon



Source: JST

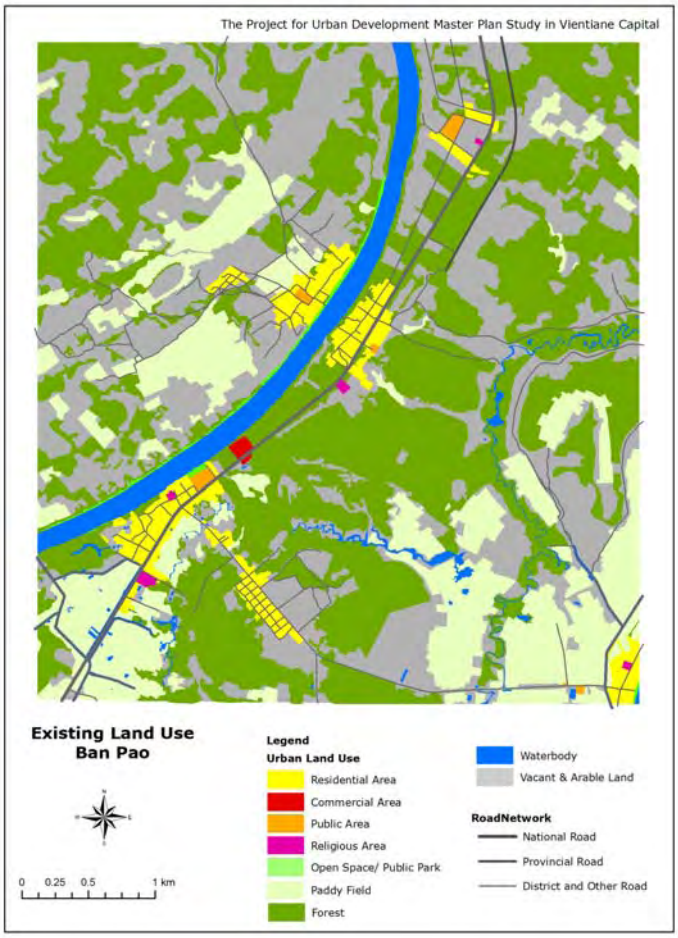
Figure 4.1.26: Land Use Plan of Tha Ngon in 2030

(2) Ban Pao Urban Cluster

1) Current Conditions

Ban Pao is one of the major towns in Mayparkhgum district in terms of the location and town size. The population of Ban Pao was approximately 2,100 in 2009. Ban Pao is located in the northwestern part of Vientiane Capital roughly 50 km from the central Vientiane Capital. This town is located next to Pak Ngum, which is the capital city of the district. Ban Pao lies on a fertile and flat plain beside the Nam Ngum River. A network of irrigation channels has been established to encourage agriculture. Owing to the geographical advantage, Ban Pao and surrounding area flourishing in agriculture especially in rice production. Additionally there are rich natural resources such as Tham Pha Cave, Tad Vang Luang waterfall and Phoukhaokhuay mountains in the surrounding area of Ban Pao. These natural environment is considered suitable for tourism development.

National road No.13S crosses the middle of Ban Pao linking between central Vientiane Capital and Thakhek through Pakxan. The urbanization pattern of Ban Pao consists of two urban agglomerations both of which tend to be developed along the national road No.13S and the Nam Ngum River. Figure 4.1.27 shows existing land use in Ban Pao. The river shown in this figure is the Nam Ngum River.



Source: JST

Figure 4.1.27: Existing Land Use in Ban Pao

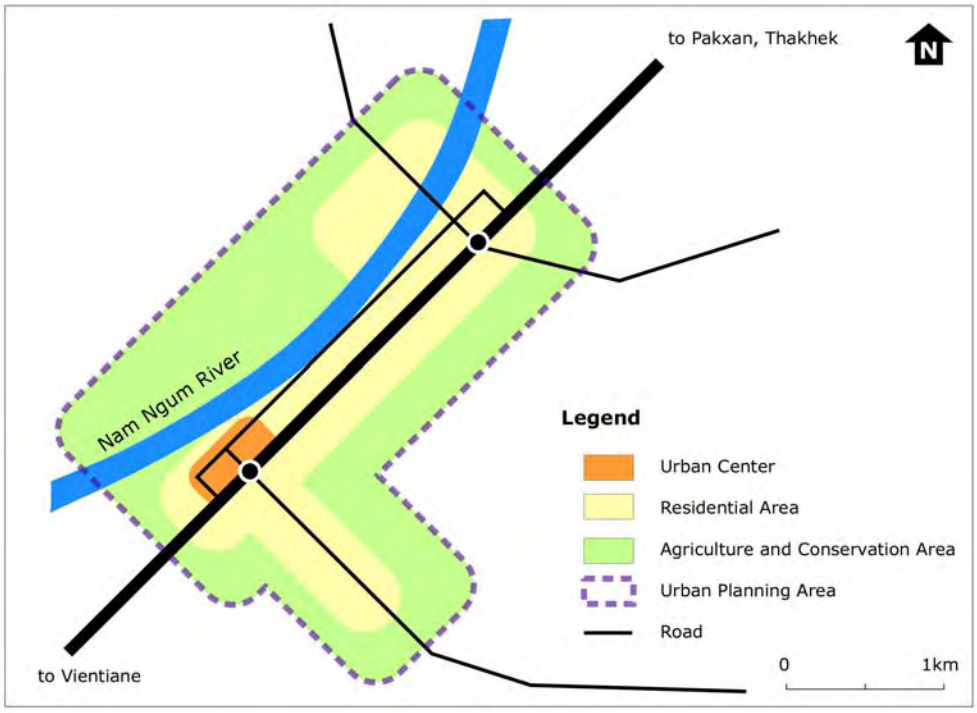
2) Development Framework

Ban Pao is expected to be one of three urban clusters. The future population of Ban Pao is estimated to be 4,000 in 2020 and 5,000 in 2030. In accordance with the population growth, urban functions of Ban Pao need to be improved for the town itself and for supporting Pak Ngum town as well. In terms of provision of public services, the facilities such as administrative center, education facilities and medical treatment facilities including clinics need to be upgraded. In the meantime major industries such as agriculture, local commercial and tourism industries need to be enhanced in order to encourage the local economy and increase job opportunities. Based upon these functions of Ban Pao, land use policy is formulated as follows:

- urbanization area is concentrated along the national road No.13S in consideration of mobility of people and commodities
- urbanization area is also designated along the Nam Ngum river in consideration of the current land use pattern and proximity to water resource
- middle to low density is considered appropriate for the urbanized area
- agricultural area and natural resource shall be conserved as much as possible in order to encourage agricultural and tourism industries

