



Suleja Smart City Master Plan in Niger State

2021. 07.

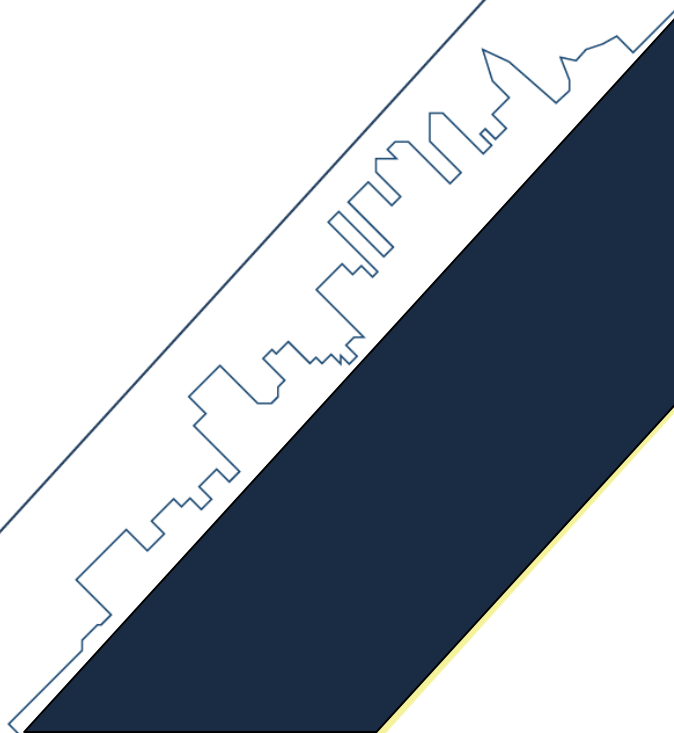
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- 02** Relevant Plan and Site Analysis
- 03** Selection of the pilot sites
- 04** Regional Development plan
- 05** Master plan of the pilot sites
- 06** Project Implementation Plan



01 Project Overview

- 1) Overview of the project
- 2) Background & Process
- 3) Organization



01 Overview of the Project

Nigeria/Niger State

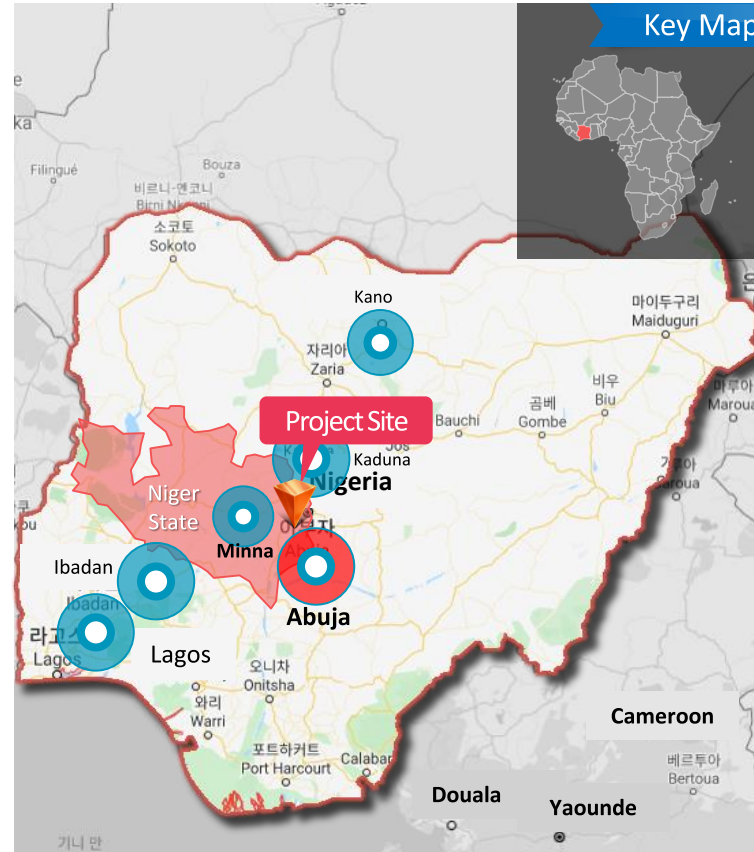
Nigeria Overview

- Area: 923,768km²
- Population: 196 million (Urbanization Rate 50.3%)
- Main Industries: Oil Industry
(90% of Total Exports)
- Major Cities: Abuja, Lagos, Kano, Ibadan

Niger State Overview

- Area: 76,363km²
- Population: 5 million (Urbanization Rate 48.6%)
- Main Industries : Agriculture, Mining, Metalwork
- Major Cities : Minna, Suleja, Bida

Source: CityPopulation (2020.09.21)



Niger vs Niger State

- Area



- Population (2016)



- GDP per capita (2007)



Nigeria is a large population country in Africa,
growing demand for urban development based on an annual economic growth rate of 7%

01 Overview of the Project

Project overview

Project Period

- Period : 2020.06.15 ~ 2021.11.30

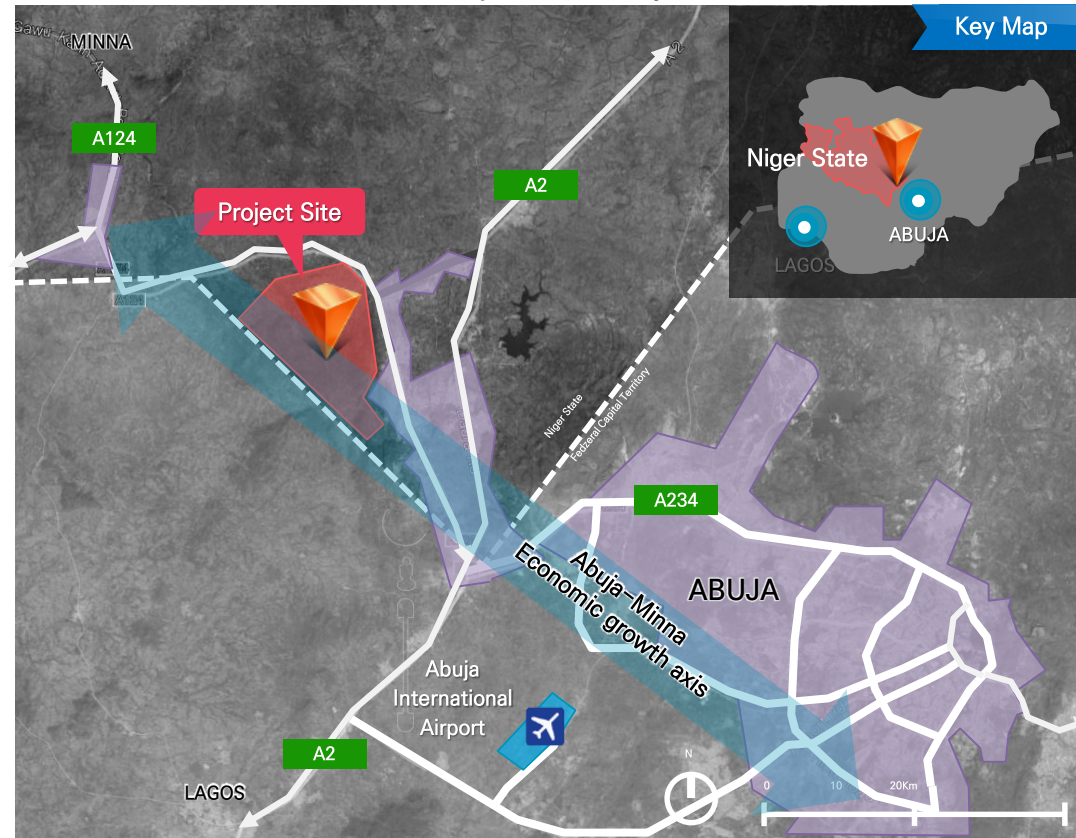
Site Location

- located in 40km west of Abuja, Suleja, Niger State
- Area : 106km² (About 10,000ha)

Work Scopes

- Analysis of Development Circumstance
- Development Direction and Planning the Spatial Structure
- Selection of a Priority Development Areas
- Feasibility Studies and Establish Action Plan
- Study of Follow-up Projects

[Project Site Map]



The project site is located in the west of Abuja, on the 'Abuja-Minna Economic Growth Axis'

01 Background & Process

➡ Background

- Housing demand is increasing due to rapid urbanization in Suleja, Niger State, adjacent to Abuja(the capital of Nigeria), but infrastructure facilities are insufficient.
- By establishing a master plan for a Smart City, this project aims to provide housing and infrastructure, make the foundation for strategic industries, and create opportunities to increase jobs and incomes for local residents.

Rapid Urbanization



Insufficient houses and infrastructure



Necessity of regional growth



Developing Smart City to provide housing and infrastructure
And to make a new economic foundation for strategic industries

01 Background & Process

Process



Jan, 2018

Request for establishment of a new city development plan by the Niger State government



Sep, 2018

Niger state delegation visits Korea and discusses business promotion



Jan, 2019

Prior study of Suleja Smart City
*Online meeting

Nov, 2019

Suleja's Smart City field survey and meetings

2022~2023

Implementation of the pilots project by Nigeria

Jun, 2020

Establishing Suleja Smart City masterplan (ODA project, a grant from MOLIT,Korea)



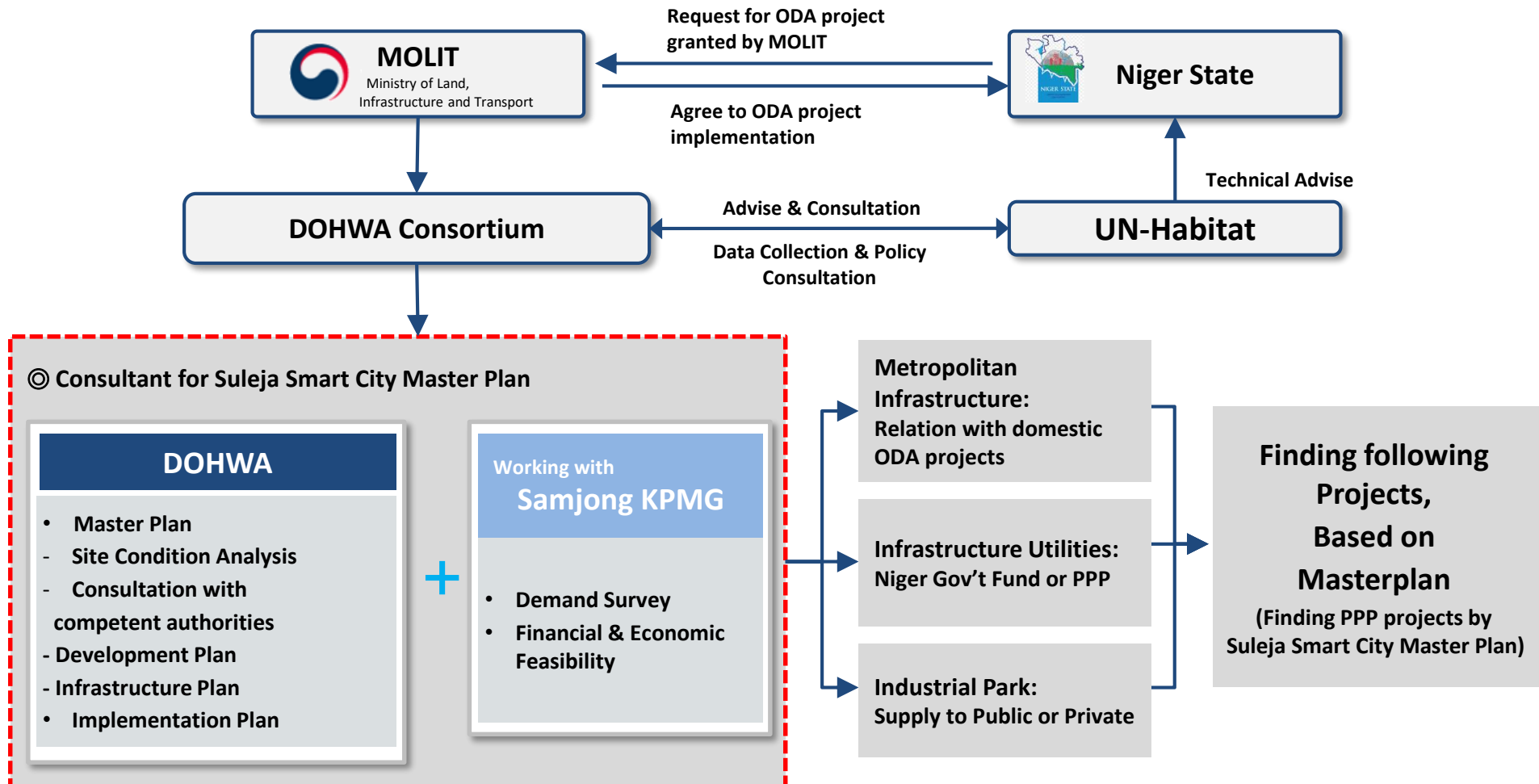
Mar, 2020

Bidding Suleja Smart City masterplan (ODA project, a grant from MOLIT,Korea)

*MOLIT: Ministry of Land, Infrastructure, and Transport

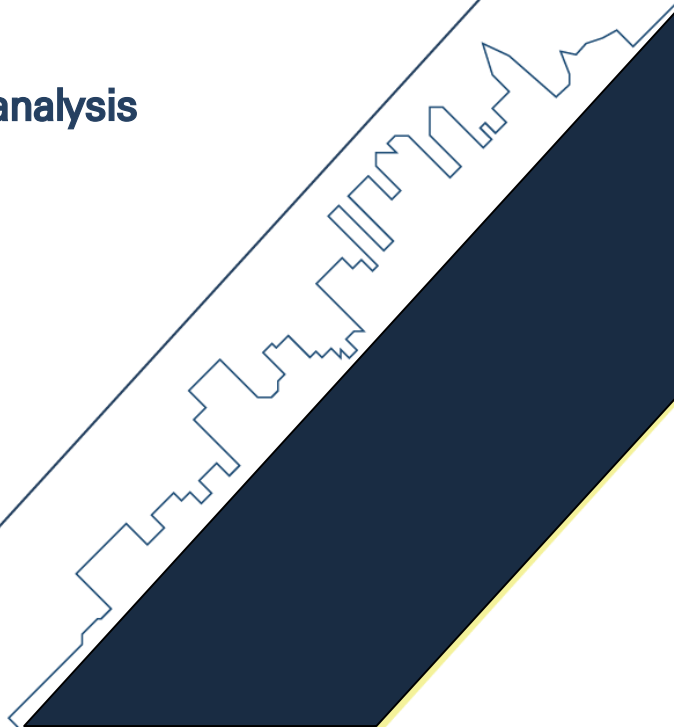
01 Organization

Organization chart



02 *Site Analysis*

- 1) Environmental analysis
- 2) Socio-economic analysis
- 3) Housing market analysis
- 4) Relevant plans
- 5) Comprehensive analysis

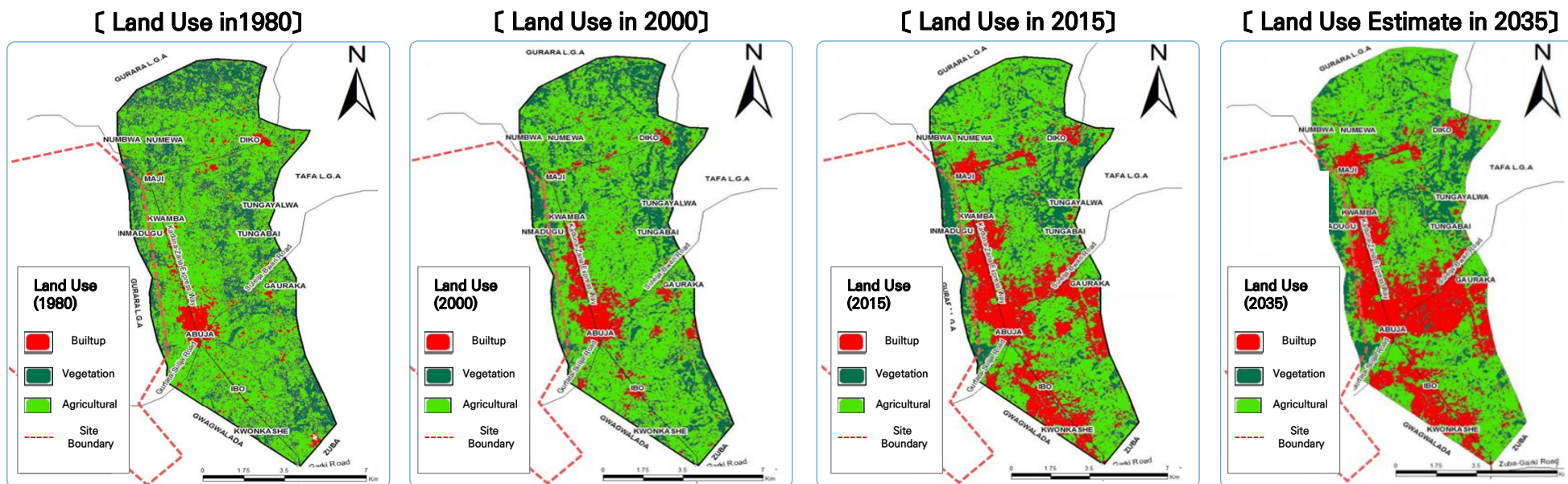


02 Environmental Analysis

Land use

Land Use History

- A plenty of commuters to Abuja have lived in Suleja, therefore the number of residents rapidly increases.(16,000 in 1977 → 55,000 in 1987)
- In 1980-2015 urbanization of Suleja and estimate, **it shows 10% urbanization rate**.



