



NUSANTARA

# Nusantara

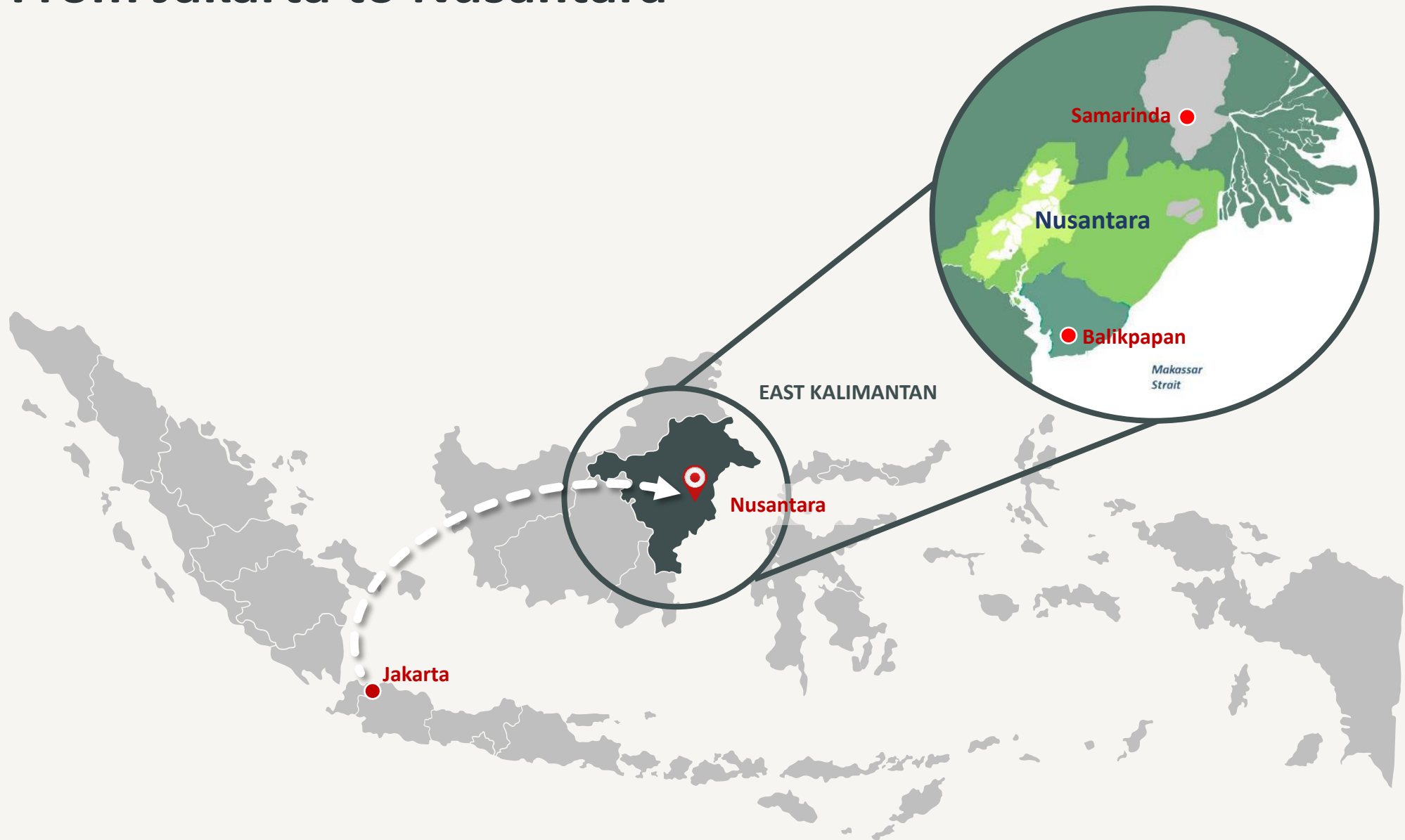
## Indonesia's Smart and Sustainable Forest City