3) Development Concept and Land Use Plan

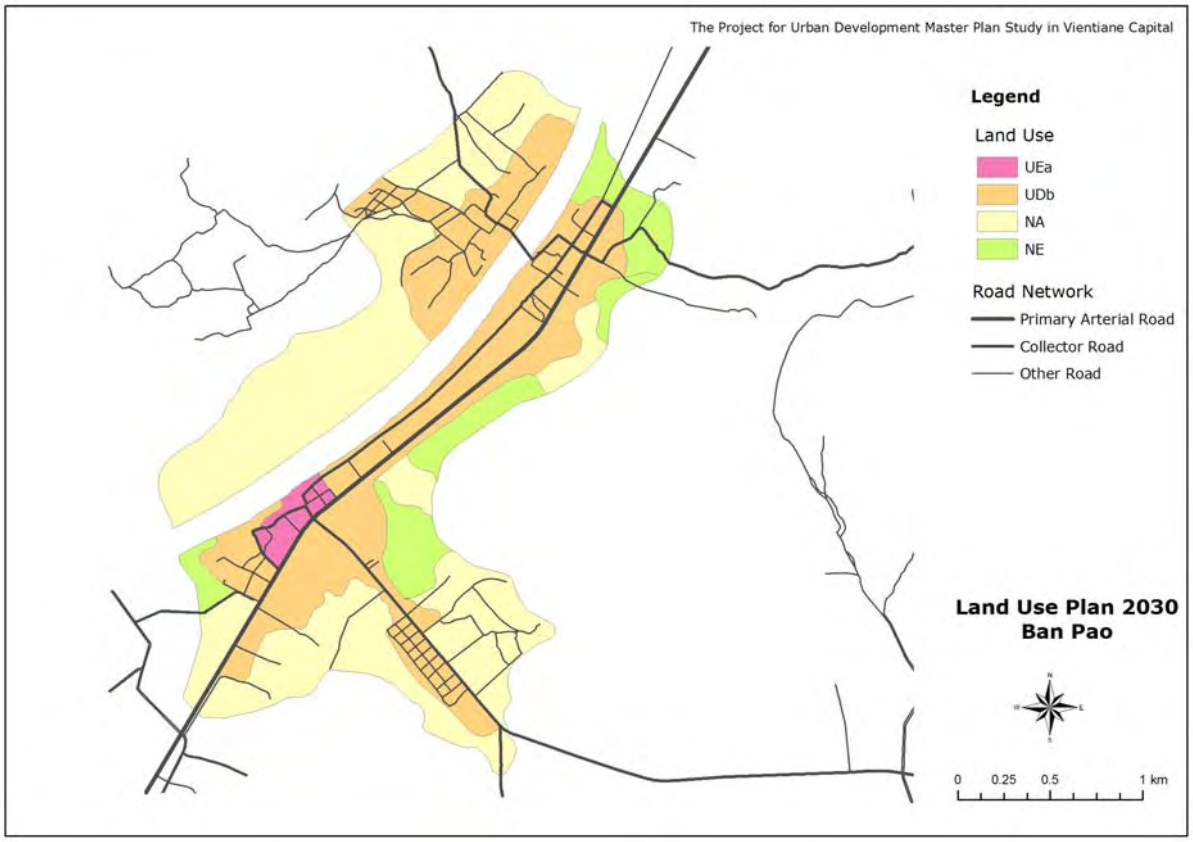
The zoning concept of land use in Ban Pao is illustrated in Figure 4.1.28. The “urban area” shall have a major function of service center, the “residential area” aims at accommodating existing and future population, and the “agriculture and conservation area” plays a roles of keeping the current land use intact and providing a green belt in Ban Pao.



Source: JST

Figure 4.1.28: Land Use Concept of Ban Pao

The land use plan in 2030 is shown in Figure 4.1.29.



Source: JST

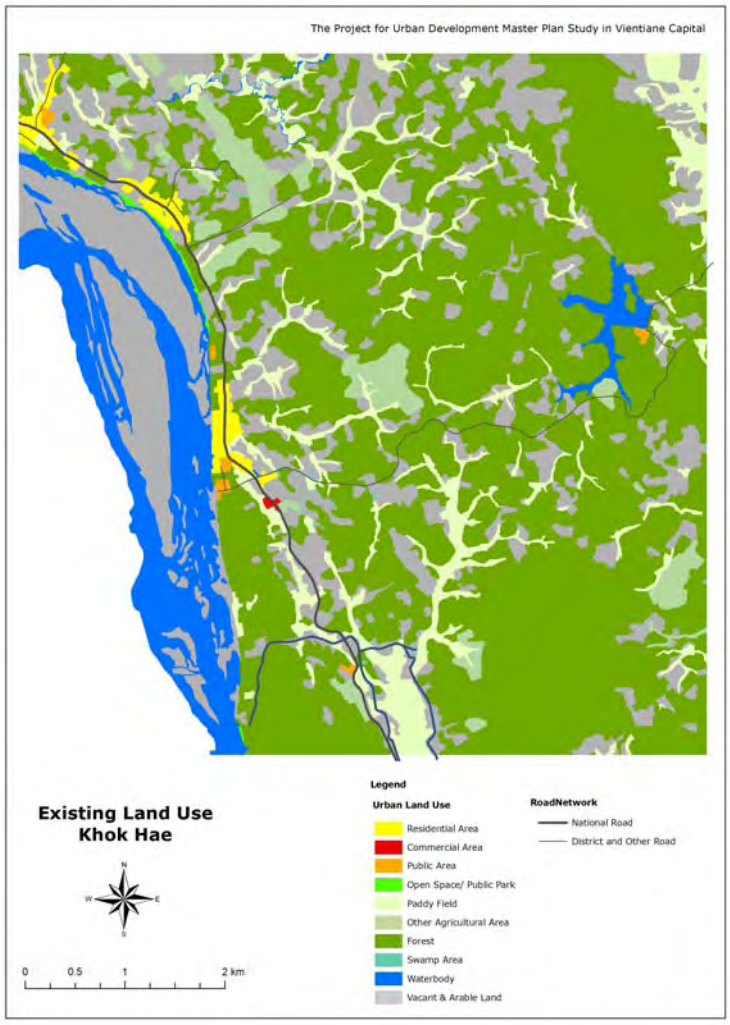
Figure 4.1.29: Land Use Plan of Ban Pao in 2030

(3) Khok Hae Urban Cluster

1) Current Conditions

Khok Hae is one of border towns in Sangthong district. The population of Khok Hae was approximately 850 in 2009. This town is located in a northeastern part of Vientiane Capital roughly 50 km from the central Vientiane Capital. Khok Hae lies between large forests and the Mekong River. The opposite side of Mekong River is Thailand and there is a town called Ban Muang. Major activities of Khok Hae are plantation, industrial crop and rice production.

From the road network viewpoint, Khok Hae lies at a cross point of two important roads. One is national road No.11 which stretches from central Vientiane Capital to national road No.13N. The other is a local road linked between Khok Hae and Sangthong town which is the capital of Sangthong district. The urbanization pattern of Khok Hae tends to be concentrated along the national road No.11 and the Mekong River. Figure 4.1.30 shows existing land use in Khok Hae. A large river in this figure shows the Mekong River which represents an international border with Thailand.



Source: JST

Figure 4.1.30: Existing Land Use of Khok Hae

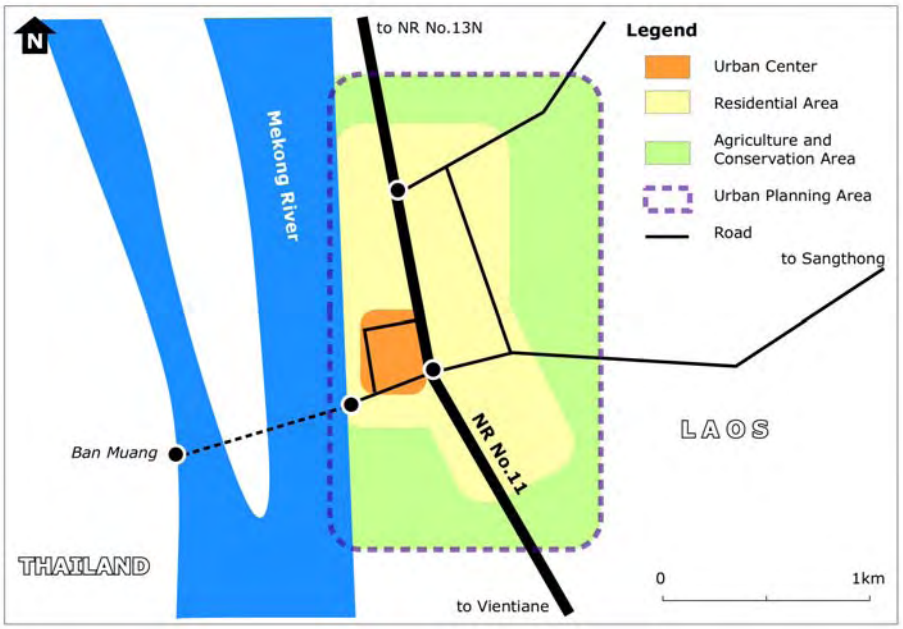
2) Development Framework

Khok Hae is expected to be one of three urban clusters. The future population of Khok Hae is estimated to be 2,000 in 2020 and 10,000 in 2030. In accordance with the population growth, urban functions of Khok Hae need to be improved in particular basic infrastructure. In terms of provision of public services, facilities such as administrative function, finance, education and medical treatment facilities need to be upgraded. In the meantime major industries such as plantation, industrial crop, other agriculture needs to be enhanced in order not only to encourage the local economy but also to provide job opportunities. Besides, for exploitation of geographic advantage, Khok Hae is expected to become a center of border trade with Thailand. Based upon these functions of Khok Hae, land use policy is formulated as follows:

- urbanization area is concentrated along the national road No.11 and local road to Sangthong town in consideration of mobility of people and commodities
- urbanization area is also designated along the Mekong river in consideration of the current land use pattern and future development of border trade with Thailand
- middle to low density is considered appropriate in urbanized area
- agricultural area and forest shall be conserved as much as possible in order to encourage the agricultural industries and protect the forest which is also a buffer against Phou Phanang national Protection Area in the hinterland

3) Development Concept and Land Use Plan

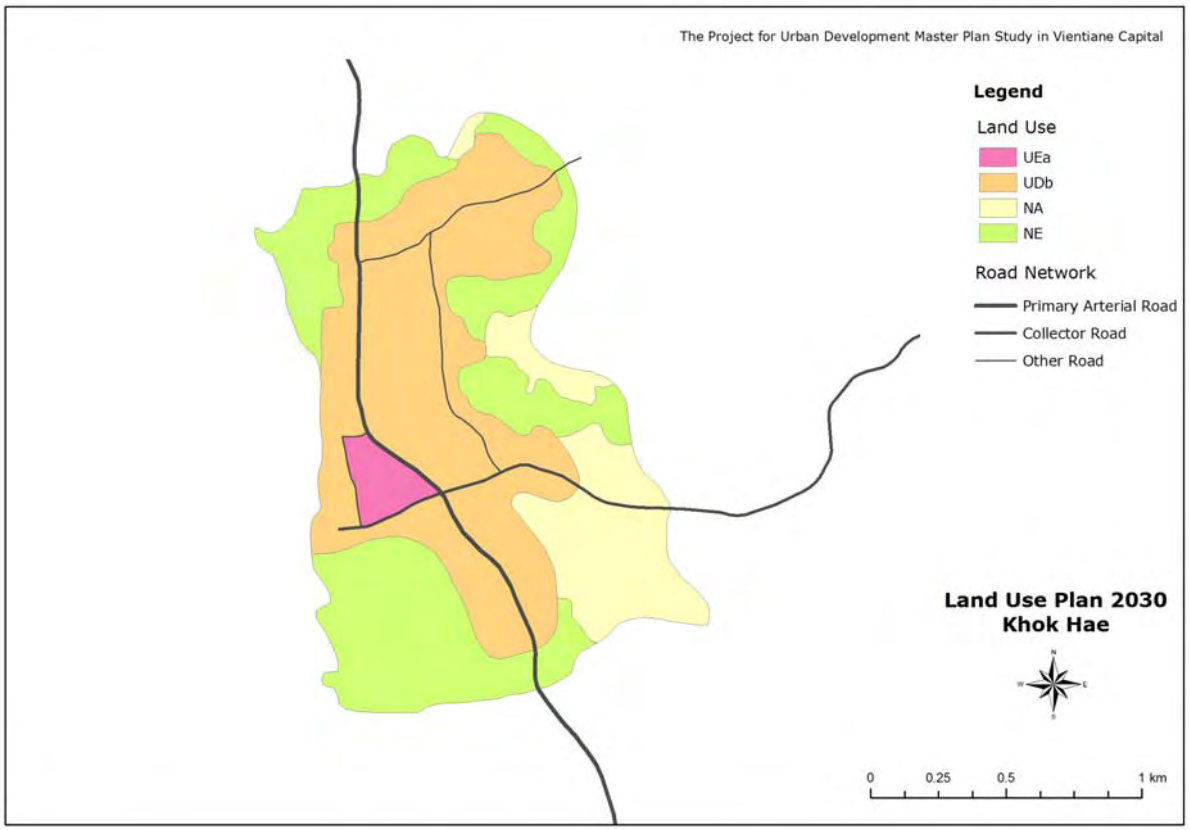
The zoning concept of land use in Khok Hae is illustrated in Figure 4.1.31. The “urban area” will have a major function of a service center, the “residential area” aims at accommodating current and future population, and the “agriculture and conservation area” plays roles of keeping the current land use intact and providing a green belt in Khok Hae.



Source: JST

Figure 4.1.31: Land Use Concept of Khok Hae

The land use plan in 2030 is shown in Figure 4.1.32.



Source: JST

Figure 4.1.32: Land Use Plan of Khok Hae in 2030

4.2 A Basic Strategy for Urban Development and Urban Landscape

4.2.1 Urban Development

(1) Recommendation on Land Use Regulations

1) Changes in Land Use Parameters

The study tried to utilize and follow the present land use regulation parameters as much as possible. However, as per the discussions held with Counterpart Group and during Working Group Meetings, certain changes are proposed.

It was argued that for UAa and UAb, the maximum Plot Ratio (COS) may allow the buildings to be too voluminous and as a result this may narrow down the view of sky from the streets. Considering this, it was decided to lower the Plot Ratio (COS) slightly to 4.0 instead of 5.0 as earlier.

UE zone, which is basically used as an urban expansion zone outside of the existing urban area, is considered to be an effective zone for the sub-centers and accordingly proposed in this study. In the sub-centers, high-rise buildings are permissible to cater the high demand for business and residential land use. The higher value of COS can be considered if the few specific conditions are met, such as 1) public open space requirement, 2) public greenery space, 3) indoor facility for public benefit and 4) fireproof building. In such cases (denoted as UEb) maximum height of 50 meters and COS of 6.0 has been proposed in place of earlier maximum limit of 23 meters and 3.0 for COS in ordinary (UEa) cases.

In the industrial area, as the current COS is already small (1.5), it is proposed to increase the coverage ratio so as to meet the maximum COS. Accordingly the coverage ratio (E) has been adjusted to 40% instead of 30% as earlier.

In consideration of the above, the present land use parameters are basically followed and maintained in the on-going land use scheme, but the values are finely adjusted and modified suiting to the current and future development and are shown in the Table 4.2.1.