Suleja shows **10% urbanization rate** because of many residents worked in Abuja FCT

02 Socio-economic Analysis

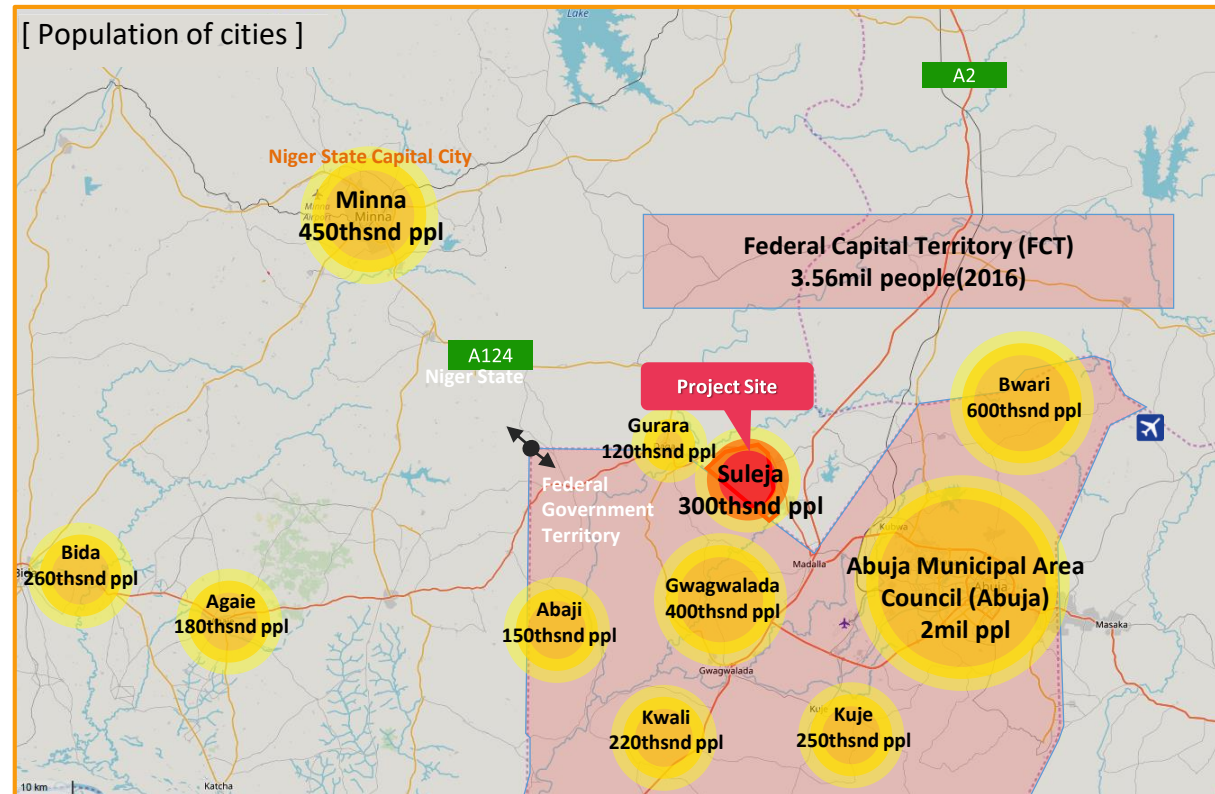
Population

Population of Suleja

- Population : 302,200 (Suleja 2016)
- The rate of Increase of Population is almost double during 25 years.
- Suleja's population density is 2,638(p/km²) and it's the second highest population density city

City	Population (2016)	City	Population (2016)
Minna	451,687	Abuja Municipal Area Council	1,967,500
Bida	260,700	Bwari	581,100
Agaie	185,600	Gwagwalada	402,000
Suleja	302,200	Kuje	246,400
Gurara	127,700	Kwali	218,400
		Abaji	148,600

※Source: CityPopulation(2020.09.21) <https://www.citypopulation.de>



The federal capital Territory (FCT) has a high population of 3.56 million, and the **Suleja (project site)** has a population of 300,000.

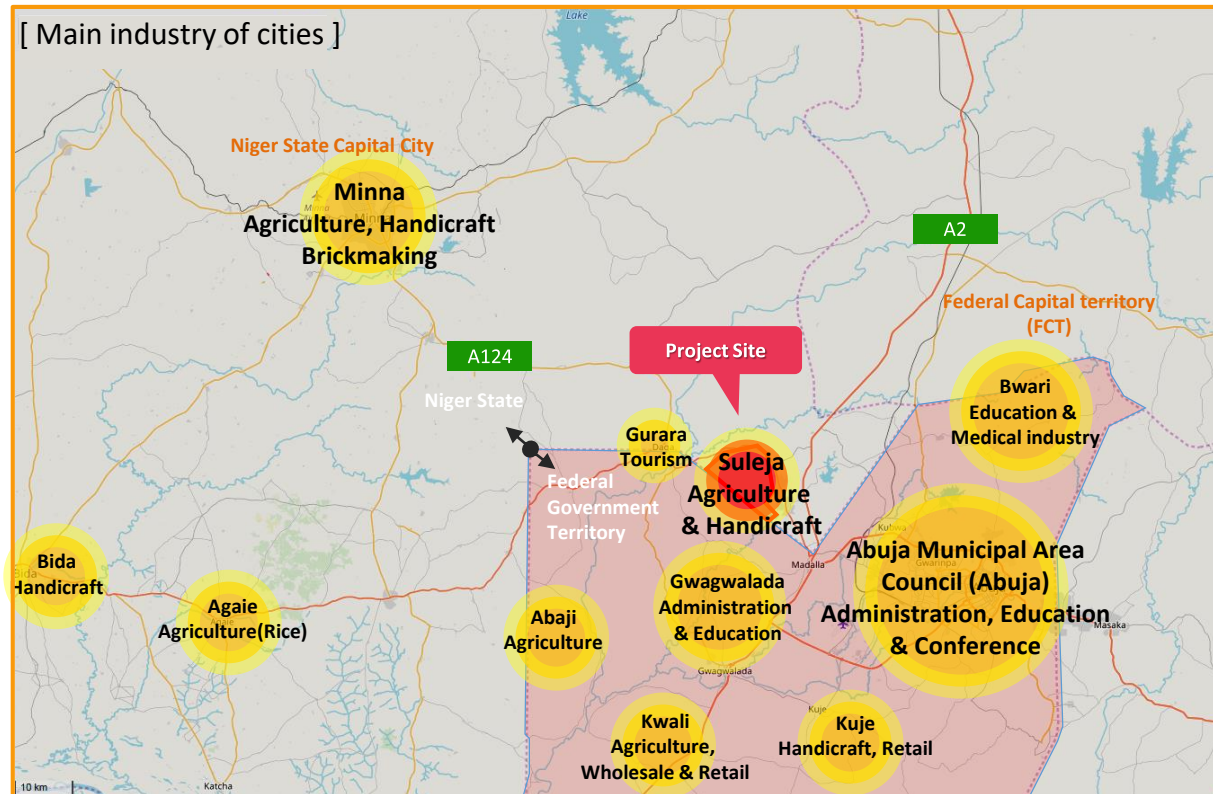
02 Socio-economic Analysis

Economic-industrial status

Industry of Suleja

- Administration and education industries are concentrated in Abuja
- The main industries of Suleja City are agriculture and handicraft industry

City	Main industry	City	Main industry
Minna	Agriculture, Handicraft, Brickmaking	Abuja Municipal Area Council	Administration, Education & Conference
Bida	Handicraft (Accessories and Clothes)	Bwari	Agriculture
Agaie	Agriculture(Rice)	Gwagwalada	Administration & Education
Suleja	Agriculture, Ceramics (Gbari), Textile	Kuje	Handicraft, Retail
Gurara	Tourism	Kwali	Agriculture, Wholesale & Retail
		Abaji	Agriculture



※Source: <https://www.britannica.com/place>, <https://en.wikipedia.org/wiki>

Main industries of Suleja are **agriculture and handicraft industry**, while administration and education are concentrated in Abuja, the capital city of Nigeria

02 Housing Market Analysis

➡ Status of Nigerian Real Estate

Sector Highlights

• Residential Market

- Demand and supply of modular houses increase due to cost reduction and shortened schedule
- Increase of Mixed-use Development ¹⁾



• Retail Market

- Average return on investment for retail is about 3.4%
- A lot less than the global average of 5.7%



• Office Market

- Vacancy rate of Grade A Offices is very high ($\approx 50\%$)
- Grade B, C Offices accelerate the decline in rental demand

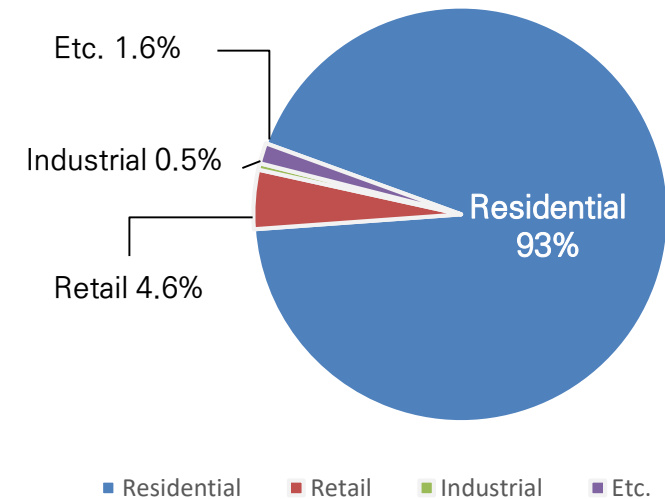


• Industrial Market

- Rapid growth of E-commerce increases demand for warehouse or logistic facilities
- Highest potential for future growth by Nigerian government



[Real Estate Market in Nigeria]



- Residential Market accounts for 93.3% of the total Nigerian Real Estate construction (as of 2008)

Residential real estate accounts for 93.3% of all real estate construction in Nigeria.

02 Housing Market Analysis

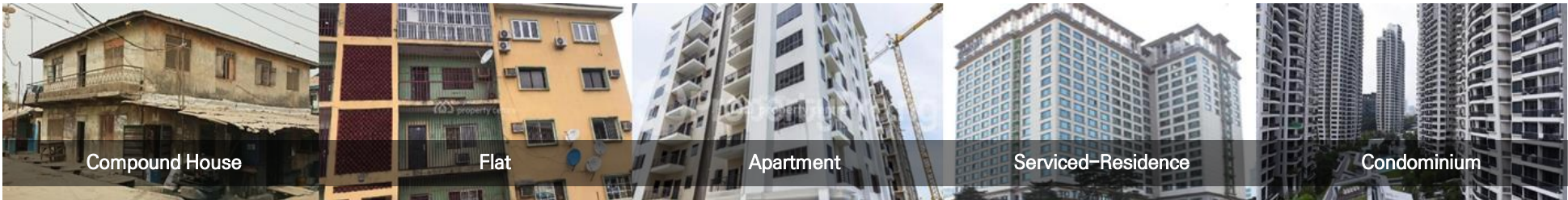
Status of Housing Types

Non-landed (High-density)				Landed (Low-density)			
Compound house	Flat	Apartment	Condominium	Terraced house	Bungalow	Duplex	Mansion
Lower Class Low Price				Lower Class Low Price			
Affluent High Price				Affluent High Price			

Landed (Low-density)



Non-landed (High-density)



High preference for low-density housing that can secure stable residential infrastructure

02 Housing Market Analysis

Housing Price Distribution

Price by Housing Type

- Average price of Apartment in Abuja region is less than USD 100,000
 - Avg. Apartment price: \$58,000 (2 rooms), \$92,000 (3 rooms)
- For House, usually higher than USD 150,000
 - Avg. Terraced House price \$170,000 (4 rooms)
 - Avg. Duplex price \$180,000~260,000 (4 rooms)

[Prices by Residential Types in Abuja]

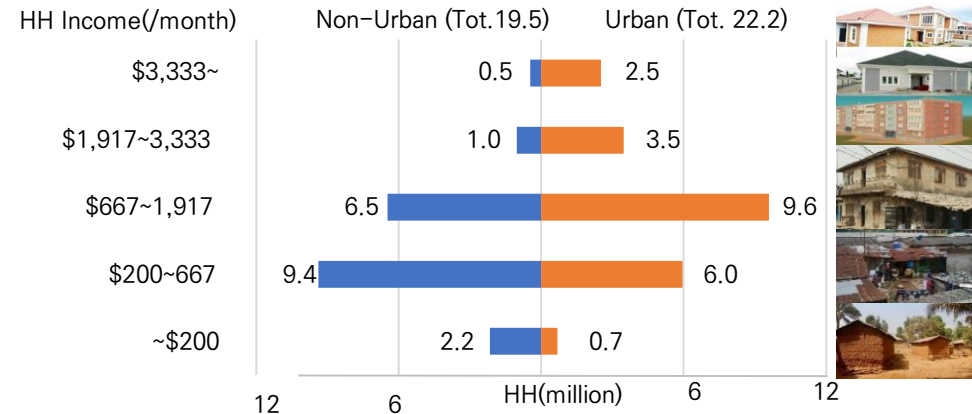
Residential Type	No. of rooms	Price(N)	Price(\$)	Note
Apartment	2	22,500,000	58,500	Flat
	3	35,500,000	92,300	Flat
Terraced House	4	65,500,000	170,300	
Duplex	4	70,500,000	183,300	Semi-Detached
	4	99,500,000	258,700	Detached

※Source: Federal Housing Authority

Housing Affordability

- According to CAHF the minimum household income to purchase a house, worth USD 60,000, is approx. \$2,900/month
 - For urban areas, only about 11% of all households can afford housing costs for apartment or Bungalow, Duplex
 - Significantly high house price-to-income ratio as 73.1% urban, **92.3% non-urban areas have a monthly income of less than \$2,000**

[Nigeria Household (HH) Income Distribution]



Housing price is high relative to household income

02 Relevant Plans

➡ Planning Hierarchy



- Reinforcing capabilities in **manufacturing** and **high value-added industries**
- Propose urban **infrastructure development** for sustainable economic growth
- Proposal of supply of public housing for low-income families
- Proposal of **new industry** promotion plan focused on anti-oil



- Specialized strategies in agriculture, manufacturing, mining, service, construction, and energy sectors as a regional development industry
- **Expansion of infrastructure** such as power and transportation and improvement of business environment
- Creation of **Abuja-Minna Economic Corridor**

10,000ha in Suleja is planned by Vision and Action Plan for Housing



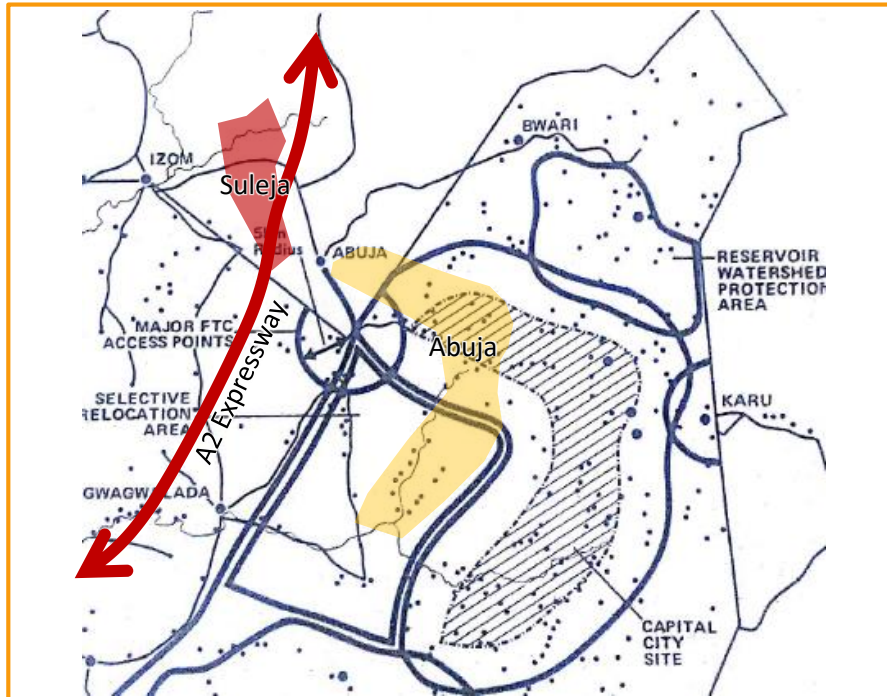
- **Integrated and balanced** territorial development
- **Smart city** strategies
- Urban resilience, climate change mitigation and adaptation

02 Relevant Plans

Regional plan

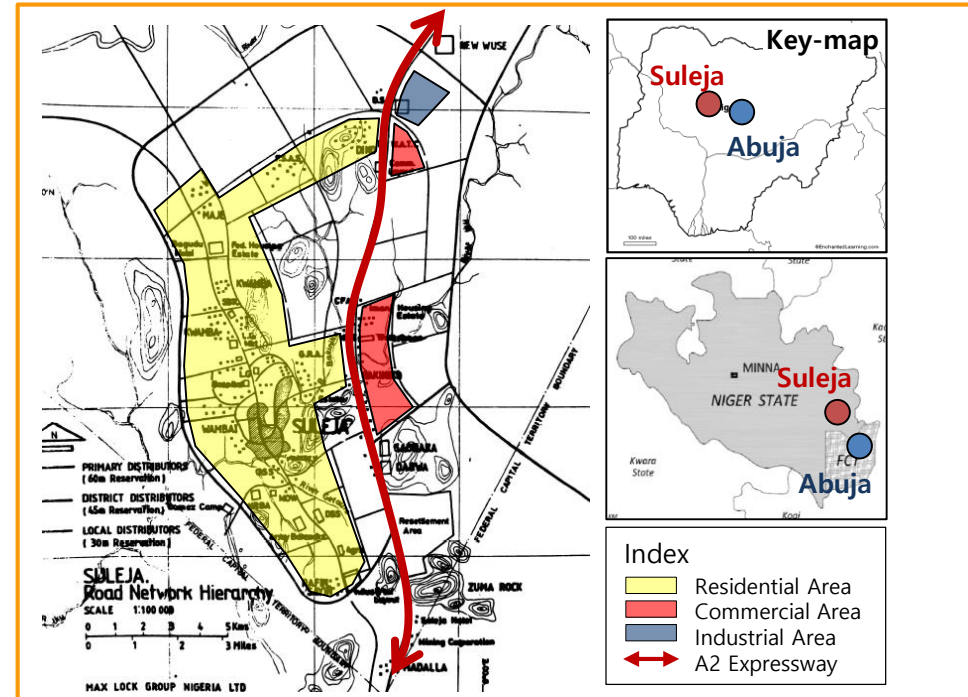
The Masterplan for Abuja the new FCT ('79)

- Development satellite cities plan such as Suleja, Madalla, Gwagwalada



Suleja Masterplan 1986-2006 ('87)