Table 4.2.1: Summary of Recommended Revision in Coverage Ration, Height of Building and Plot Ratio

Zones	Description of Zone	Coverage ratio (%)	Height of Building (m)	Plot Ratio (COS)
ZPP-Ua	- Historical town conservation zone	75%	12	2.0
ZPP-Ub	- Ancient site conservation zone	50%	7	0.7
UAa	- Administration and trade central zone	60%	26	**4.0**
UAb	- New central zone	60%	26	**4.0**
UBa	- Urban inner zone within aircraft flying zone	60%	Referring to relevant org.	1.5
UBb	- Urban inner zone	60%	20	**3.0** *
UCa	- Mekong River bank zone with aircraft flying zone	50%	10	1.0
UCb	- Mekong River bank zone	50%	10	1.0
UDa	- Urban Surrounding Zone with aircraft flying zone	40%	7	0.7
UDb	- Urban Surrounding Zone relevant to agricultural activities	50%	15	**2.0** *
UDc	- Urban Surrounding Zone and suburb	50%	15	**2.0** *
UF	- Village surrounded by rice field	40%	10	1.0
UEa	- Urban expansion zone	50%	23	**3.0** *
UEb	- Urban expansion zone (Sub-center)	50%	23	**3.0** *
I	- Industrial zone	40%	15	1.5
T	- Transport zone	**	**	**
Ef	- Education zone	**	**	**
Em	- Military zone	**	**	**
Eh	- Public health zone	**	**	**
NA	- Agricultural zone	**	**	**
A	- Rice field has been surrounded by build up area	**	**	**
NE	- Public preservation zone	**	**	**

Source: JST

Note; Underlined figures indicates decrease from the present regulations; **Figures in bold** indicates increase from the present regulations. Shadowed row is a proposed additional zoning category

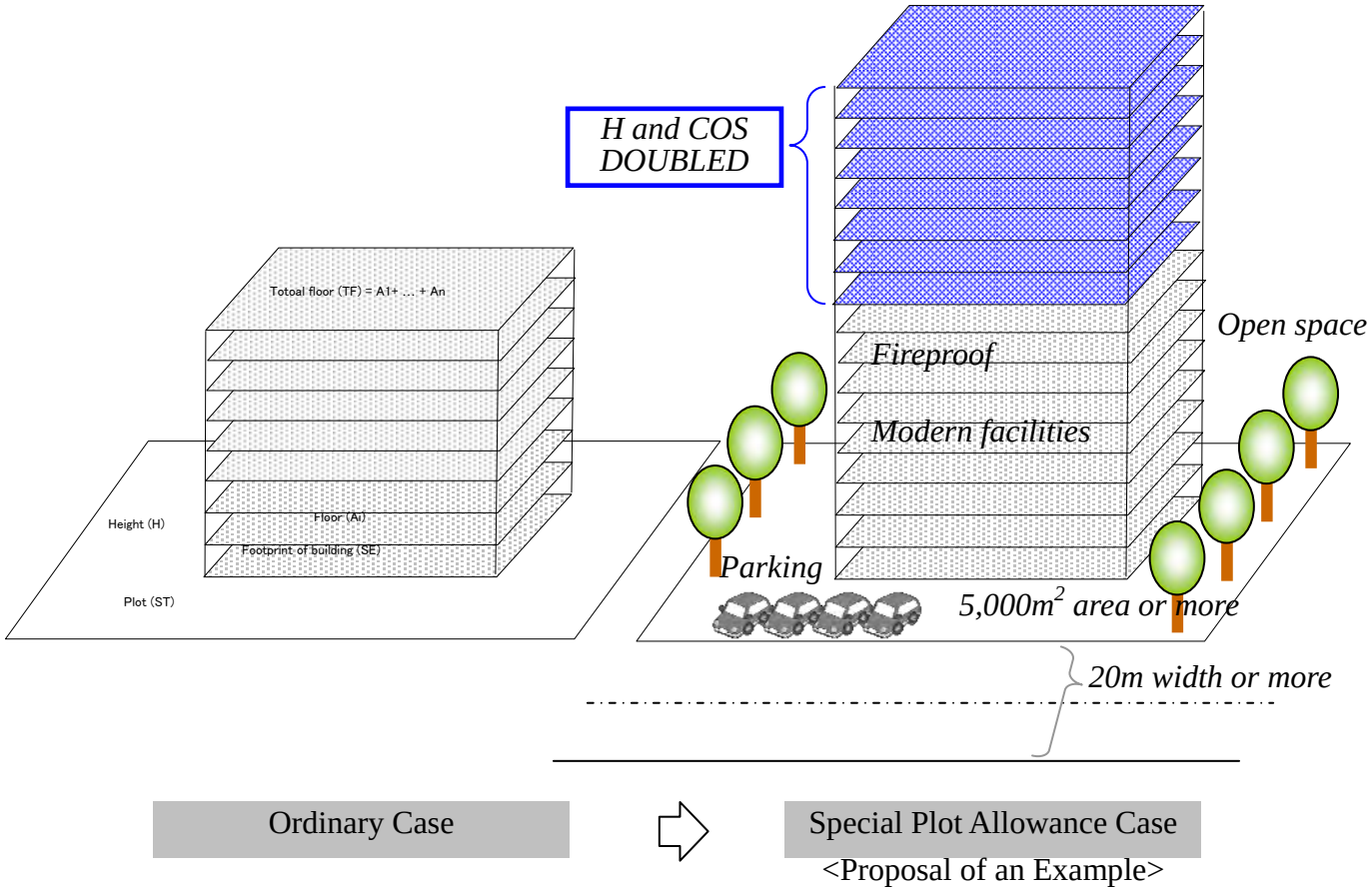
* Special Plot Allowance Case

** As these subdivide/specific land use zones are not for residential use, building construction is permissible at minimal.

2) Special Plot Allowance Case

For areas where high building are necessary, special plot allowance case is proposed that some of the regulations on Height of Building (H) m; and Plot Ratio (COS) could be "Doubled" if the following conditions are satisfied;

- Plot faces arterial road (for example, with minimum width 20 m)
- Plot has minimum area requirement (for example, 5,000 m2)
- Plot has enough parking spaces for tenants (Parking space requirement must be specified for type of development)
- Plot has open space/park (for example, 20% of plot area)
- Plot has modern water supply and sewerage treatment plant.
- Plot has fireproof facilities.
- Plot is located in UBb, UDb, UDc, UEa and UEb.



Source: JST

Figure 4.2.1: Proposal of Special Plot Allowance Case

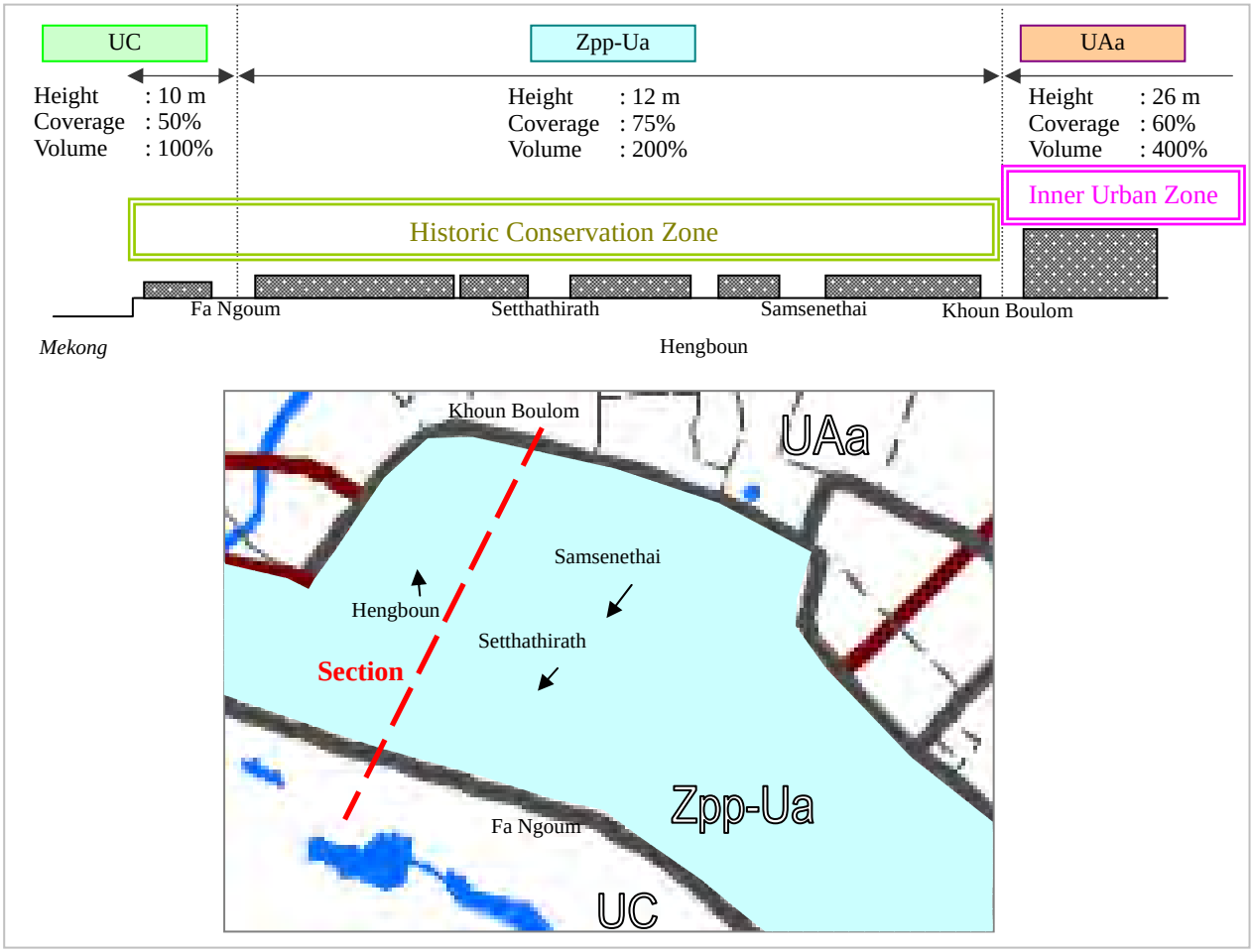
3) Architecture Control (Restriction and Inducement)