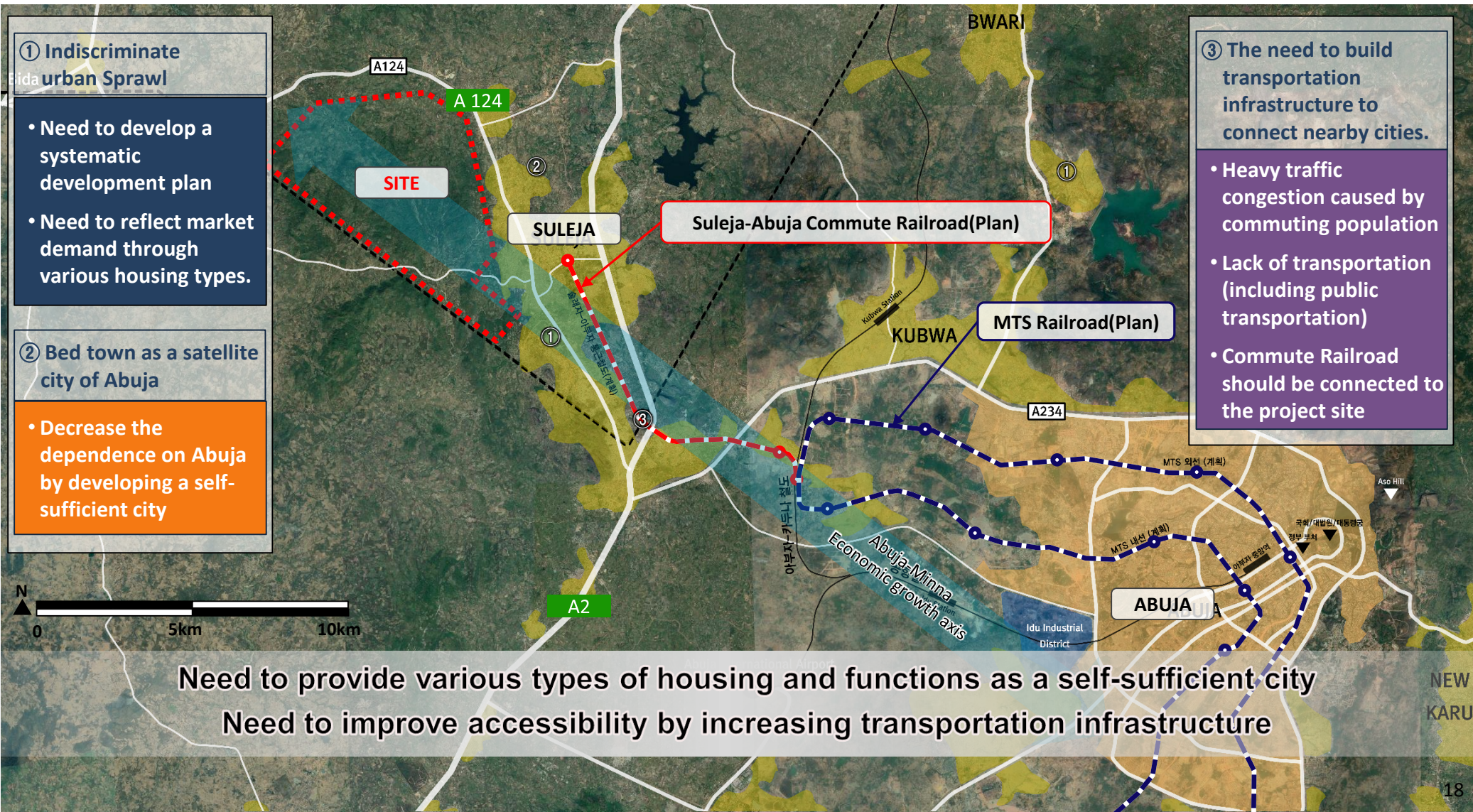
- Emphasis of the role of bed town(satellite city) with construction of Abuja capital



Need for planning satellite city in connection with Abuja FCT

02 Comprehensive Analysis

Metropolitan Site Analysis



02 Comprehensive Analysis

Project Site Analysis

① Large Scale Mountain Area

- Propose optimum development scale through development available area analysis
- Suggest step urban growth scenario

② Natural Environment in Good Condition

- Need to come up with environmental development plan considering a vegetation and a topography
- Nurturing the Industry considering topography(Hill)

③ A Sharp Increase of Population Growth and Urbanization

- A drastic urbanization caused by capital Abuja's growth
- Shortage of job, increasement of shackland

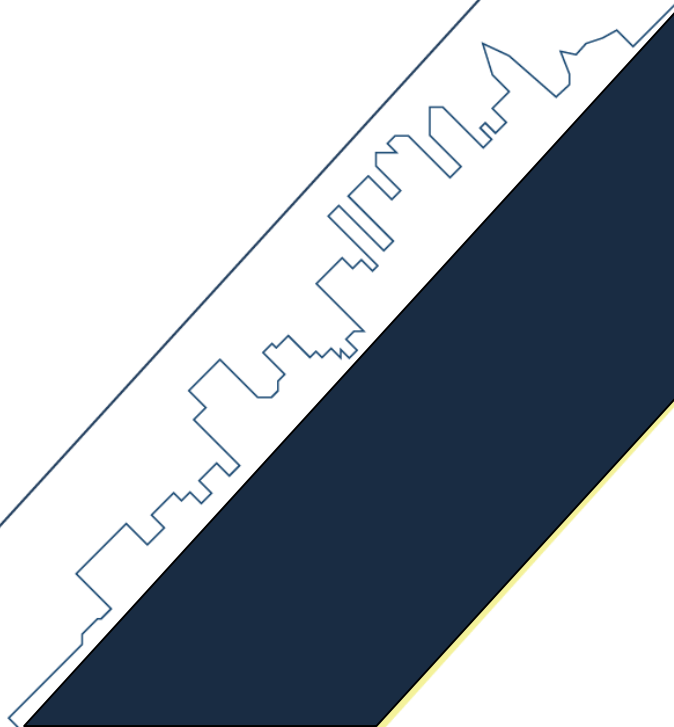
④ Existing Rivers Potential

- Potential of holding amount of water resource with Iku River, Gurara River, and high precipitation

Need to consider the mountainous area with a high slope in the middle of the site
Need to link between outer main road(A-124) and existing Suleja town

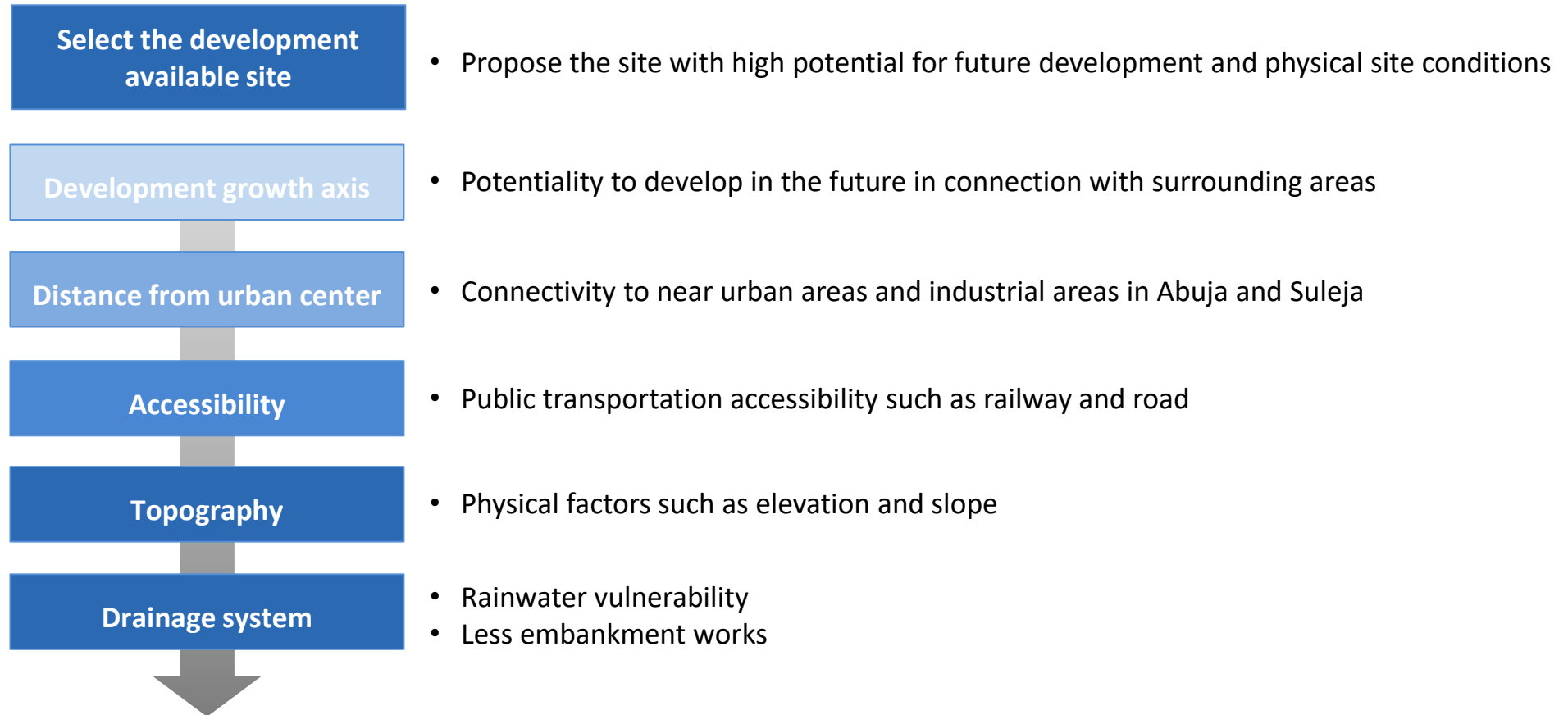
03 ***Selection of the Pilot Sites***

- 1) Selecting pilot candidate site
- 2) Analysis on selecting pilot candidate site
- 3) Selection of pilot candidate site



03 Selecting pilot candidate site

➡ Process of selecting pilot candidate site

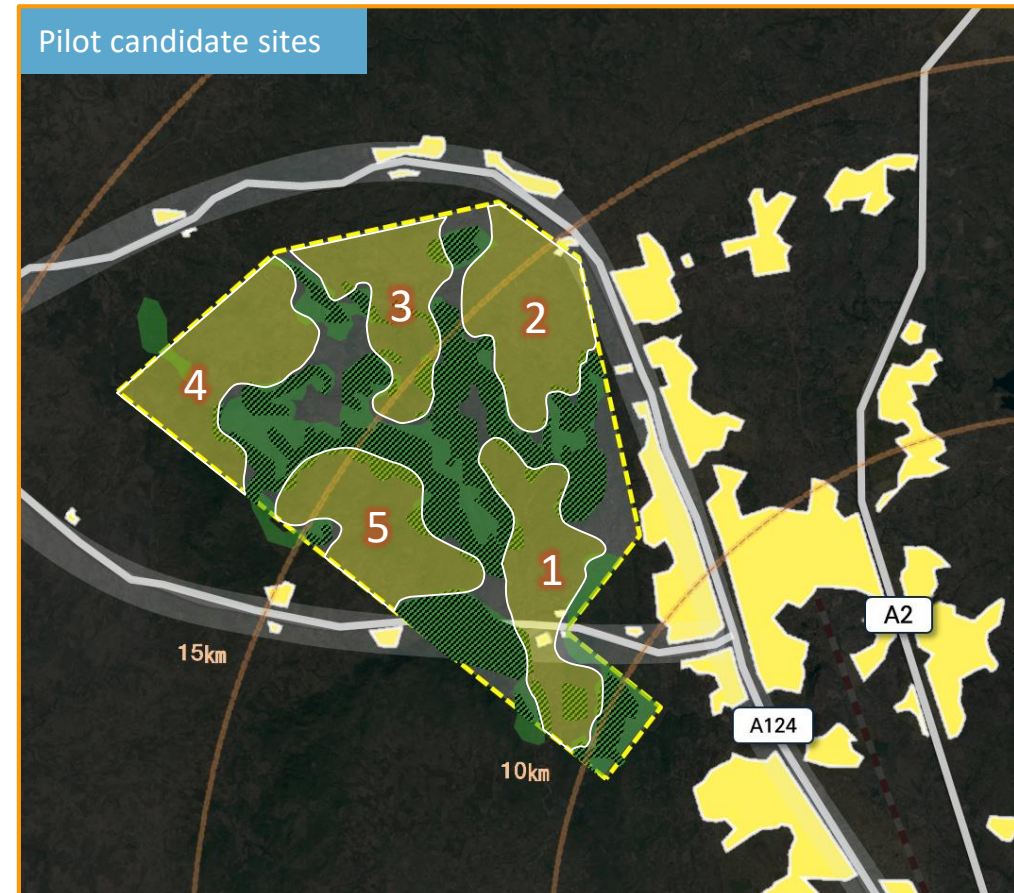
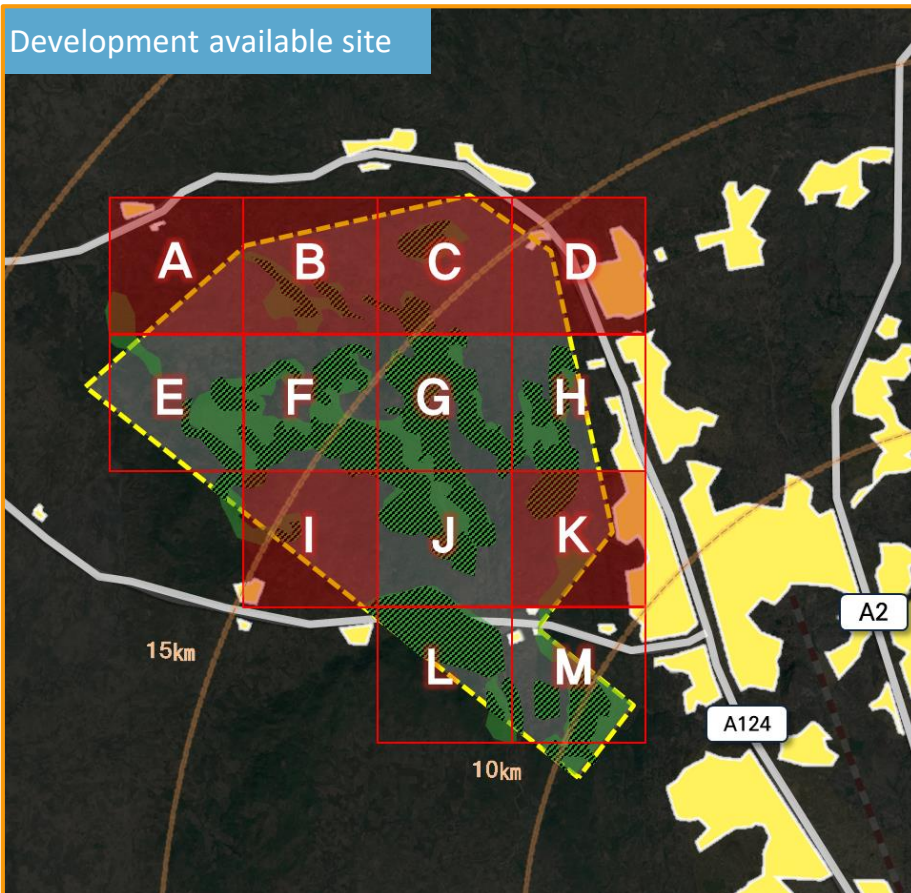


**Finding five (5) candidate lands through analysis on development available land
Select a pilot site in consideration of five (5) locational factors.**

03 Selecting pilot candidate site

➡ Setting priority site for the first development

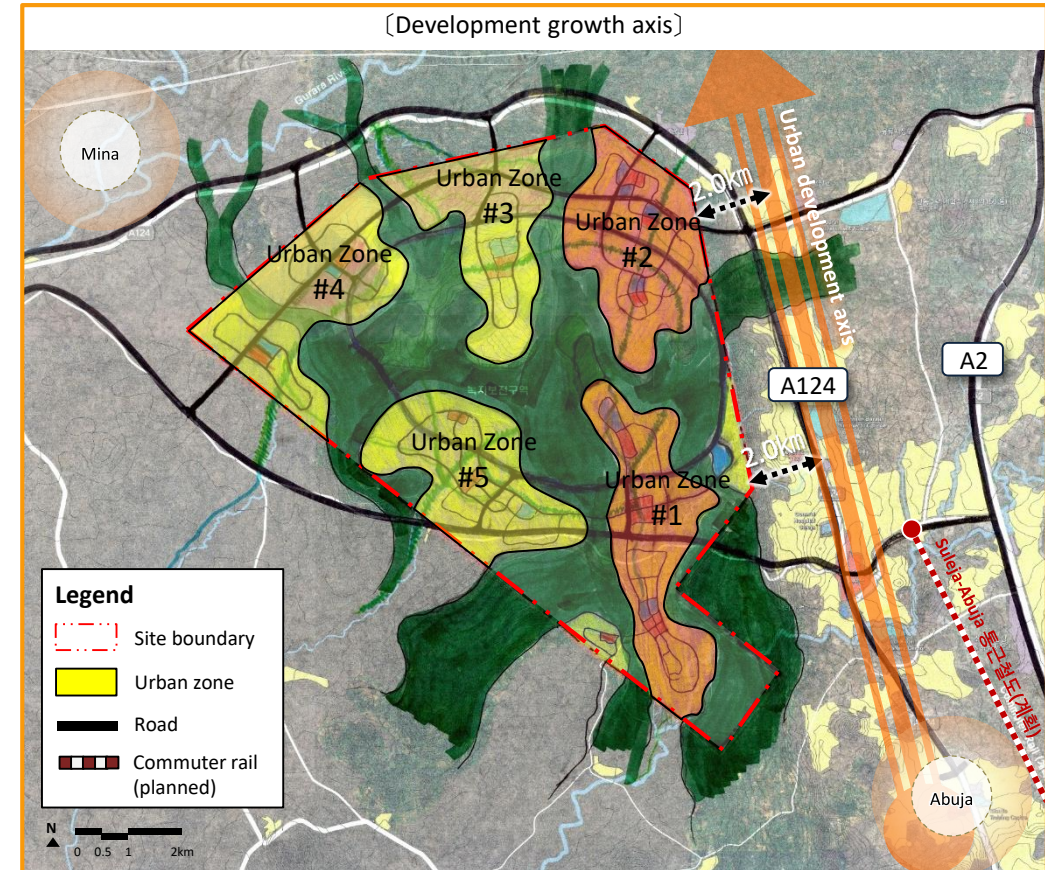
- District **A, B, C, D, I, and K** were selected as development available land based on analysis of land use, slope, elevation and obstacles.
- Five (5) candidate sites for pilot project were selected in consideration of **district A, B, C, D, I and K**