- To follow the actual institutional framework on the whole with partial modifications
- To enforce the strict "Building Construction Permit" System

In Zpp-Ua, the details of all new buildings shall be carefully checked by the Lao authorities prior to their construction. It is recommendable to check the building again after the completion to verify the compliance with the regulations. In case that the building does not meet the height or volume regulations, the construction will not be permitted. As shown in Figure 4.2.2, the maximum permissible building height is 12 m (*partially 10 m) in the Historic Conservation Zone. At the time of building permit application buildings with a height of more than 12 m shall be directed to the adjacent Inner Urban Zone where buildings with a height of 26 m are allowed.

For other zones, it is recommendable that Lao authorities should carefully check the details of sizeable new buildings prior to granting any permission, especially for the buildings that have a plan with four (4) or more floors or have a floor area of 500 m^2 or more. In case that the building does not meet the height or volume regulations, the construction should not be permitted.

- To deal with illegal buildings (To ban extending or reconstructing the building)



Source: JST (Social Survey: Key Informant Survey)

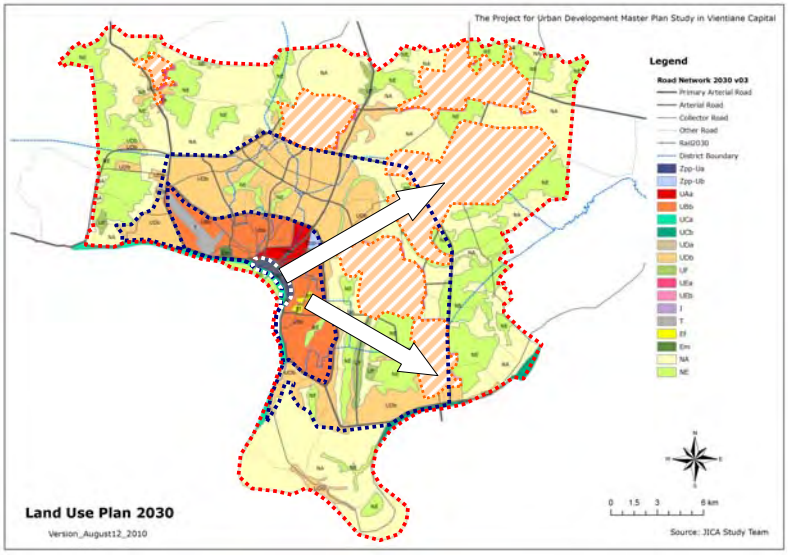
Figure 4.2.2: Partial Cross Section in the Historic Conservation Zone and the Permissible Maximum Height and Volume

- The higher and more voluminous buildings in the Sub-center zone should only be allowed if they are able to meet specific conditions and are contributing significantly for the public benefit. The specific conditions include provision of open spaces with greenery, parking lots, etc.

(2) Recommendation of Placement and Relocation

1) Appropriate Placement of Industrial and Logistic Facilities

- To prohibit any kind of new factory/industry in the Historic Conservation zone (Zpp-Ua) and the Inner Urban zone
- To prohibit logistic facilities construction in the certain areas of the Historic Conservation zone (Zpp-Ua) and the Inner Urban zone (*The maximum permissible area varies between 100 and 300 m^2 depending on the zoning categories.)
- To direct the factories and logistic facilities for relocation to the Outer Urban zone and the Sub-center zone



Source: JST

Figure 4.2.3 Inducement of Industrial and Logistic Facilities toward the Suburbs

2) Relocation of Public Facilities

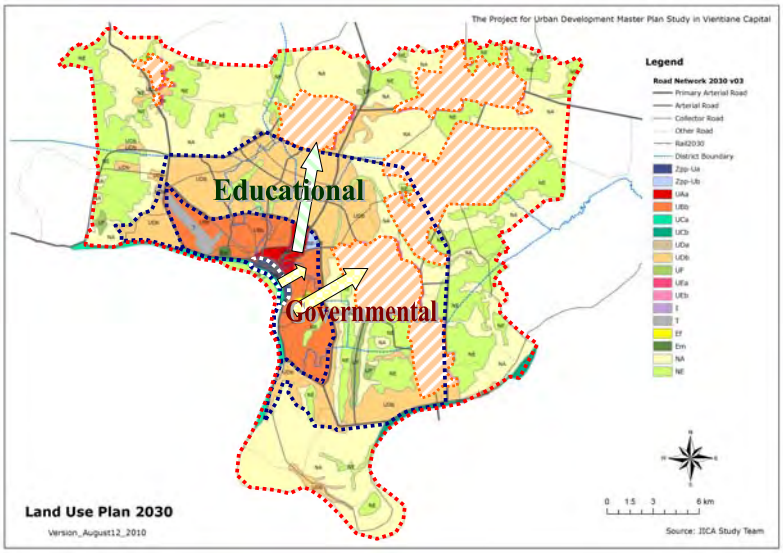
- The Table 4.2.2 describes the direction of movement or relocation of governmental offices and educational facilities located in the Historic Conservation zone and Inner Urban to other zones and locations i.e. Inner Urban zone, Outer Urban zone and Sub-center.

Table 4.2.2: Basic Relocation Policy for Governmental and Educational Facilities

Facilities to be relocated		Actual Location	Shall be induced to move to
a	Governmental Offices	1. Historic Conservation	2. Inner Urban 3. Outer Urban 4. Sub-Center
b	Universities, Collages	1. Historic Conservation 2. Inner Urban	3. Outer Urban 4. Sub-center

Source: JST

- To create systematic (a) government office district(s) and (an) educational zone(s) in the Sub-center



Source: JST

Figure 4.2.4 Inducement of Governmental and Educational Facilities toward the Suburbs