03 Analysis on selecting pilot site

Development growth axis

- Urban Expansion is following the A124. It means the northwest of A124 and A2 have a high development potential axis for future growth
- Priority is given if the area located within 2.5km of the development growth axis is more than 50% of zone



Criteria	Priority zone
Distance from development growth axis	1, 2

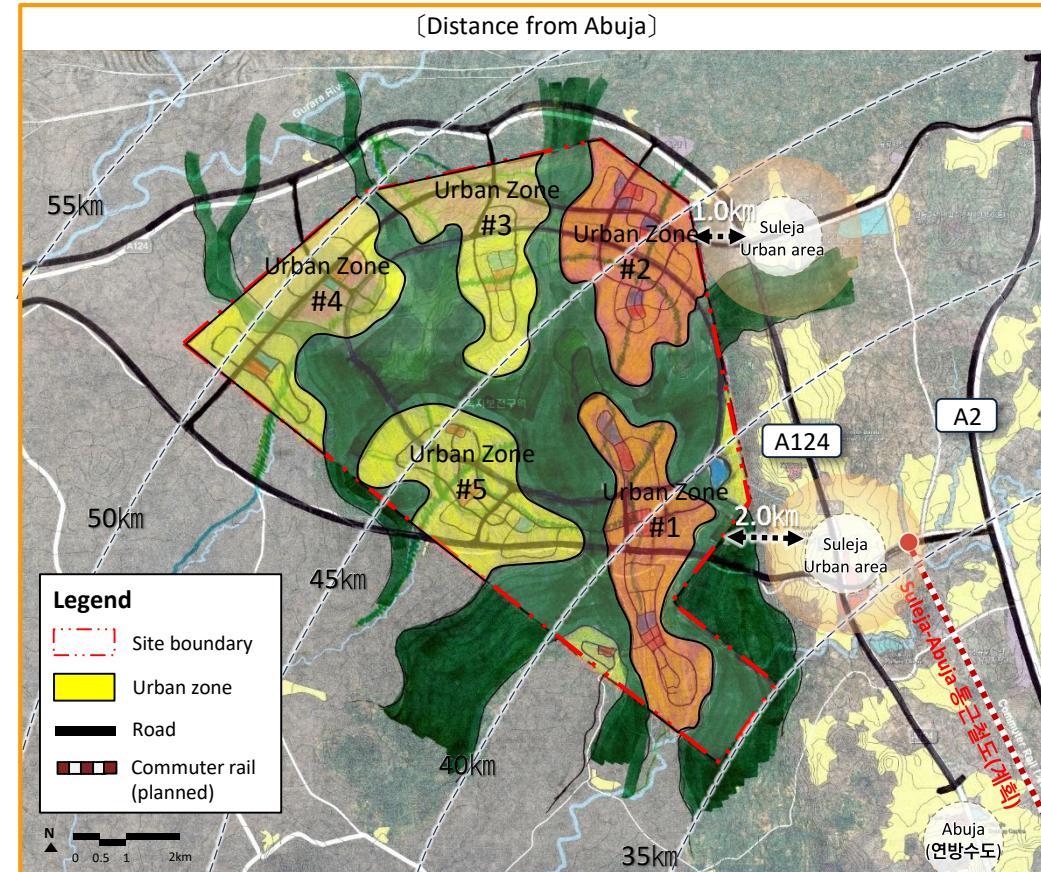
Considering the development growth axis,
Zone 1, 2 are recommended as pilot candidate sites

03 Analysis on selecting pilot site

Distance from urban central

- Abuja FCT is expanding to the northwestern axis, so that the priority is given on the basis of distance from the center in consideration of future urban expansion
- Considering connectivity with existing urban areas in Suleja, distance from existing urban areas is very important criterion for pilot site

Criteria	Priority zone
Distance from Abuja	1
Distance from existing urban area of Suleja town	1, 2
Comprehensive analysis	1, 2

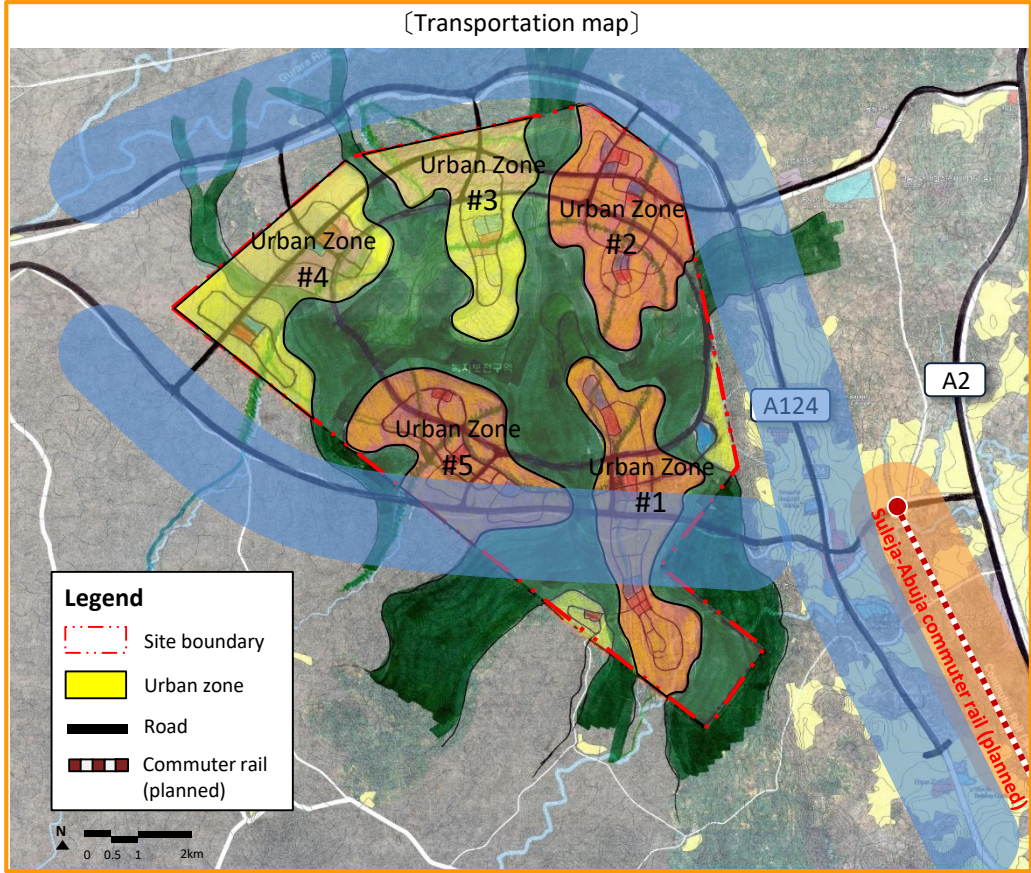


Considering the distance from urban central and existing town
Zone 1, 2 are recommended as a pilot candidate sites

03 Analysis on selecting pilot site

Accessibility

- Priority will be given to areas within 0.5km of metropolitan roads such as A124 and A2
- Areas adjacent to the planned commuter railway is also a very important criterion for pilot site

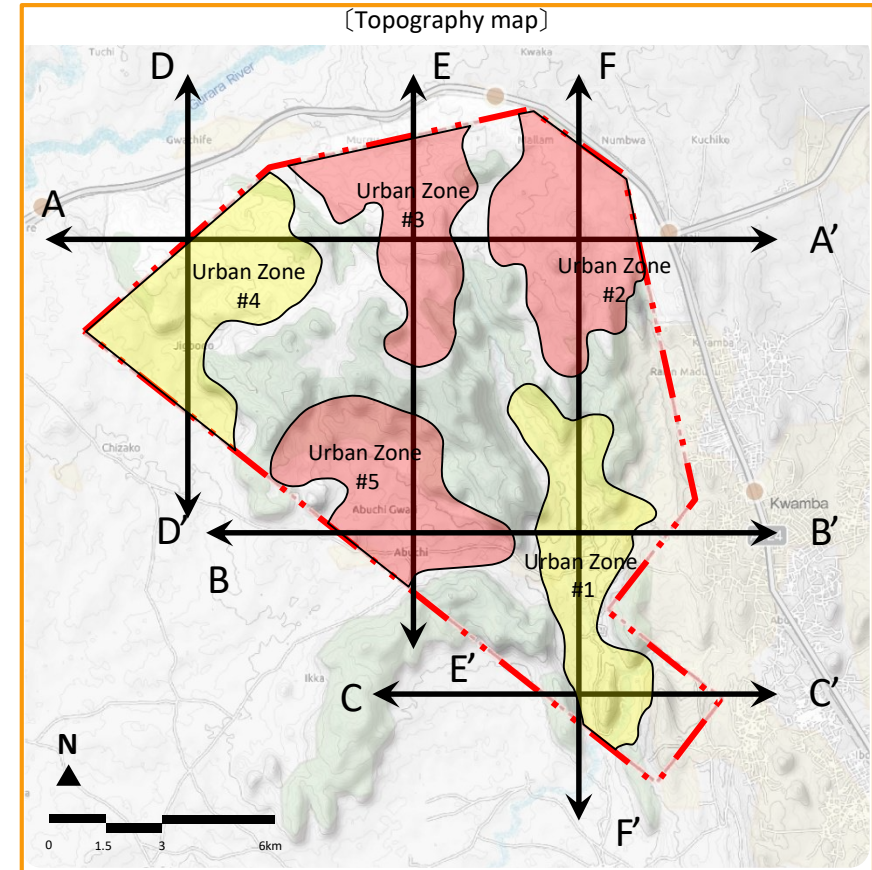
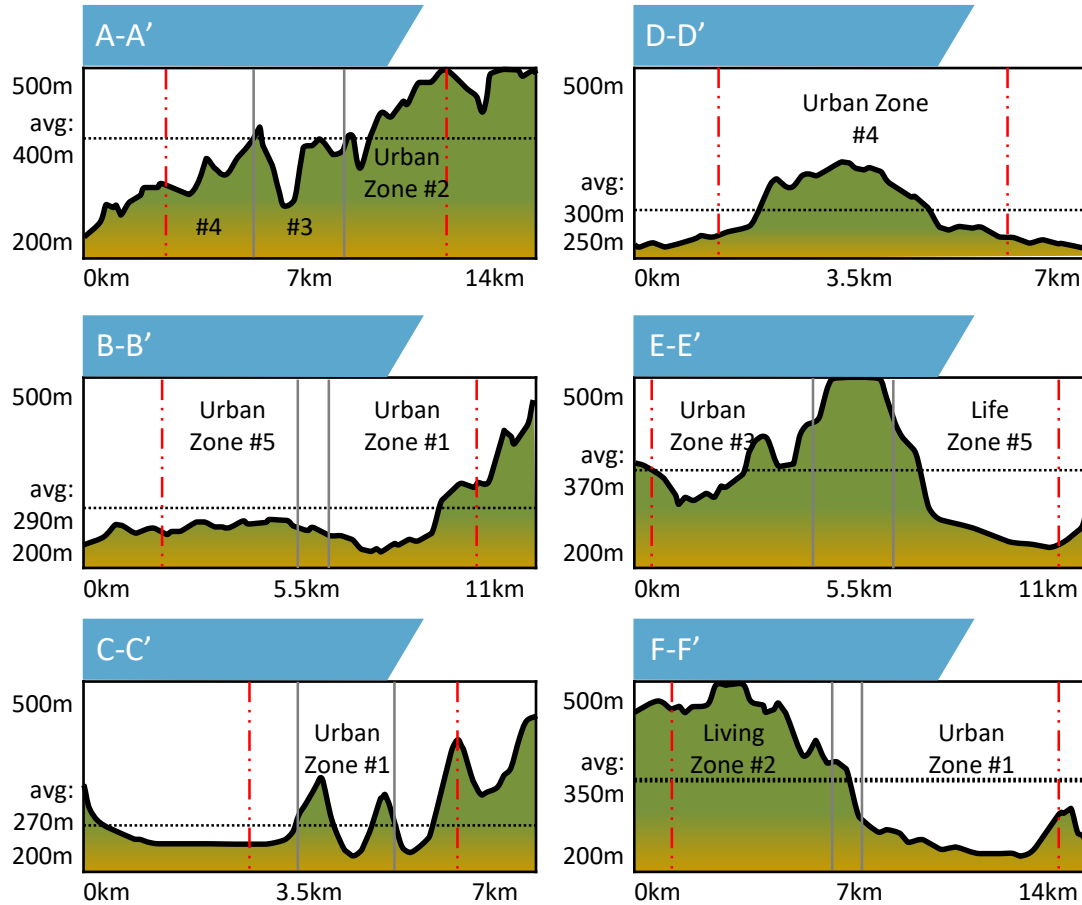


Criteria	Priority zone
Distance from metropolitan road	1, 5
Distance from planned commuter railway	1, 2

Considering the accessibility,
Zone 1, 2, 5 are recommended as pilot candidate site

03 Analysis on selecting pilot site

Topography



Site elevation ranges from 240m to 550m with slopes of more than 8% distributed in the area.

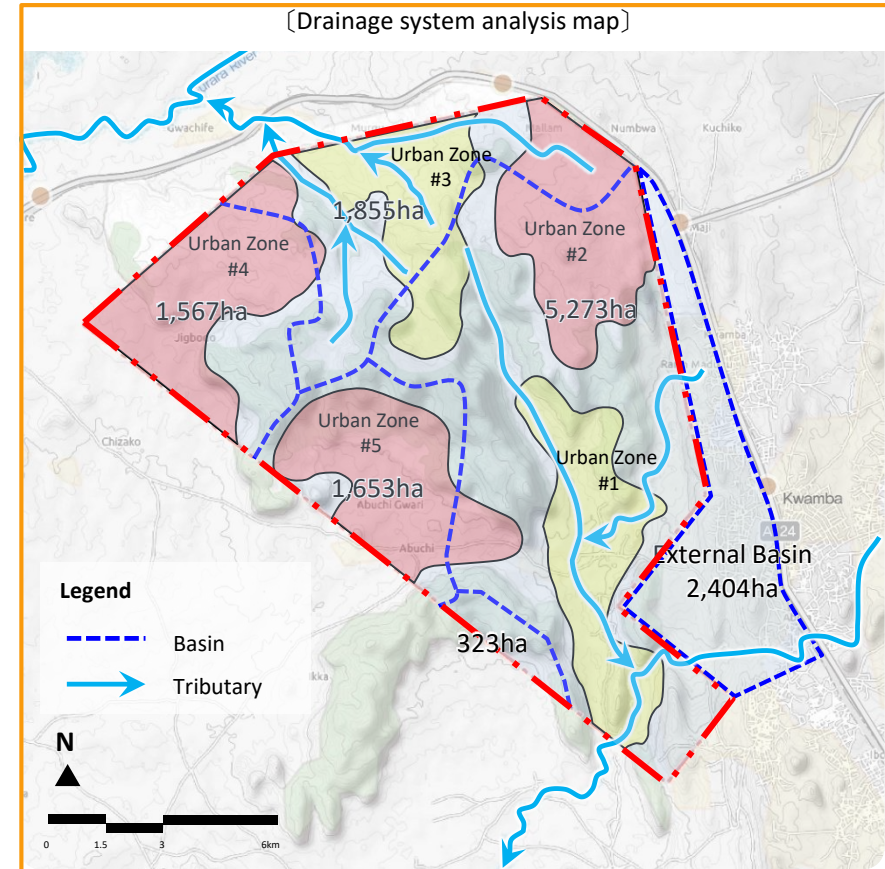
Zone 2, 3, and 5 are analyzed to be advantageous for minimum earthwork.

Drainage system

- Annual average precipitation of 1,220mm and tributary of the Kurara river exists at the North-South direction of the site; Storm water of the site is being discharged to tributaries on the north and south direction.
- Generally, Stormwater is discharged to the river without the need of a separate treatment facility through the roadside trench (side ditch).

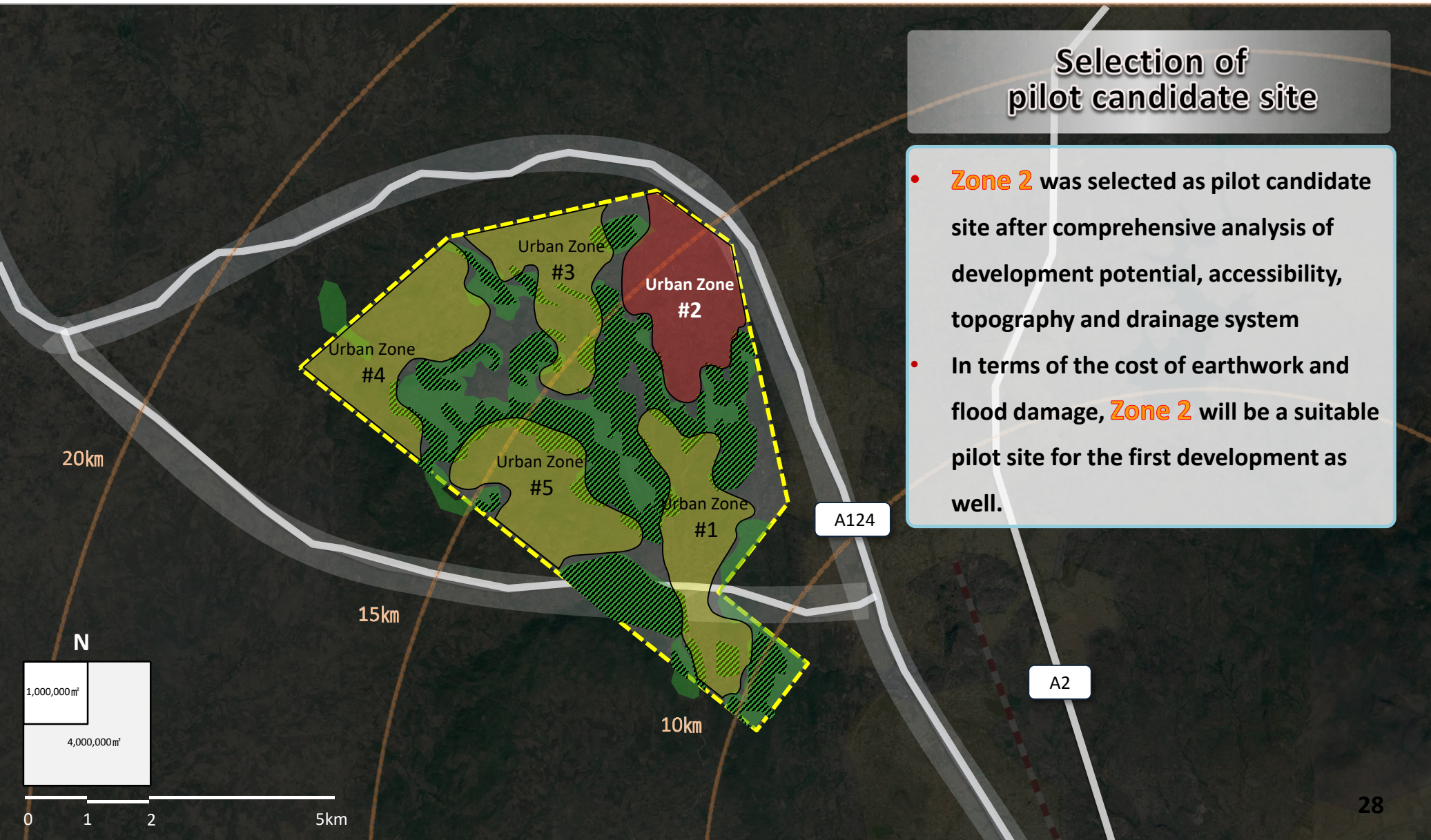
- Site utilization of Zone #4 is recommended considering confluent of tributaries and terrain conditions.

- Zone #1 requires disaster mitigation measures following the current inflow of rivers from Eastern Suleja area and low terrain conditions, it is disadvantageous to utilize the site due to expected river construction and large-scale embankment works. Site utilization of Urban Zones #2 and 5 is recommended.



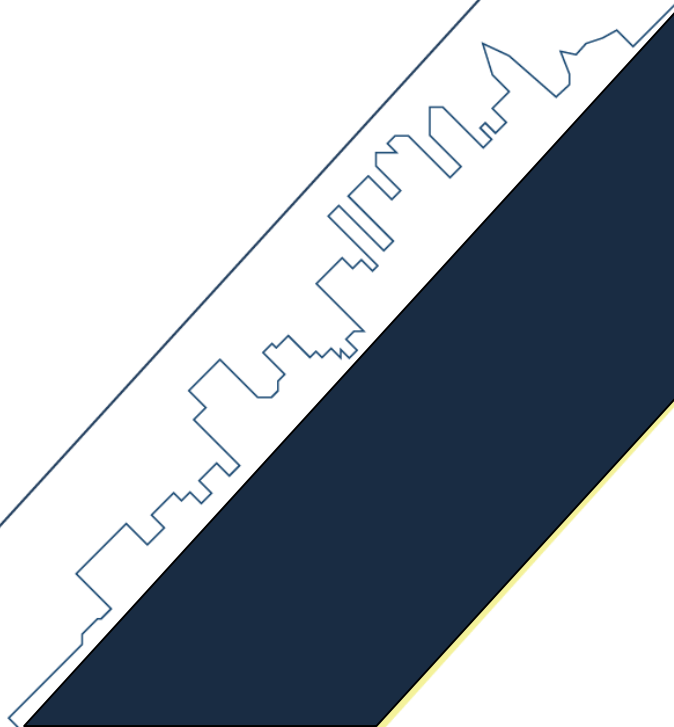
Considering the drainage system and terrain conditions,
Zone 2, 4, 5 are recommended as pilot project site

03 Selection of pilot candidate site



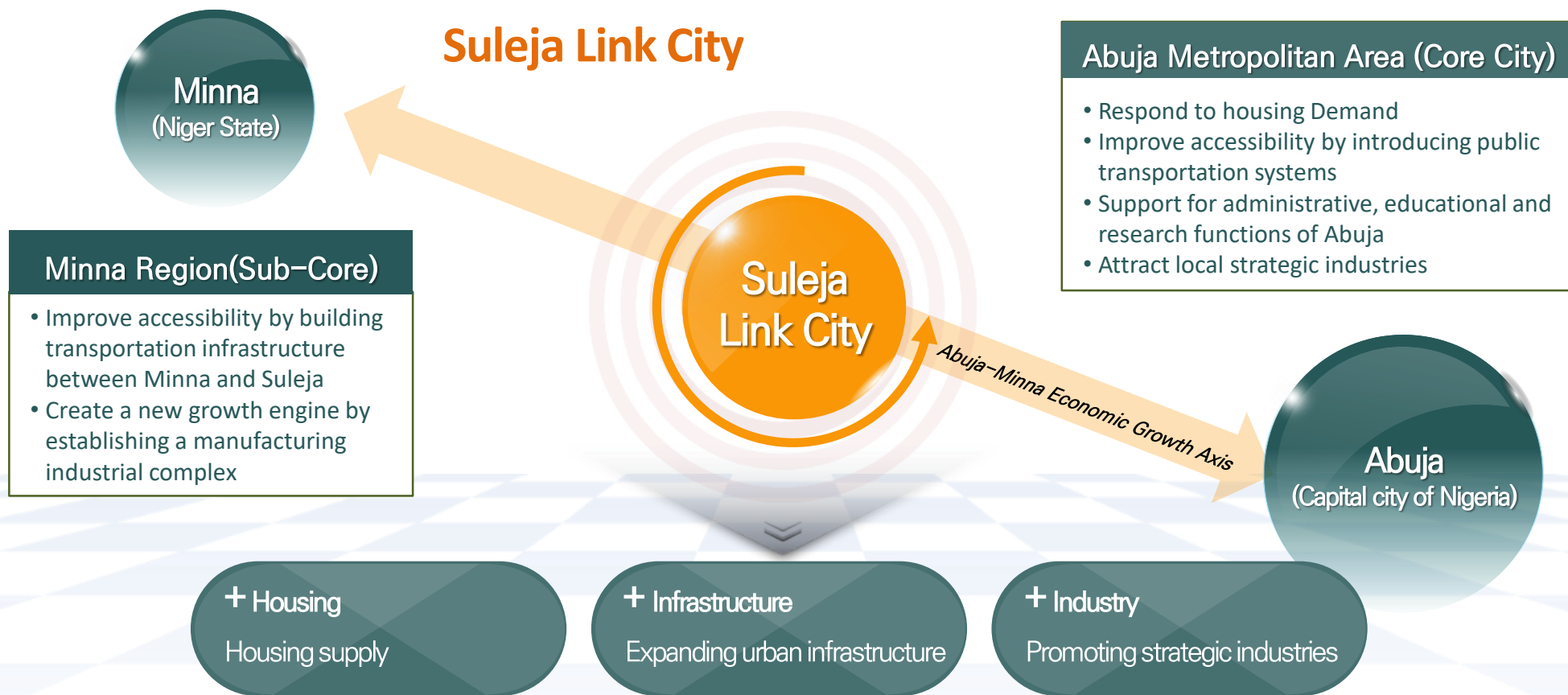
04 *Regional Development Plan*

- 1) Regional development concept
- 2) Spatial structure



04 Regional Development Concept

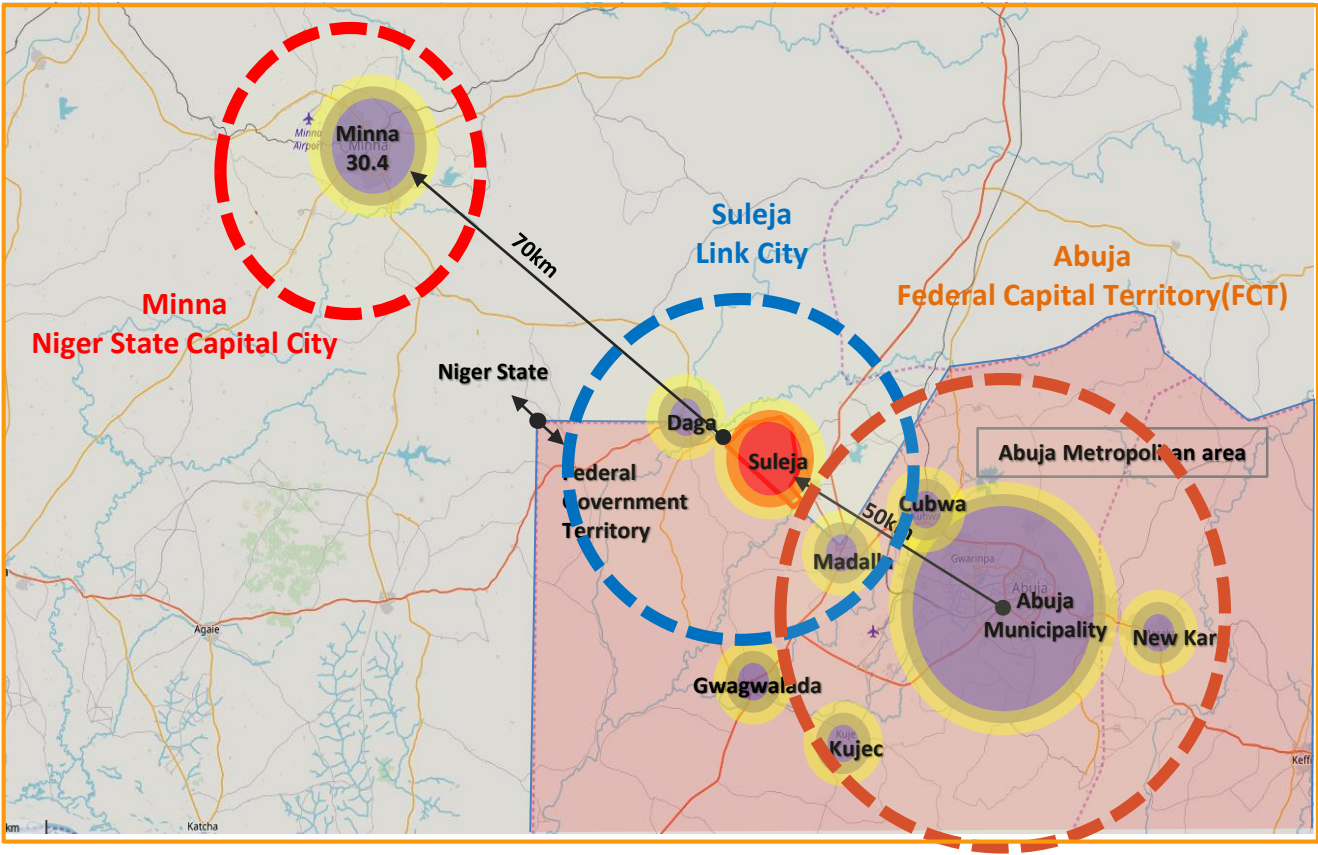
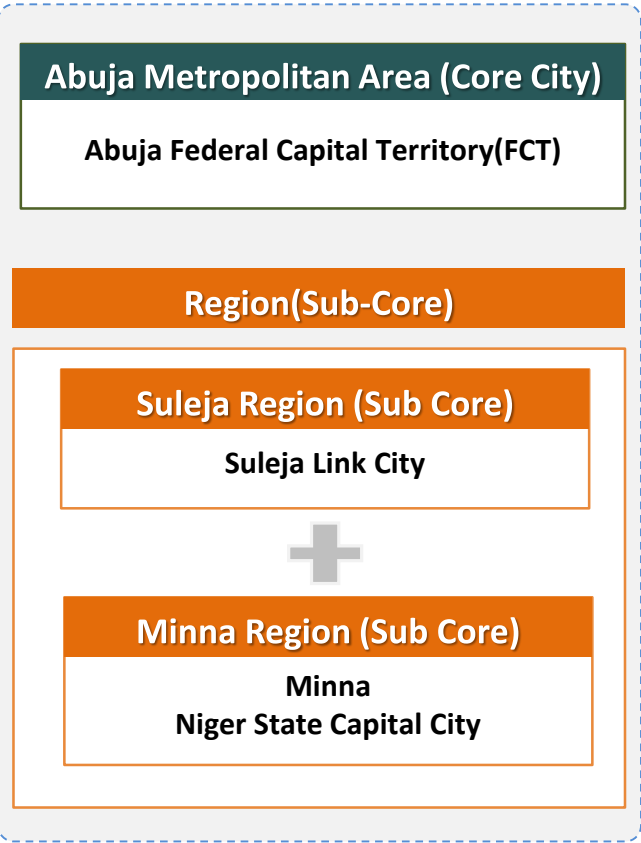
“Gate city to Abuja, the center of Nigeria”



Establish a foothold by connecting Abuja metropolitan area and Minna region

04 Spatial Structure

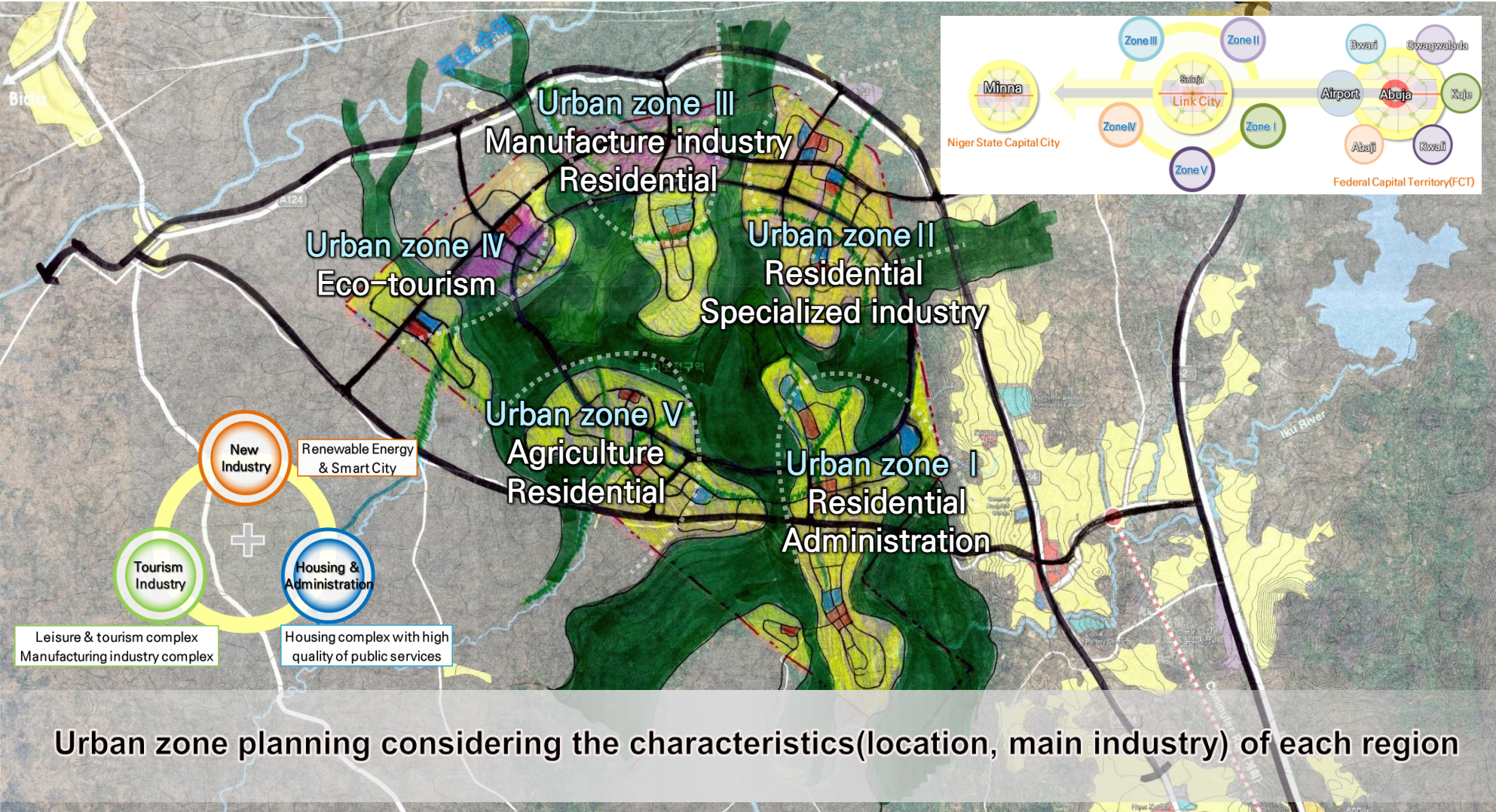
Metropolitan spatial structure



Promote balanced regional development of the Abuja Metropolitan Area and Suleja Region by presenting functional sharing & shared growth model

04 Spatial Structure

Spatial structure of Suleja Smart City



Urban zone planning considering the characteristics(location, main industry) of each region

05 *Master Plan of Pilot Site*

- 1) Development concept & strategies
- 2) Land use plan
- 3) Sectoral plan
- 4) Infrastructure plan

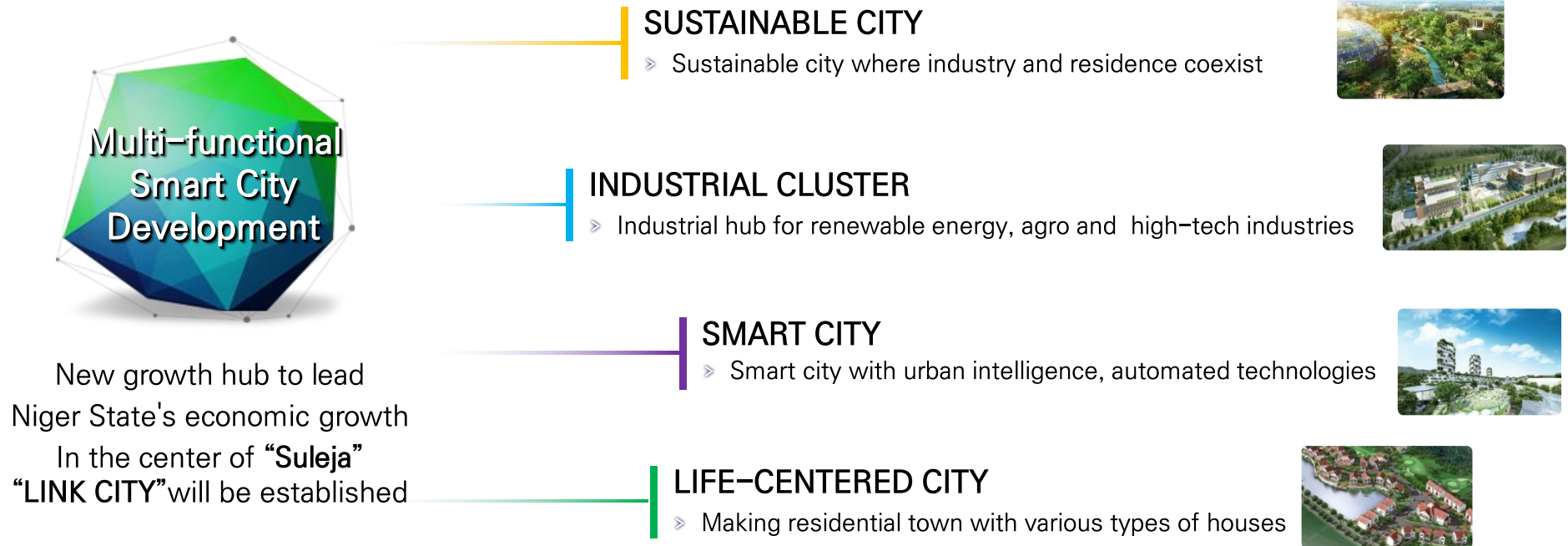


05 Development Concept & Strategies

Basic Direction

- According to Online Survey, Suleja Smart City shall be established an integrated Smart City with Industrial functions
- Creating a pleasant & safe city, Supplying various type of houses with well-equipped infrastructural facilities

Vision



* Visions have been decided based on results of online survey conducted in last Nov to Dec, 2020.