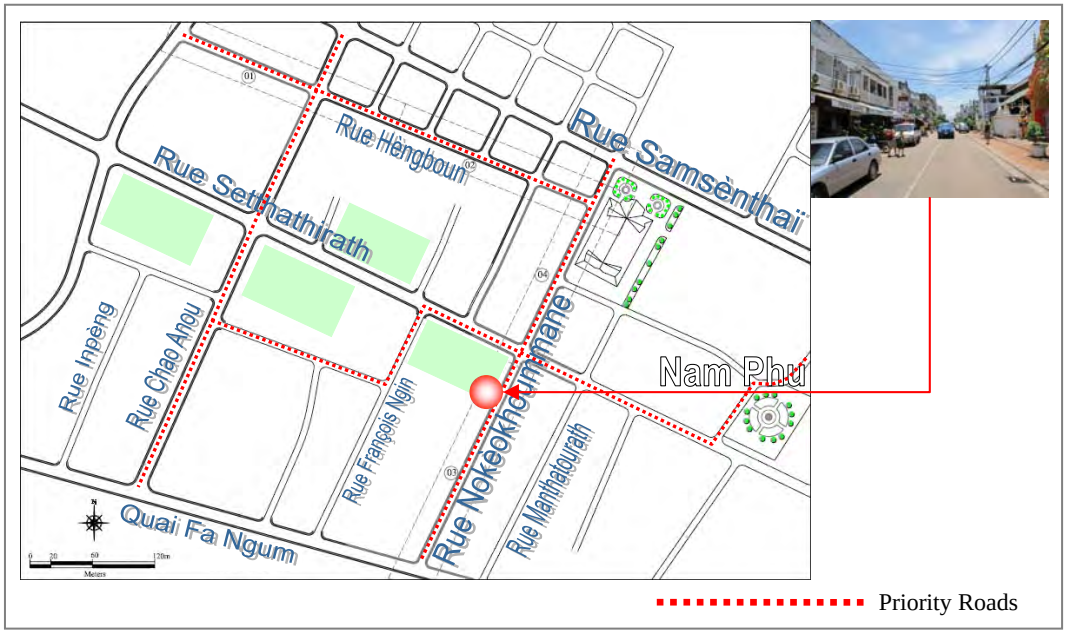
3) Vitalization of the Urban Center

- To promote the vitalization of the Historic Conservation zone where different historic heritages or monuments are located

- To introduce "Community Road" and a "Belt Line Bus" system mainly in the Historic Conservation zone where many restaurants, cafés, hotels, bars, souvenir stores are located. This will be based on the urban design including the landscape policy

- To make the best use of the vacant sites that will be available after the relocation of governmental offices. The objective will be to make an area beautiful, attractive and appealing to domestic and foreign visitors. (Ex. Creation of more commercial space, accommodation facilities, culturally interesting space, etc.)

  The "community road" concept shall be introduced in the main feeder roads in the Historic Conservation zone (Zpp-Ua). The objective is to create a safer, comfortable, and attractive communal space with the harmonized coexistence of vehicles and pedestrians. Figure 4.2.5 shows the priority main feeder roads for introducing this concept.



Source: JST

Figure 4.2.5 Priority Roads for introducing "Community Road" (Historic Conservation Zone)

4.2.2 Urban Landscape

(1) Objectives and Basic Policy

On the 450 years commemoration of Vientiane Capital, a direction of urban image and scenery improvement for a long term is proposed to be set together with the formulation of mid/long term plan 'Urban Development Master Plan of Vientiane Capital'.

An image of Garden City with rich rice field and natural environment in form of water bodies and greenery is broadly recognized as historic and traditional urban scenery of Vientiane Capital. However, based on the result of the Key Informant Survey conducted by JST and discussion held during Working Group Meetings with counterparts and related government agencies, "Middle-rise Urban with Traditional Greenery in Vientiane Capital" has been identified as the future image of Urban Landscape.

Urban landscape improvement will focus on the following,

1. Formulation of set of policies and strategies to realize the urban landscape improvement and its conservation with smooth, comprehensive, and scheduled implementation,
2. Clear set of urban landscape improvement and conservation policies and strategies will contribute in enhancing the participation of local communities and citizens and in creation of soothing greenery and urban scenery in Vientiane Capital.

In order to realize the future image of Vientiane Capital, four basic policies are proposed for the urban landscape improvement, as follows,

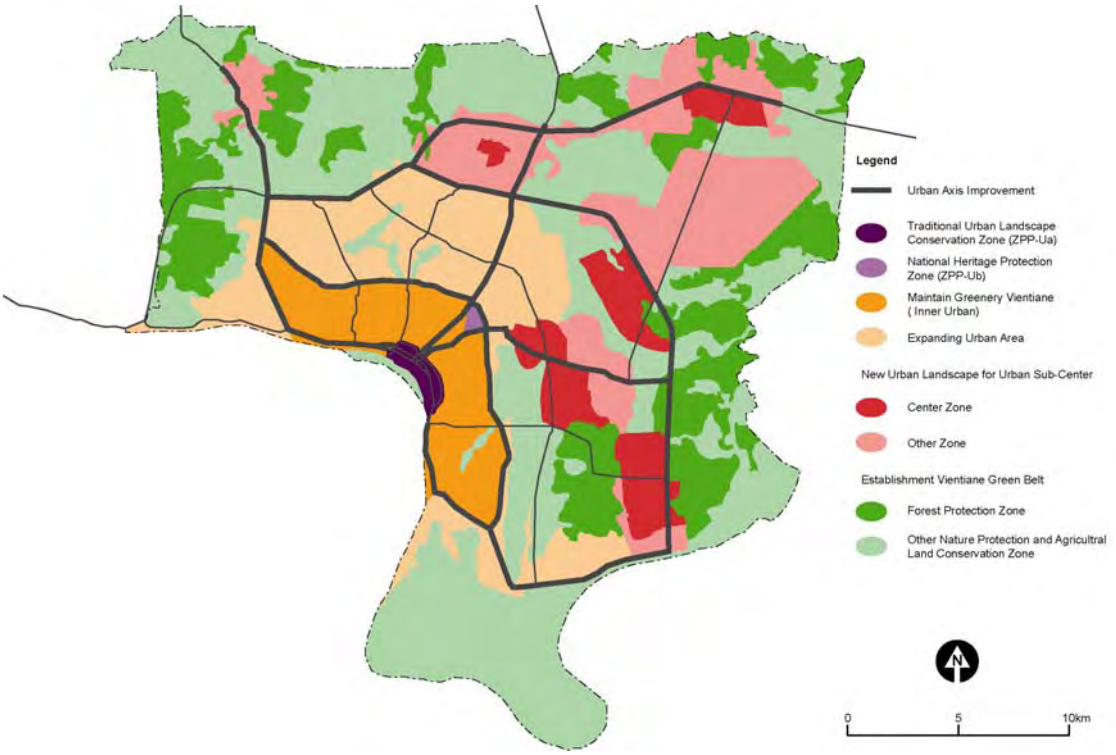
Basic Polcy-1: To maintain the traditional urban image of "Calm and Green Vientiane Capital"

Basic Polcy-2: To protect National Heritages and conserve surrounding historic and traditional urban landscape

Basic Polcy-3: To improve and up-grade streetscape and tourism environment for the enhancement of international tourism in Historic Conservation Zone

Basic Policy-4: To strengthen a sense of arrivals at the gateways (airport, etc.) and establish the feature of future urban image of Vientiane Capital

Zones and urban axis are identified to realize the above policies in coordination with the land use zoning plan and road network plan, etc. For Basic Policy-1: "Calm and Green Vientiane Capital", a concept of green belt and strategies to conserve NE and NA zones has been proposed. For Basic Policy-2, zones for traditional urban landscape conservation and national heritage protection are identified in ZPP-Ua and ZPP-Ub. For Basic Policy-3, improvement and up gradation of urban landscape along roads and streets in the zones of traditional urban landscape conservation has been proposed. For Basic Policy-4: Urban axis improvement routes are identified and proposed for strengthening to establish a sense of arrivals and feature of future urban image of Vientiane Capital. Proposed zones and axis are shown in Figure 4.2.6.