05 Development Concept & Strategies

Strategies



- Creation of a sustainable and self-sufficient city through the development of “LINK CITY”
- Introducing various functions that meet the long-term development direction of Niger State

1 SUSTAINABLE CITY

Self-sufficient City



- Introducing functions to be a self-sufficient including Industrial Zone / R&D / Logistics / Commercial-Business Zone

2 INDUSTRIAL CLUSTER

Creative Industrial Parks



- Inviting agro & renewable energy industries for a Niger State's local economic growth
- Creating job opportunities to make industrial parks where are rear side of residential town

3 SMART CITY

Convenient & Safe City



- Providing smart technology and profit model linked to city service facilities

4 LIFE-CENTERED CITY

Eco-friendly Residential Town



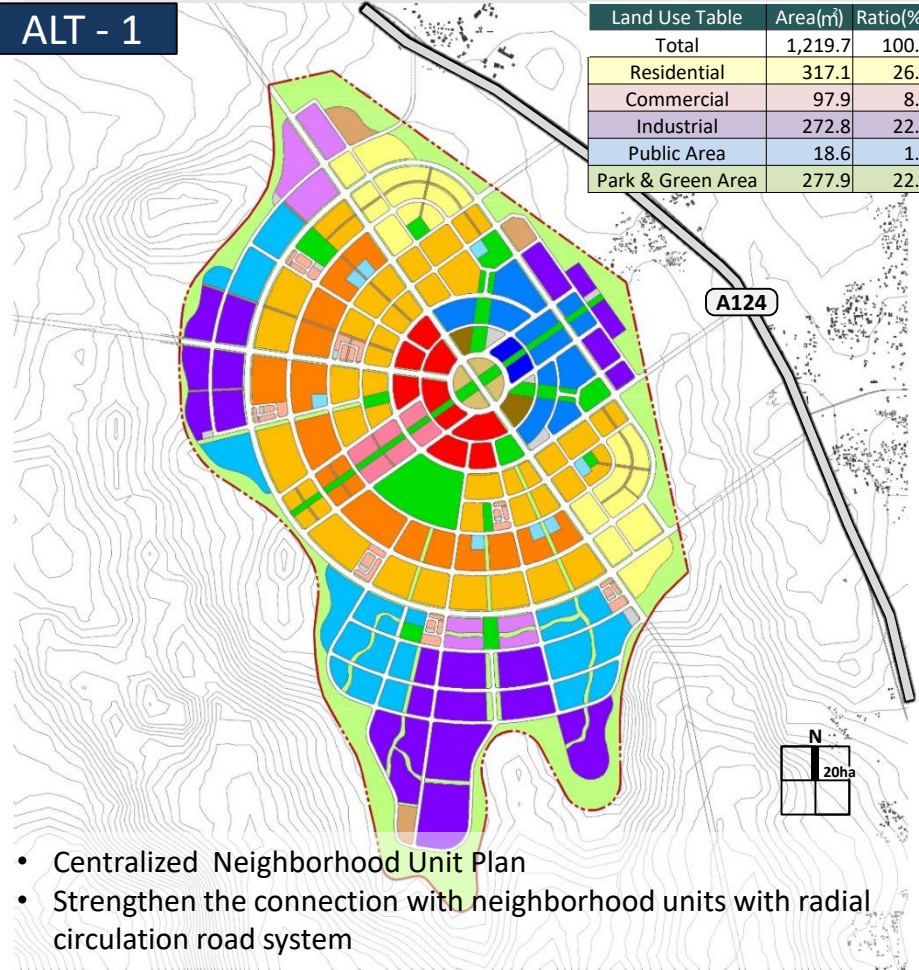
- Large-scale housing supply with various housing type
- Creating convenient living environment for users including neighborhood living facilities /education/green & park

05 Land Use Plan

Selection of land use plan

ALT - 1

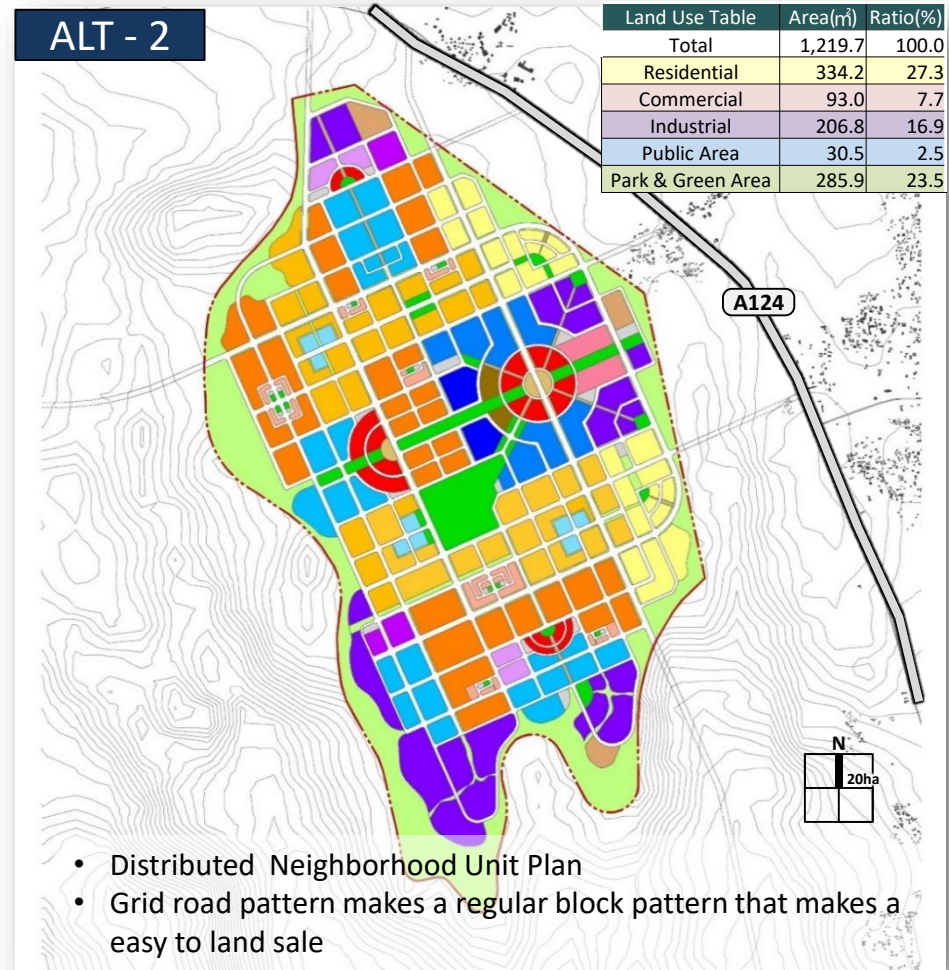
Land Use Table	Area(m ²)	Ratio(%)
Total	1,219.7	100.0
Residential	317.1	26.0
Commercial	97.9	8.1
Industrial	272.8	22.3
Public Area	18.6	1.5
Park & Green Area	277.9	22.8



- Centralized Neighborhood Unit Plan
- Strengthen the connection with neighborhood units with radial circulation road system

ALT - 2

Land Use Table	Area(m ²)	Ratio(%)
Total	1,219.7	100.0
Residential	334.2	27.3
Commercial	93.0	7.7
Industrial	206.8	16.9
Public Area	30.5	2.5
Park & Green Area	285.9	23.5

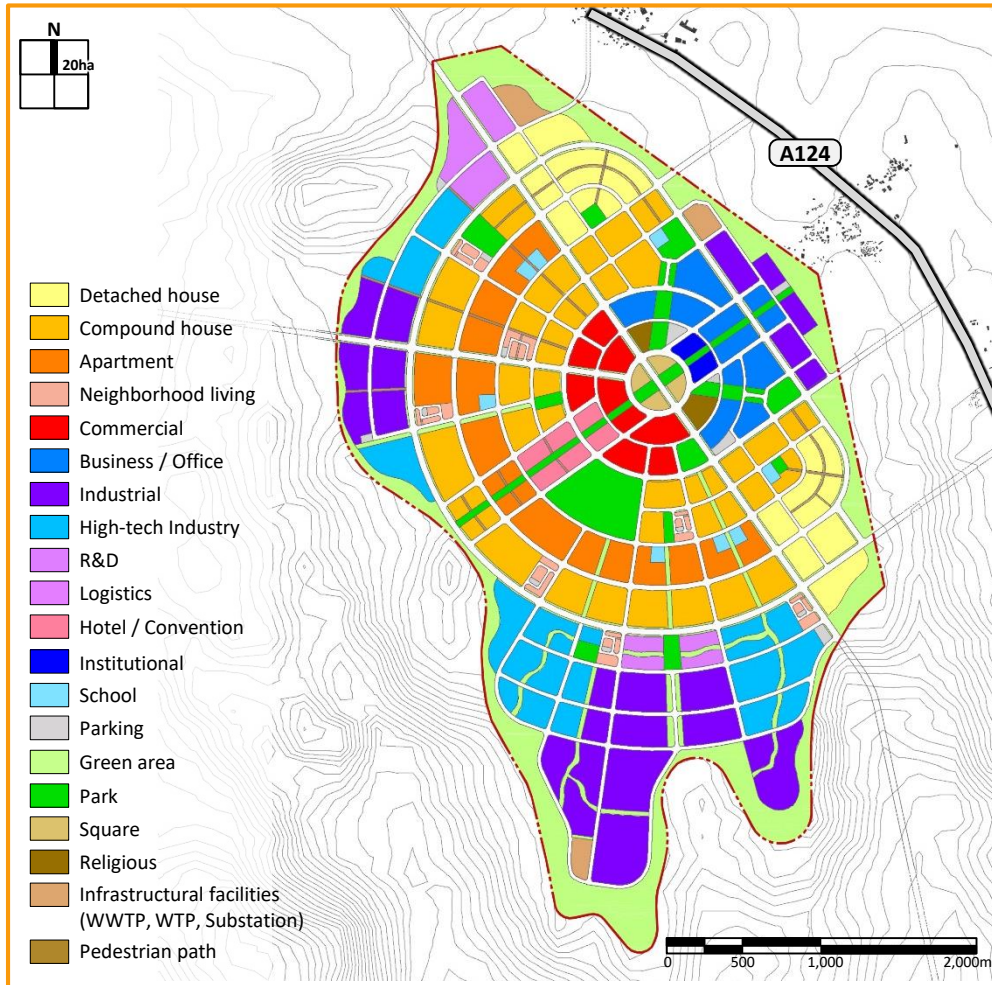


- Distributed Neighborhood Unit Plan
- Grid road pattern makes a regular block pattern that makes a easy to land sale

Selection plan **ALT-1 with a radial road pattern** and a centralized Neighborhood Unit Plan

05 Land Use Plan

Land use plan



		Area(ha)	Ratio(%)
Total		1,219.7	100.0
Residential Area	Residential Area	317.1	26.0
	Detached house	69.3	5.7
	Compound house	165.2	13.5
	Apartment	82.7	6.8
Commercial Area	Commercial Area	97.9	8.1
	Commercial	30.7	2.5
	Business / Office	40.9	3.4
	Neighborhood living	13.2	1.1
	Hotel / Convention	13.2	1.1
Industrial Area	Industrial Area	272.8	22.3
	Manufacturing industry	148.0	12.1
	Logistics	16.0	1.3
	High-tech Industry	94.0	7.7
	R&D	14.8	1.2
Public Area	Public Area	18.6	1.5
	School	7.6	0.6
	Institutional	4.3	0.4
	Religious	5.2	0.4
	Square	1.4	0.1
Park & Green spaces	Park & Green spaces	277.9	22.8
	Park	63.7	5.2
	Green area	214.3	17.6
Road & Infrastructural facilities	Road & Infrastructure	235.3	19.4
	Road	217.8	17.9
	Parking	6.1	0.5
	Substation	4.9	0.4
	Waste water treatment plant	3.1	0.3
	Water treatment plant	3.4	0.3

A sustainable city with Residential 26%, Industrial 22% and Park & Green 23%

05 Sectoral Plan

Population & Housing Plan

Population plan

	Area(ha)	Ratio(%)	Household	Population (people)	Density (ppl/ha)
Total	317.1	100.0%	37,502	212,262	157.9
Detached house	69.3	21.9%	3,466	19,618	
Compound house & Apartment	Total	247.8	78.1%	34,036	192,644
	Type A	78.6	24.8%	9,496	53,747
	Type B	23.1	7.3%	3,046	17,240
	Type C	23.0	7.3%	4,851	27,457
Type D	123.1	38.9%	16,643	94,199	

Housing type

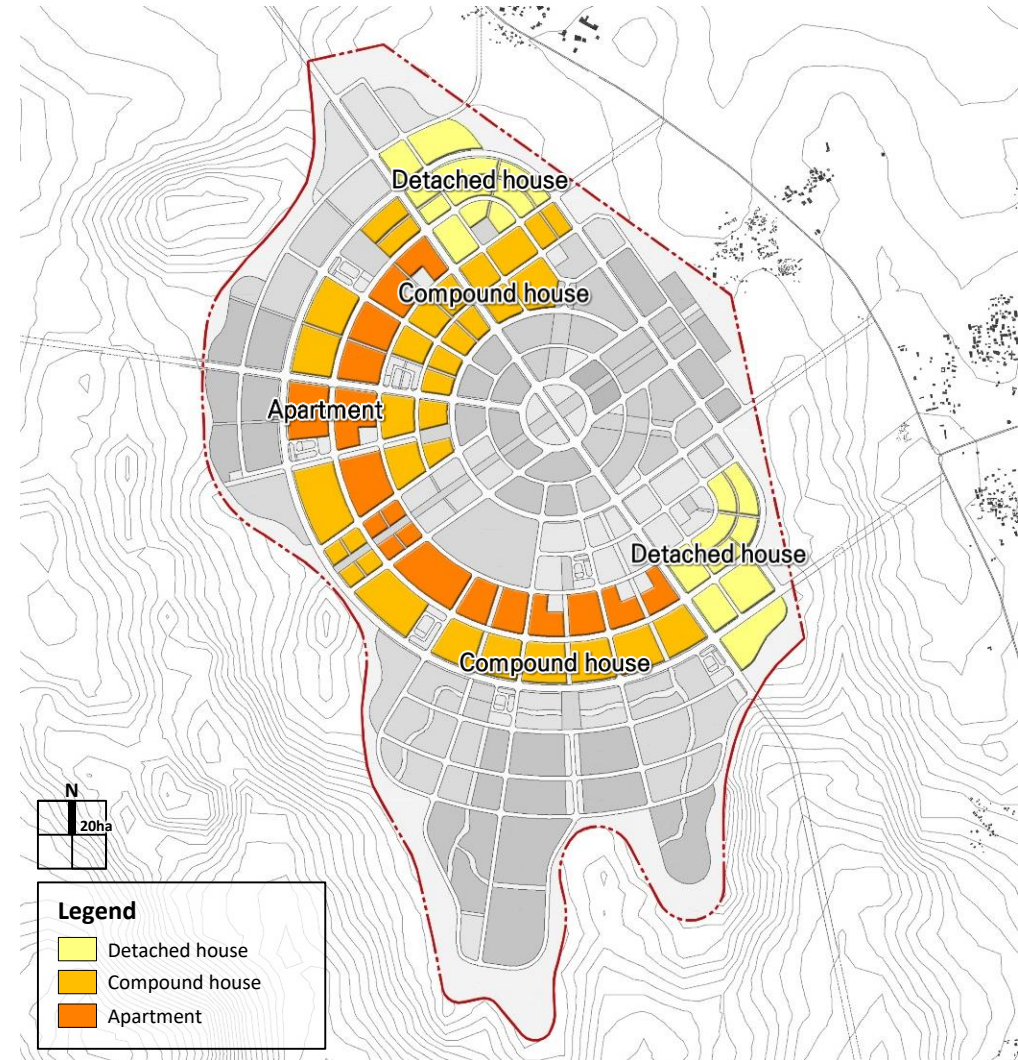
1 Detached house



2 Compound house



3 Apartment



05 Sectoral Plan

Road & Transportation Plan

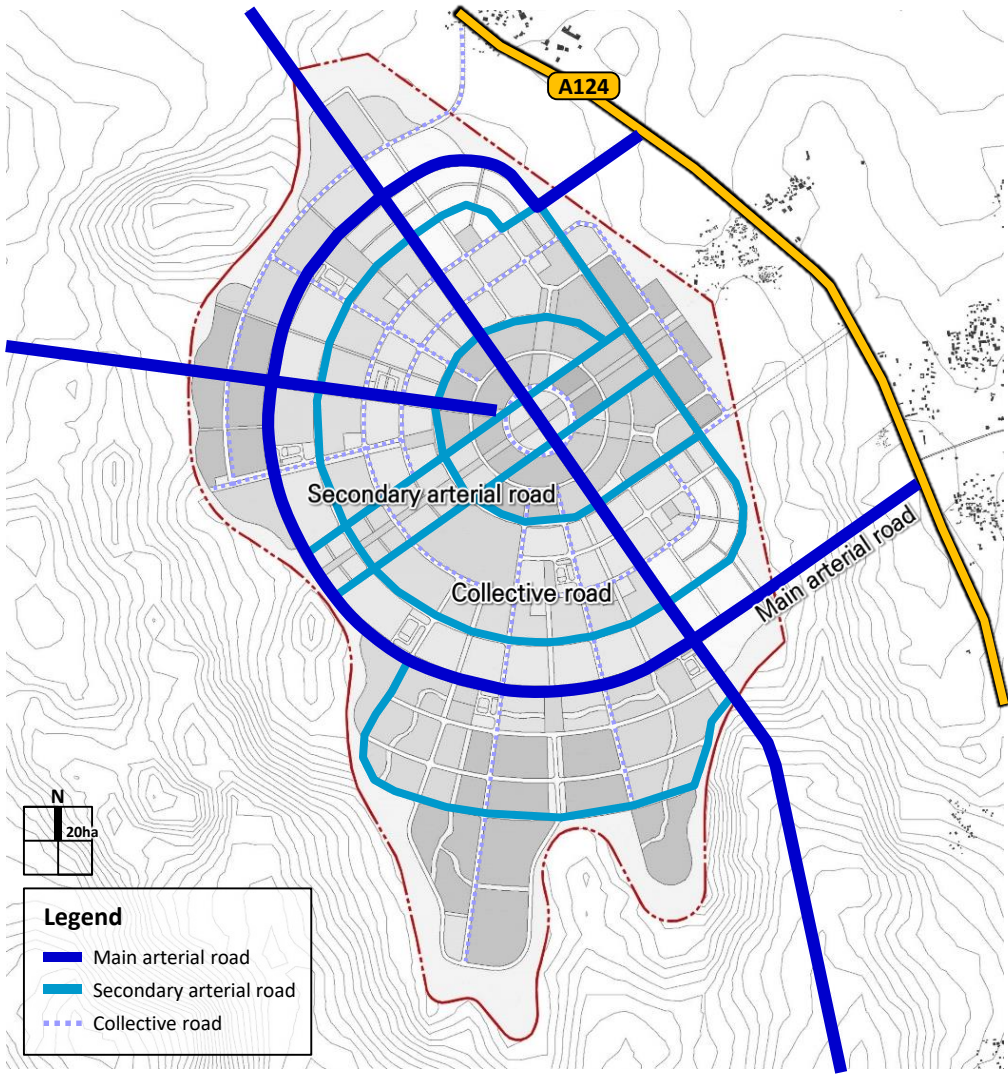
Road System

Road	Detail	width
Main arterial road	Connect with Abuja metropolitan region	40m
Secondary arterial road	Disperse transportation demand through ring roads	25-35m
Collective road	Connect with public transportation system	15-20m