Source: JST

Figure 4.2.6: Historical and Traditional Urban Landscape Improvement Zones and Axis

(2) Basic Policy-1: To Maintain Traditional Urban Image of "Calm and Green Vientiane Capital"

The traditional urban image of "Calm and Green Vientiane Capital" must be maintained in the future. For "Qualm and Green Vientiane Capital", the strategies to be taken shall address the formation of middle-rise urban area with densely planted trees and well conserved wetland and intensively cultivated farmland especially for Inner Urban Zone within Inner Ring Road. Outside of Inner Urban Zone, strategies to establish an inner green belt is proposed to separate the expanding urban areas and newly developing Sub-Centers through protection and improvement of the existing forests, protection of water surface/wetland/marsh areas and its' water quality and conservation and enhancement of agricultural activities on the existing agricultural land. Basic strategies are identified as follows,

1) To Control Building Height and Density in the Inner Urban Zone

Building height has to be controlled relative to the height of taller tree in the plot and street so that greenery shall be visible in volume from the streets. And floor area ratio has to follow the set COS figure of the building regulation plan with an exception to the selected area designated as urban revitalization zone in the Inner Urban Zone.

2) To Conserve Existing Trees and Promote Tree Planting

The identified large trees on private and public plots and trees along arterial roads should be protected to maintain an image of green urban area. And also, tree planting on newly developing plots should be promoted to maintain the urban image in Inner Urban Zone and Outer Urban Zone.

3) To Conserve Rice Fields, Farmland, and Villages

The existing green landscape of farmland, forest and natural area, agricultural land with village have a great potential for future urban open and green spaces. These are needed to be protected by measures of preservation of existing natural resources and supporting and enhancing agricultural activities within the Outer Ring Road

4) To Establish Vientiane Capital Green Belt

In order to buffer the expanding urban areas and to promote the newly developing Sub Centers to meet their functions, protection of the identified forest (NE) zones and conservation of identified agricultural (NA) zones along and outside the Outer Ring Road is indispensable strategy.

5) To Protect Identified Water Surface, Wetland and Marsh (NE)

To protect the identified water surface, wetland and marsh requires strategic measures to control water quality and avoid discharge of sewage from surrounding existing and new urban areas.

(3) Basic Policy-2: To Protect National Heritages and Conserve Surrounding Historical and Traditional Urban Landscape

History and traditional culture of Vientiane Capital has to be preserved by conserving the registered national heritages and its surrounding historical and traditional urban landscape in ZPP-Ua/Ub. Strategic protection and conservation measures are required for the registered and would-be national heritages and its' surrounding historical and traditional urban landscape. Such measures are also important for enhancement of international tourism in Vientiane Capital.

1) To Register the Identified Urban Heritages

The identified urban heritages of 233 buildings of Lao and colonial styles architecture with the large trees in each plot within ZPP-Ua are proposed to be registered under "Law of National Heritage" at the local level of national heritage by the Department of Information and Culture of Vientiane Capital under the direction of MIC.

2) To Formulate and Execute Guideline to Protect National Heritages

Guideline for national heritage at local level have to be set to protect historical and traditional value of buildings, fence, and site with landscaping from the point of views of maintaining the original and traditional design vocabulary, color, and material. For proper and timely execution of restoration, renovation and maintenance works, a public subsidy system (material and financial support) will be required. This has to be clearly defined in the guideline to realize aims of the Law.

3) To Formulate Zoning Plan

Based on the Law of National Heritage, a zoning system has been introduced to protect and conserve historical and traditional cultural landscape in the surroundings of designated national heritages and national heritages at local levels as described in the article 43 of the Law. Zoning system of "Protected Area of Heritage Site" is composed of 3 zones including Zone-1: core zone or sanctuary, zone-2: buffer zone, and zone-3: facility development zone to support zone-1/2. The designated 6 national level and the identified 233 local level of national heritages are currently located in the zones of ZPP-Ua and Ub in the existing zoning plan. Zoning to conserve historical and traditional urban landscape and scenery has to be set from the following point of views,

a) Zone-1 Core /or Sanctuary Zone

The existing compound of temples or defined historical sites by archeological survey could be defined as zone-1 for national level. Database of the identified urban heritages and national heritages at the local level are compiled in GIS database. Compiled property boundary of urban heritage could be utilized as a boundary for zone-1 at local level.

b) Zone-2 Buffer Zone

Buffer zone has to take the function to conserve value of zone-1 heritage. To serve this purpose, historical and traditional urban landscape and scenery of surroundings of national heritage should be conserved. The visible areas of the national heritage at national level has to be covered by zone-2 as follows,

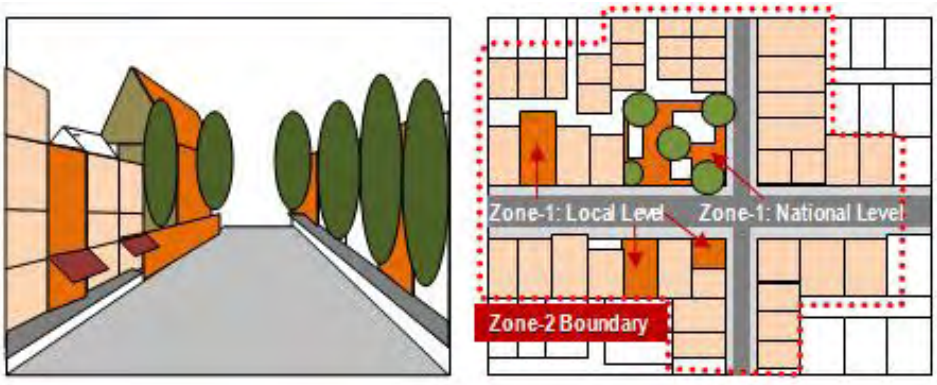
1 Visible area from heritage site

2 Visible area from all access road to heritage

For local level national heritage (urban heritages), the following area surrounding local level of heritage has to be covered by zone-2.

1 The adjacent 3 plots to heritage on the both sides along the street

2 The opposite of the above section of 1



View to National Heritage Setting-up Zone-2 surroundings heritages

Source: JST

Figure 4.2.7: To set-up Buffer Zone boundary

c) Zone-3 Facility Development Zone

Five (5) temples of national level heritages are located in ZPP-Ua. Therefore, facility development zone for 5 temples will not be necessary. Otherwise, That Luang and the north and south Outer City Wall of national level of heritage will require facility development zone to provide car parking space, information dissemination and souvenir shop for tourist. For That Luang, Historical Eastern Approach Road Restoration Project including building relocation between That Luang compound and the Inner Ring Road is under implementation. Facility development zone has to be carefully set especially considering the car parking (based on demand and supply analysis) and smooth traffic management with Inner Ring Road.

4) To Formulate and Enforce Guideline to Conserve Historical and Traditional Urban Landscape and Scenery for ZPP-Ua/Ub

Full-fledged application, permission and monitoring system to control design/material/color for set-back area, building and floor height, façade, roofing, fence, and billboard are required for all the building construction, expansion, and repairing works in the zone-2, which is Buffer area and zone-3 which is a facility development area in the designated land use zones of ZPP-Ua and Ub.

The identified existing important trees in public and private plots and on street are also proposed for protection as an important element of historical, traditional urban landscape and scenery in ZPP-Ua. Owner has to replant substitute tree, when the identified tree is damaged or removed by accident or need to be removed for some reason.