Pulbic Transportation

- Consider the connectivity to existing roads and planned road
- BRT plan and shared-use mobility plan for industrial area need to be considered



05 Sectoral Plan

Green & Open Space Plan

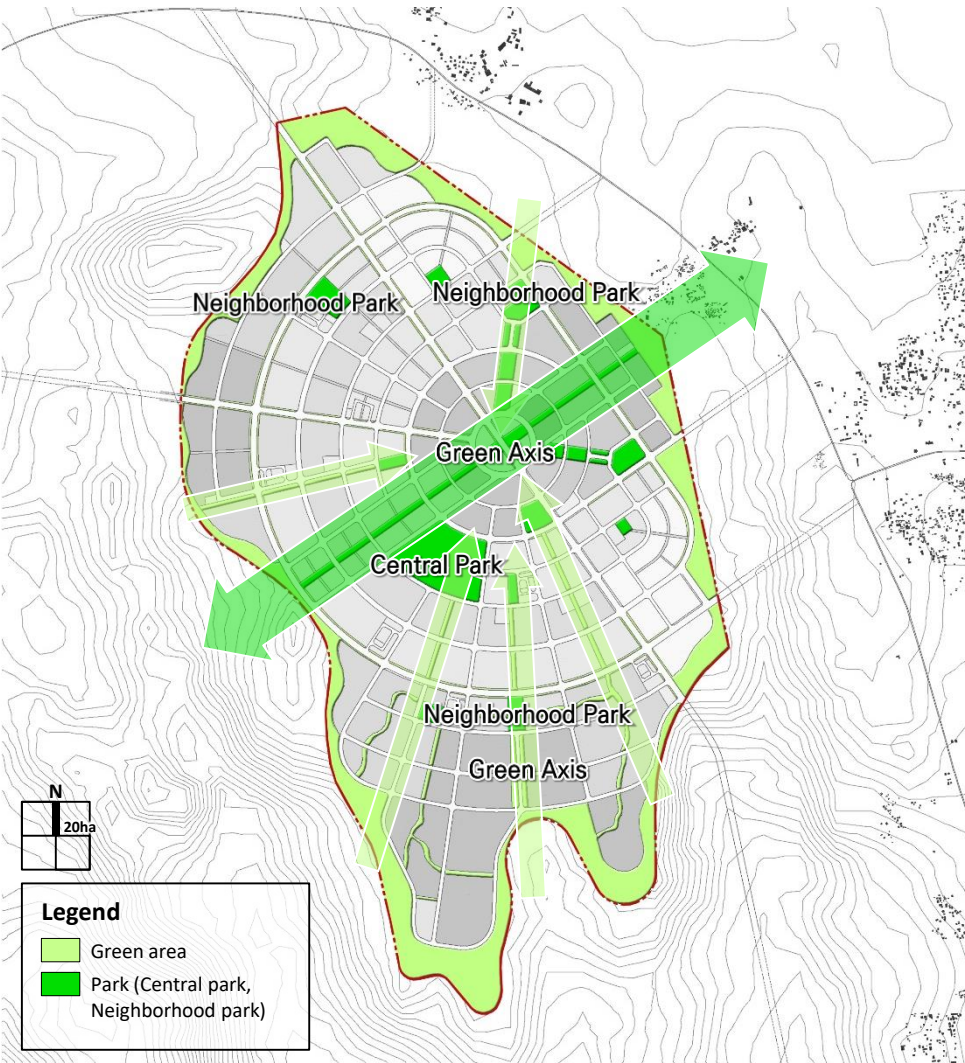
Central Park

- Establish the identity of Suleja Smart City



Neighborhood Park

- Provide leisure space for residents



Green Axis

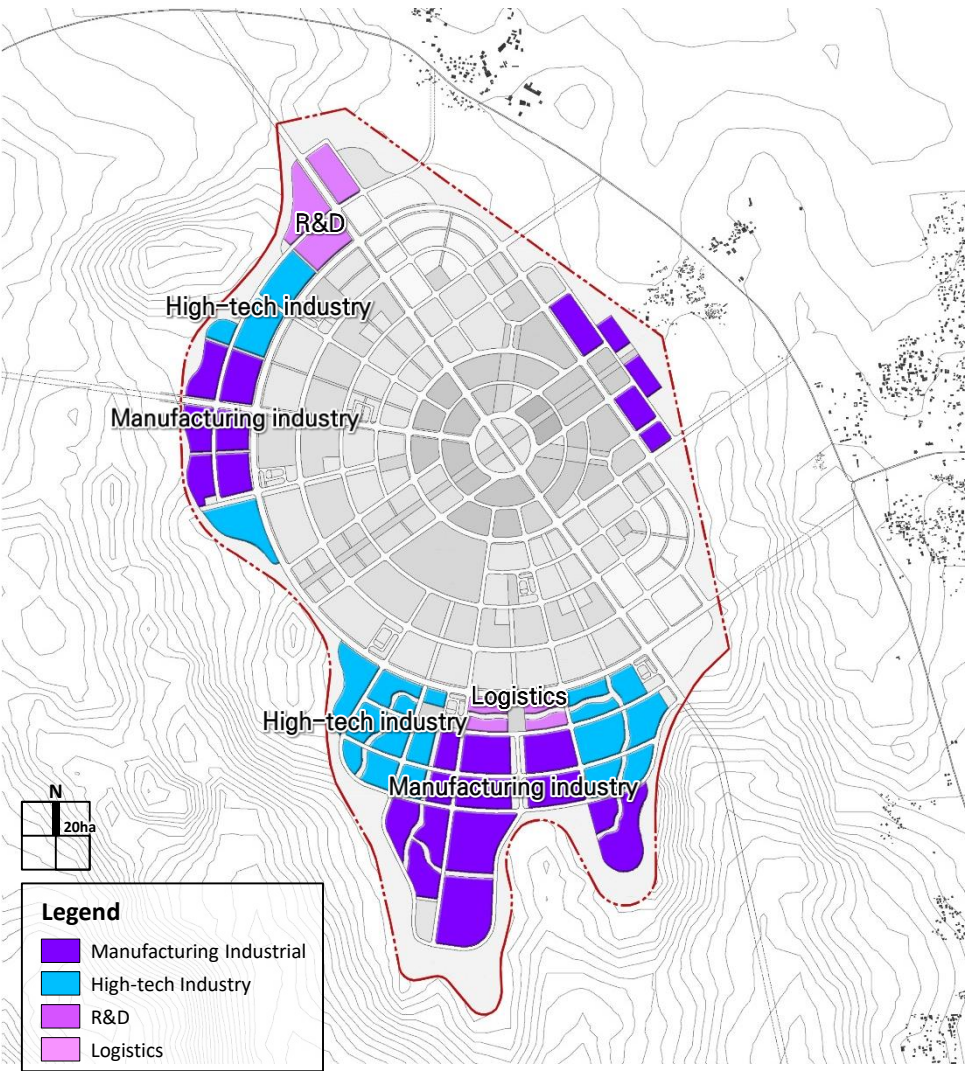
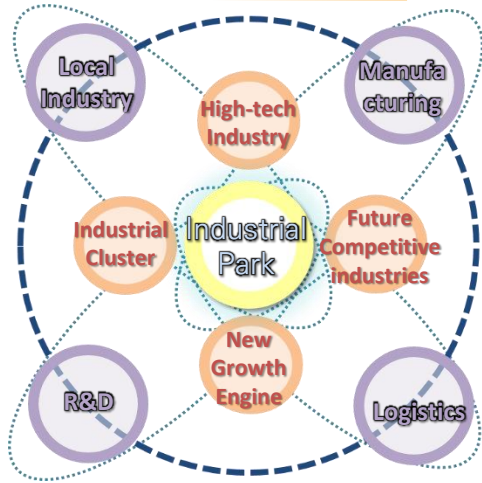
- Green axis plan for creating an eco-friendly city
- Green area ratio: 22.8%
- Green area per population: 13.1m² (WHO standard: 9 m²)



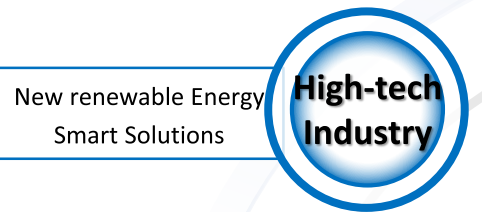
05 Sectoral Plan

Industrial Park Plan

Concept



Main Industry



05 Infrastructure Plan

Water Supply and Sewage Treatment

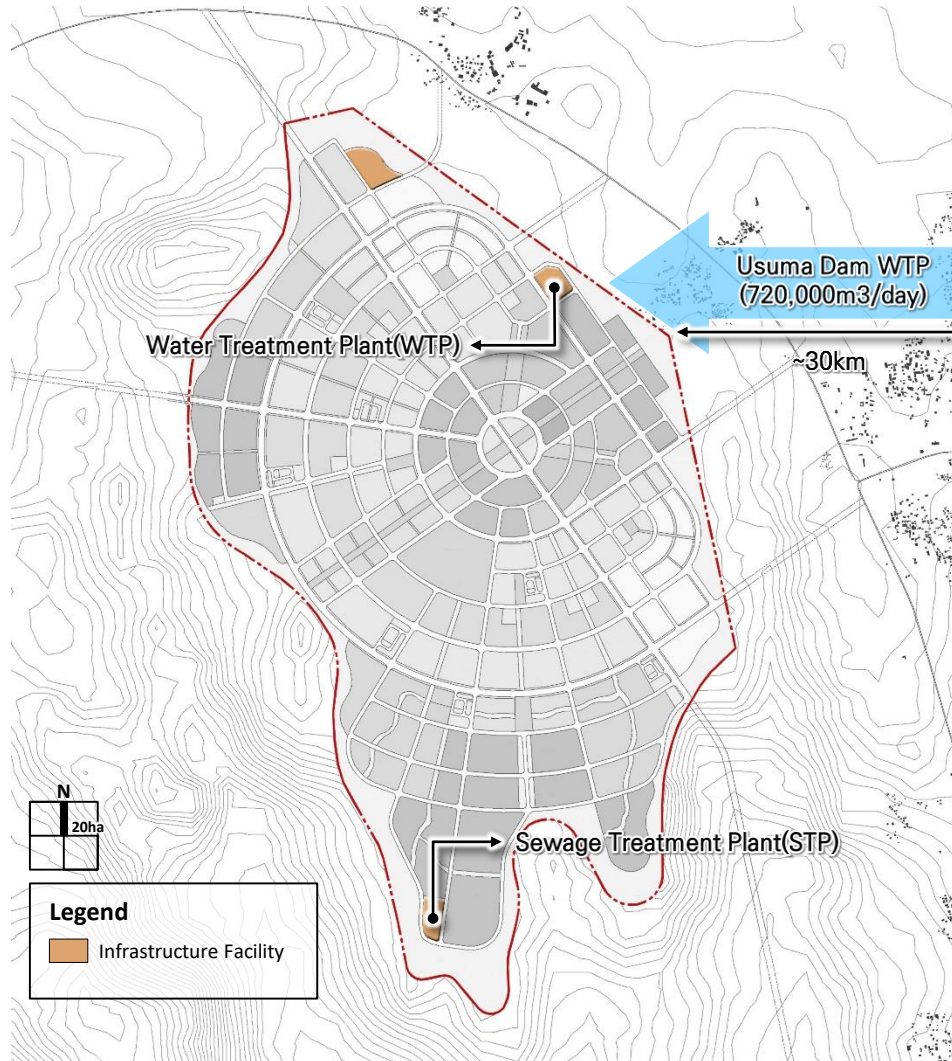
Water Supply

- Usuma Dam Water Treatment Plant (720,000m³/day)
- Water Supply Plan(30,600m³/day) for project area is reviewed in connection with the existing water supply network in the Suleja area.



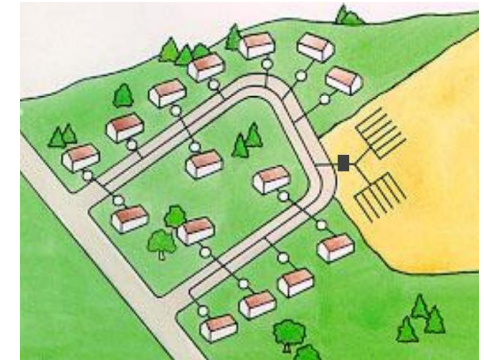
- Water consumption per person (National Water Policy 2016)

Contents	Population (person)	Consumption (L/person/day)
Urban	over 20,000	120
Town	5,000 ~ 20,000	60
Rural	less than 5,000	30

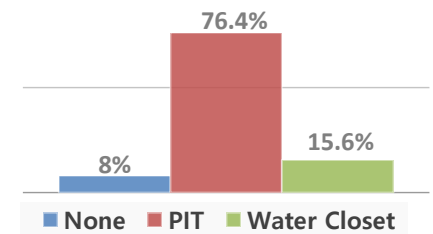


Sewage Treatment

- Review of a Decentralized Wastewater Treatment System (24,200m³/day) for integrated treatment by household, using Septic Tanks



- Sewage Treatment status from Suleja Master Plan 1987-2006



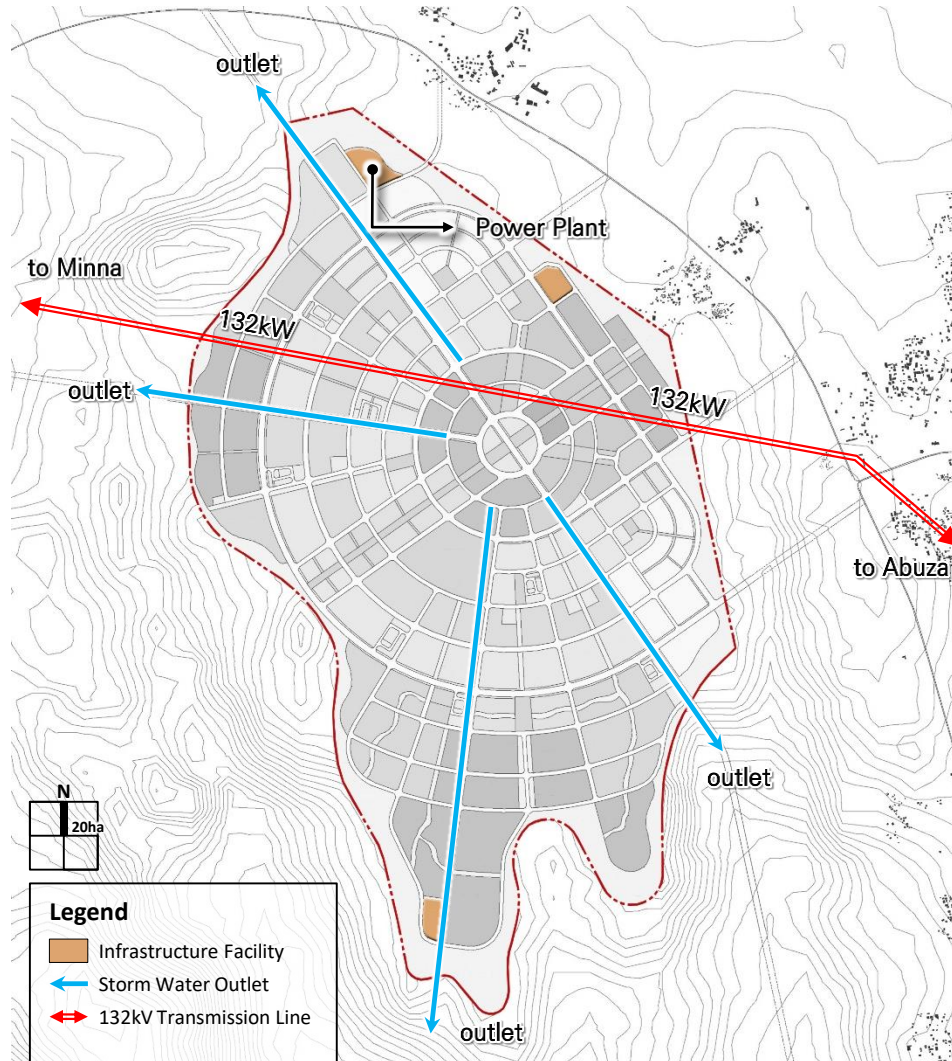
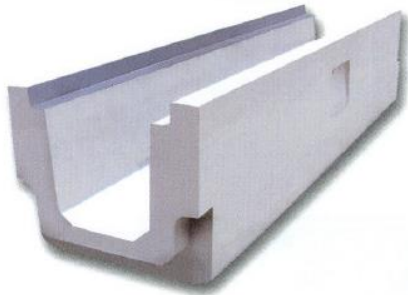
05 Infrastructure Plan

Storm Water Drainage and Power Supply

Storm Water Drainage

- The average annual precipitation is 1,220mm, and there is a tributary of the Gurara River in the north-south direction of the site
- The general method of drainage of rainwater in the region is that it is discharged into a river without a separate treatment facility through a roadside trench (gutter).