Concept of protection of national heritages and conservation of historical, traditional urban landscape and scenery is shown in the table as follows,

Table 4.2.3: Concept of Protection of National Heritage and Conservation of Historical and Traditional Urban Landscape

	Zone-1		Zone 2	Zone 3
	National Level	Local Level		
Building Set-back	To keep existing set-back		To coordinate set-back line with buildings of nearest local heritage and both sides	To keep the existing set-back regulation and coordinate with buildings on both sides
Building Structure/material	To keep original type of structure/materials (to suggest prompt repair and restoration works. To avoid reconstruction as much as possible)		no	no
Building Height	To keep original height		To control building height on top of roof for ornamental design items. To be coordinated with buildings on both sides and maximum height limit: ZPP-Ua: 12m + 3m roofing height allowance = 15m, ZPP-UB: 7m + 3m roofing height allowance=10m	
Floor Height (especially ground floor)	To keep original height		To coordinate floor height with buildings on both sides	no
Façade Design	To keep original design	To keep existing arch type with traditional design vocabulary	To utilize traditional design vocabularies by arch type	no
Façade Material	To keep original material as much as possible	To keep original material as much as possible	To utilize natural materials and to avoid metals/glass/ mirror material	to avoid metals/glass/ mirror material
Façade Color	To keep original color	To utilize traditional natural color	To utilize traditional natural color	to utilize traditional natural color
Roofing Design	To keep original design		To coordinate roofing design with nearest local heritage exist along the same street	no
Roofing Material	To keep original material as much as possible		To coordinate roofing material with nearest local heritage building	no
Roofing Color	To keep original color	To utilize traditional natural color	To utilize traditional natural color	utilize traditional natural color
Fence Design	To keep original design		Without fence or lower than 1.5m	
Fence Material	To keep original material and color as much as possible	To utilize traditional natural materials and colors	Hedge or natural materials	
Billboard Design/size	To keep original design/size	To suggest common or unified design/size of billboard. Smaller than 5% of area of façade wall. To avoid back-light type of design		
Billboard Material/color	To keep original material/color	To suggest common or unified material/color billboard by type of industry (hotel, guest house, restaurant/coffee shop, souvenir/other shop, etc). To utilize natural materials and colors.		
Identified Important Tree	To be conserved. Re-planting substitute tree, when identified important tree get damage or removed			

Source: JST

(4) Basic Policy-3: To Improve and Up-grade Streetscape and Tourism Environment for Enhancement of International Tourist in ZPP-Ua

At the present, international tourists are concentrated and are increasing in numbers in old town area. As a result, international and domestic investment for tourism development such as guest house, restaurant, coffee shop, souvenir shop and so on are also concentrated and accumulated in old town area. Uncontrolled investments for tourism development are steadily changing the urban landscape and it may devastate the identified urban heritages and surrounding historical and traditional urban landscape. The existing uncontrolled development and investment activities could be controlled by formulating guidelines. These guidelines and strategies will be able to maintain historical and traditional cultural heritages and urban landscape which will be major resource for the further development of international tourism in future.

On the other hand, improvement and upgrading strategies are also required keep the investment trend for streetscape and tourism environment and to motivate the private sector to invest and play an important role in the tourism industries. Such strategies will be able to attract more international tourists in this area. Community based conservation of urban landscape and tourism development with public support system will be an indispensable and effective strategy as follows,

1) Community Oriented Urban Landscape Conservation and Utilization

Community based local bylaws to conserve and utilize historical and traditional cultural urban landscape and scenery is proposed as a strategy to realize harmonious execution of basic policy-2. Agreement on bylaws will be set based on a consensus and deep understanding for future tourism development opportunities by local community. In order to motivate and enhance understanding and awareness to protect national heritage and to conserve urban landscape and scenery by local communities, strategic improvement measures for street and infrastructure in the zone are indispensable. Such measures in coordination and collaboration with public and private sectors will be able to up-grade the tourism infrastructure and environment and will facilitate in establishing Vientiane Capital as an international tourism destination.

a) Pedestrian Way (Walk Free)

This type of improvement work (pedestrian way) is suggested to apply in the north-south narrow street between the Mekong River to Samsenthai Road with enhanced roadside tourism development (two third of roadside land use has been shared by tourism industries such as guesthouse/hotel, restaurant, souvenir/other shop and tour agent etc). In order to improve urban landscape and tourism environment, more safe and comfortable walking environment with clean and ordered streetscape are required. In consultation with local communities, mall type streets may be developed by public sector.

- integrated comfortable/safe/attractive pavement for winding road, sidewalk and set-back area,
- to provide street furniture such as street light, shade, bike stand and others,
- to avoid overhead cables/poles (relocate to the backside of street or lay underground) and
- to avoid vehicle access and on-street parking (vehicle access for goods delivery will be permitted during off tourist hour: early morning. Public car parking system has to be

introduced which will support and meet the demand of residents, tourist, and customers)

b) One-way Mall

This one-way mall improvement work is suggested to apply in the north-south street which are comparatively wide. This is to be supported by enhanced roadside tourism development (50% to 65% shared by tourism industries). This section will be used as future tourist bus route.

- integrated pavement for sidewalk and set-back area at the same level,
- to provide street furniture such as street light, bus stop shelter and shade, bike stand and others,
- to avoid overhead cables/poles (relocate to the backside of street or lay underground), and
- to avoid on-street parking

(5) Basic Policy-4: To Strengthen and Establish a Sense of Arrivals and Feature of Future Urban Image of Vientiane Capital

Primary urban arterial roads and some urban arterial roads, which will be major urban axis in future in Vientiane Capital will be linked with the core urban area, sub-centers and international gateways such as international airport, new railway station and international friendship bridge.

Urban center, sub-centers and international gateways to be linked:

- ZPP-Ua and core urban area
- Sub-center: KM21, Thanaleang, Dongdock, Naxaithong and Railway Town
- International gateway: international airport, new central station and international friendship bridge

The seven Urban Axis to link the above Centers are:

- National Road 13 North: to Naxaithong sub-center through the international airport
- National Road 13 South: to KM21 sub-center through Dongdock sub-center
- Thadeua Road: to international friendship bridge through Thanaleang sub-center
- New Arterial Road: Inner Ring Road (14 Road) to Outer Ring Road through Railway Town sub-center
- Inner Ring Road (14 Road): link with Thadeua Road and National Road 13 North following the ancient Outer City Wall
- Outer Ring Road: link with international friendship bridge to National Road 13 North through Thanaleang sub-center, KM21 sub-center, and Dongdock sub-center
- New Arterial Road: direct link with National Road 13 South and Outer Ring Road on the north of Dongdock sub-center

Strengthening and improvement of streetscape along the above network with controlled and pleasing roadside landscape and sceneries are required to create clear identity and positive urban image of each area to the new arrivals in the Vientiane Capital.

The above mentioned 7 urban axis will consist of urbanized section and green belt section. For urbanized and green belt sections, the following measures are required to strengthen and improve streetscape.

(1) To Strengthen and Improve Streetscape of Urban Axis on Urbanized Section

- Wider right of way has to be provided to accommodate lanes for BRT, bikes and others traffic; adequate spaces for bus stops, pedestrian way, trees plantation and landscaping in the road sections existing in Inner Urban Zone and Sub-Center Zones. For the sections falling in other expanding urban area and sub-center zone, quasi wider right of way will be required to accommodate the above functions.
- High to medium height roadside tree plantation in urbanized section. Plantation fo selected specialized species (with flower) in all the seven (7) Urban Axis as mentioned above.
- To control and regulate the minimum setback of 6m to building facade from the right of way. In addition, need to control green coverage ratio in the set-back area (more than 50% is proposed).

(2) To Strengthen and Improve Roadside Scenery along Urban Axis in Green Belt Section

- For forest protection: proper regulation and monitoring activities are required to control illegal logging and exploitation of tree. Such measures will assist in maintaining forest scenery on roadside.
- For water surface, wetland, marsh protection: proper regulation and monitoring activities are required to control illegal development and discharge of sewage to water bodies. Such measures will assist in maintaining roadside natural scenery.
- For agricultural land conservation: proper enforcement of land use regulation and monitoring activities are required with proper public support. Such measures will enhance household income through farming activities (technical dissemination of sub-urban type farming species, supporting system of products circulation and trading, etc).
- Minimum right way width is required and need to be controlled from any encroachment for the provision of infrastructure and biking lane in future.