- U-type trench(sample image)



Power Supply

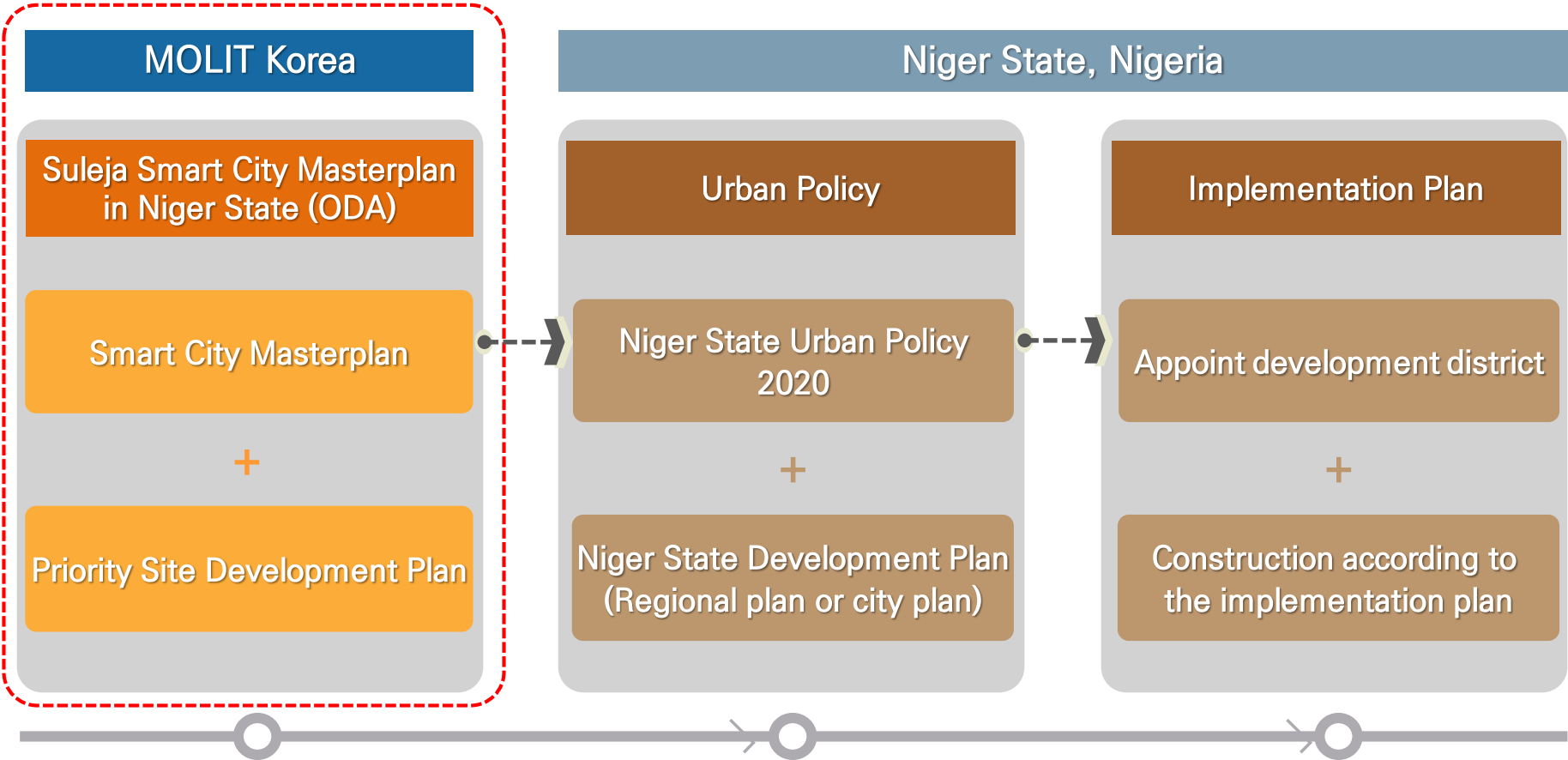
- Electricity is supplied to Mina, Suleja, and Abuja areas through a 132kV transmission line from the Shiroro Hydro Power Plant (600MW) (National Power System Development, 2019)



06 Project Implementation Plan

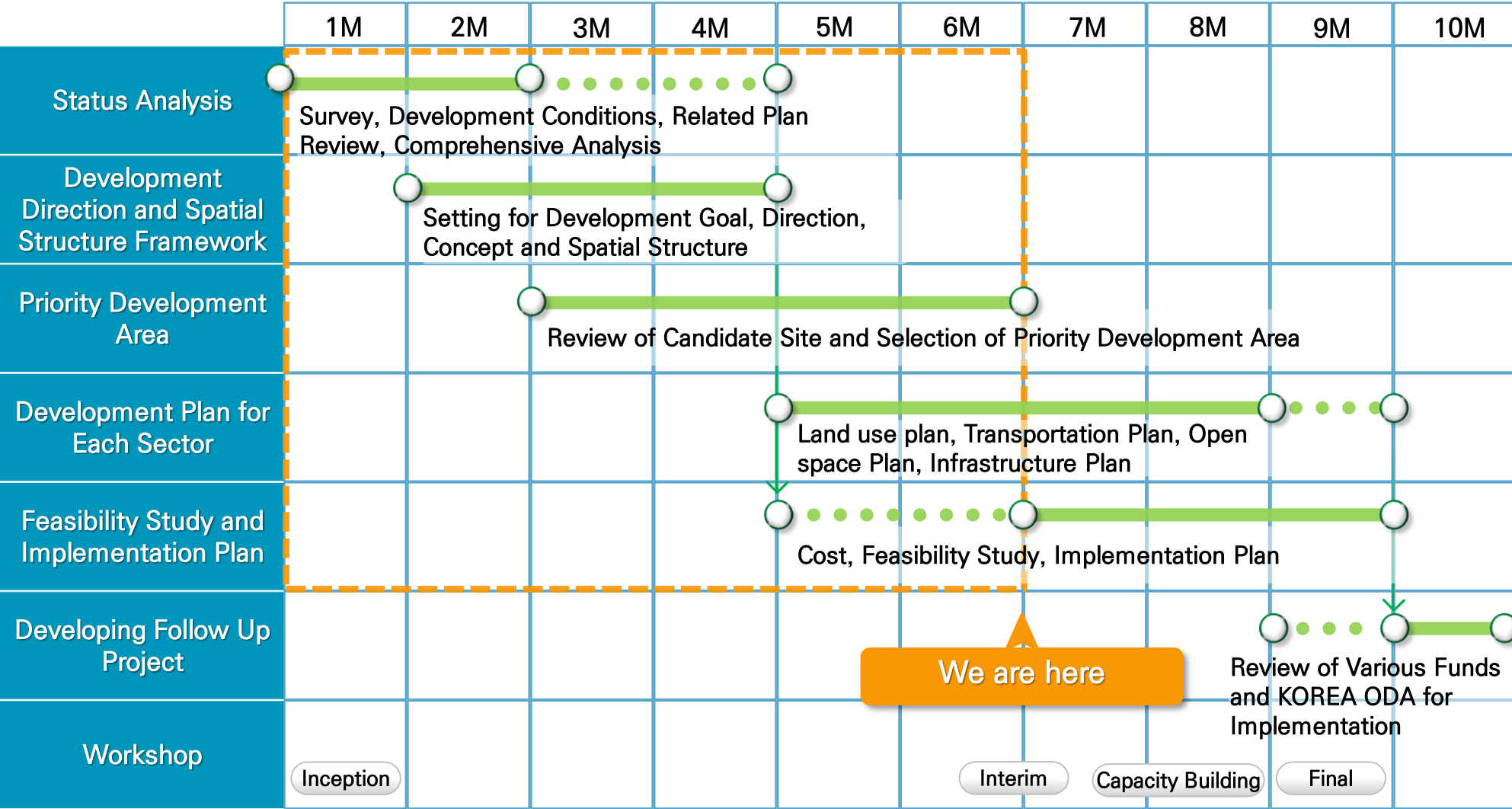
- 1) Implementation Strategy
- 2) Project Schedule

06 Implementation Strategy



Reflect the Suleja Smart City Masterplan in the urban policy of Niger State, establish a specific plan and implement the construction.

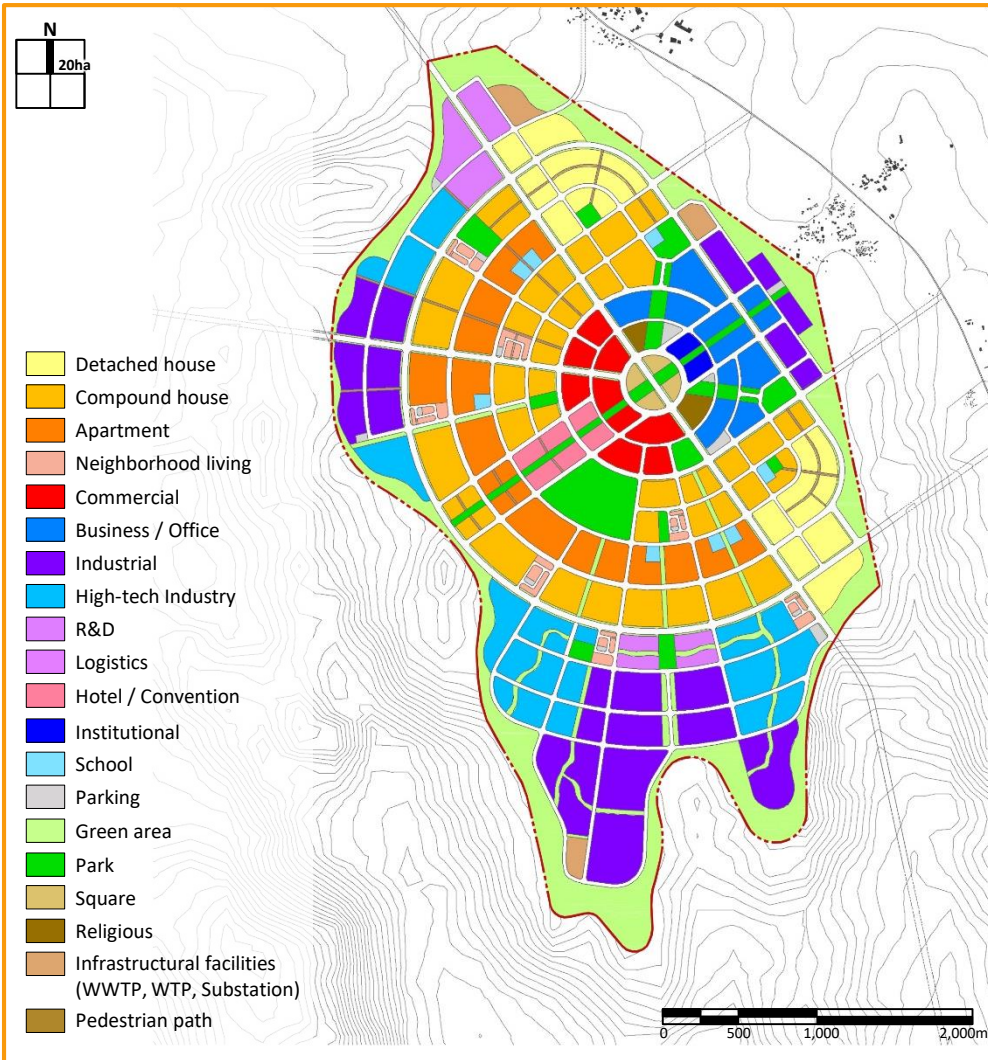
06 Project Schedule



Thank you

05 Land Use Plan

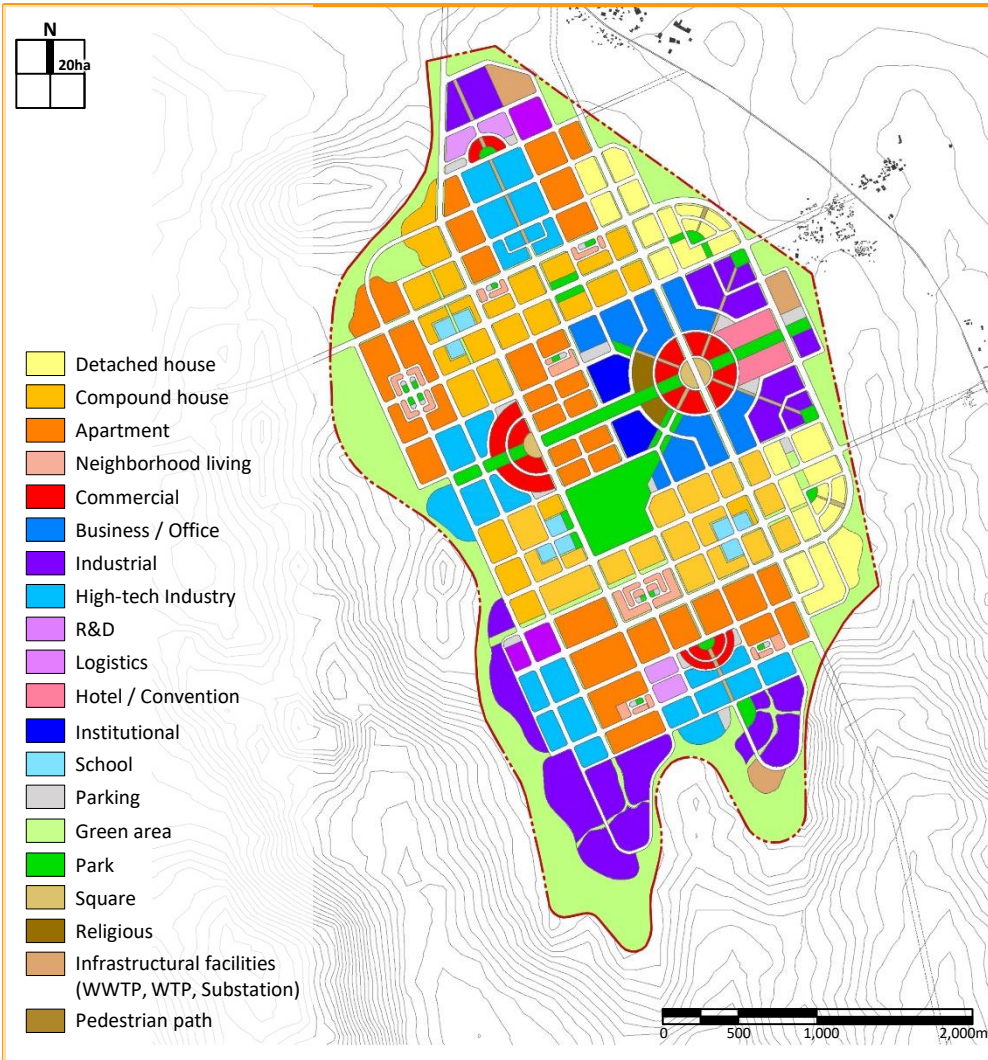
Land use plan #1



		Area(ha)	Ratio(%)
Total		1,219.7	100.0
Residential Area	Residential Area	317.1	26.0
	Detached house	69.3	5.7
	Compound house	165.2	13.5
	Apartment	82.7	6.8
Commercial Area	Commercial Area	97.9	8.1
	Commercial	30.7	2.5
	Business / Office	40.9	3.4
	Neighborhood living	13.2	1.1
Industrial Area	Hotel / Convention	13.2	1.1
	Industrial Area	272.8	22.3
	Manufacturing industry	148.0	12.1
	Logistics	16.0	1.3
Public Area	High-tech Industry	94.0	7.7
	R&D	14.8	1.2
	Public Area	18.6	1.5
	School	7.6	0.6
Park & Green spaces	Institutional	4.3	0.4
	Religious	5.2	0.4
	Square	1.4	0.1
	Park & Green spaces	277.9	22.8
Road & Infrastructural facilities	Park	63.7	5.2
	Green area	214.3	17.6
	Road & Infrastructure	235.3	19.4
	Road	217.8	17.9
Road & Infrastructural facilities	Parking	6.1	0.5
	Substation	4.9	0.4
	Waste water treatment plant	3.1	0.3
	Water treatment plant	3.4	0.3

05 Land Use Plan

Land use plan #2



		Area(ha)	Ratio(%)
Total		1,219.7	100.0
Residential Area	Residential Area	334.2	27.3
	Detached house	60.3	4.9
	Compound house	130.8	10.7
	Apartment	143.1	11.7
Commercial Area	Commercial Area	93.0	7.7
	Commercial	28.8	2.4
	Business / Office	39.2	3.2
	Neighborhood living	14.5	1.2
	Hotel / Convention	10.5	0.9
Industrial Area	Industrial Area	206.8	16.9
	Manufacturing industry	102.8	8.4
	Logistics	9.9	0.8
	High-tech Industry	83.5	6.8
	R&D	10.6	0.9
Public Area	Public Area	30.5	2.5
	School	10.7	0.9
	Institutional	11.4	0.9
	Religious	4.7	0.4
	Square	3.6	0.3
Park & Green spaces	Park & Green spaces	285.9	23.5
	Park	54.3	4.5
	Green area	231.6	19.0
Road & Infrastructural facilities	Road & Infrastructure	269.3	22.1
	Road	246.0	20.2
	Parking	11.1	0.9
	Substation	5.2	0.4
	Waste water treatment plant	3.3	0.3
	Water treatment plant	3.8	0.3