**Sylvia Putri Larasati**

Green & Digital Transformation  
Nusantara National Capital Authority



# From Jakarta to Nusantara



# Nusantara's Scope of Development

Total Area  
Land & Water IKN  
**324,332 Ha**

Land Area  
256,142 ha

**KIKN**  
Urban Area  
56,180 ha



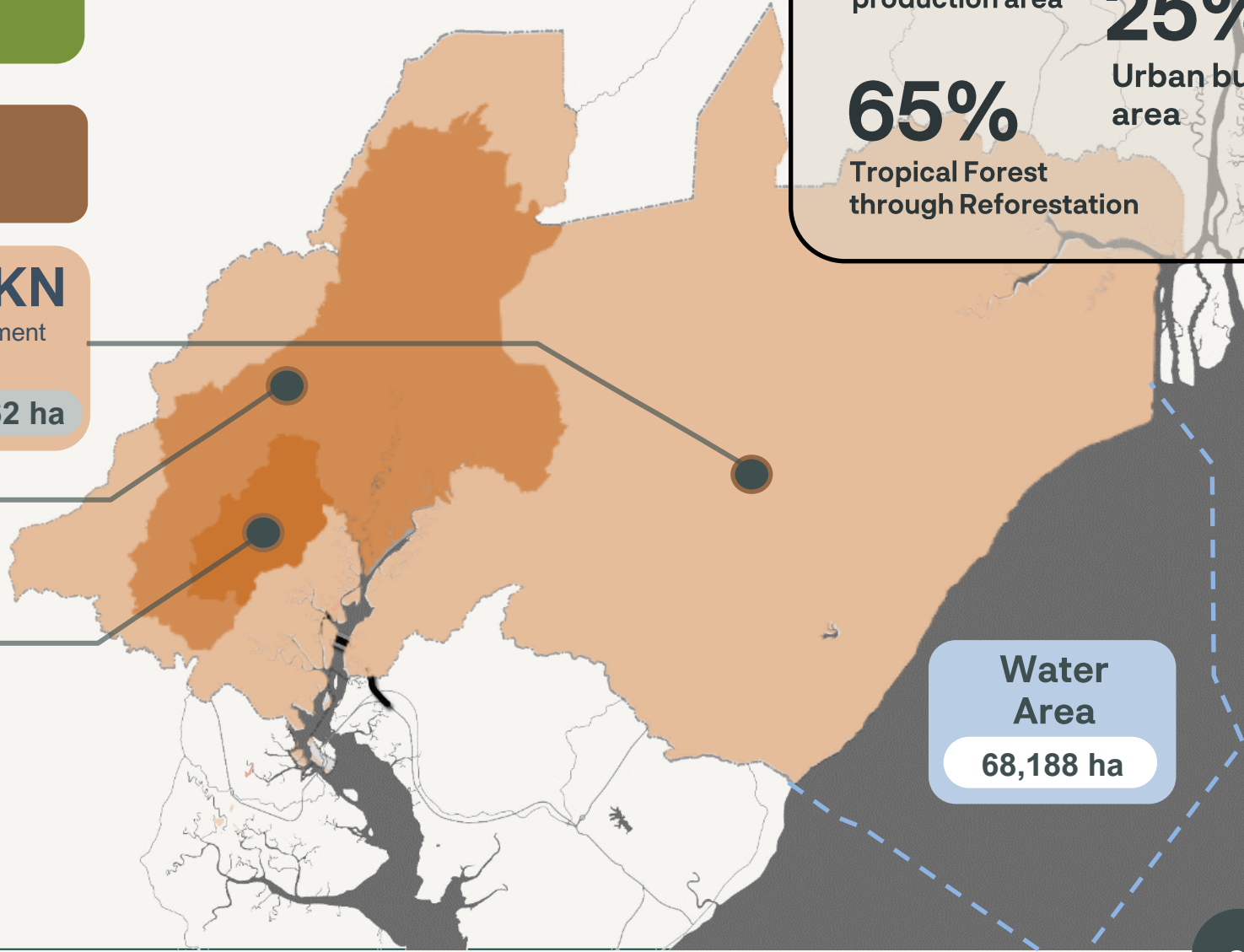
**KP-IKN**  
Development Area  
199,962 ha

**KIPP**  
Government Core Area  
6,671 ha

**10%**  
Parks and food production area

**25%**  
Urban built area

**65%**  
Tropical Forest through Reforestation



Water Area  
68,188 ha



# Nusantara Development's Principle

A Modern City of the Future

**Green**



**Resilience**



**Sustainable**



**Inclusive**



**Smart**





# Nusantara: Green, Resilient, and Sustainable City

Tropical forest are preserved as a carbon sink  
and built area are controlled to minimize emission and footprint

**10%**

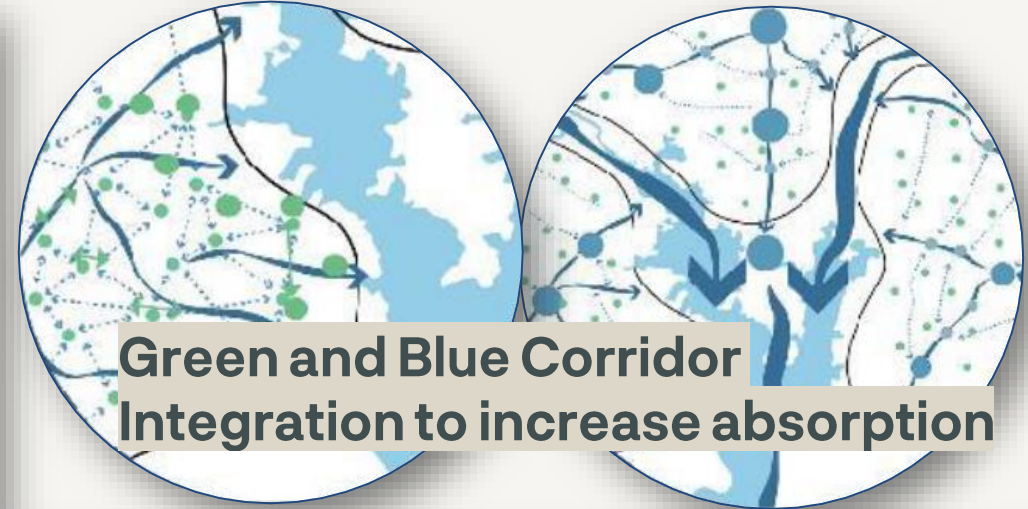
Parks and food  
production area

**65%**

Tropical Forest  
through Reforestation

**25%**

Urban built  
area



City landscape to  
reduce water runoff



**Goal: To become carbon-neutral city by 2045**



## Nusantara as *Sponge City*

A city that acts like a sponge, able to retain rainwater and increase infiltration into the soil thereby reducing flooding and increasing the quality and quantity of water



### Reducing Surface Runoff

- Natural environment to contain runoff
- Application of green rooftops, rainwater storage tanks, and water-sensitive city designs



### Maximizing Rain Water Infiltration

- Development of green open spaces that are widely distributed and evenly distributed as rain gardens
- Modification of porous road pavements and sidewalks to absorb water quickly



### Rainwater Harvesting

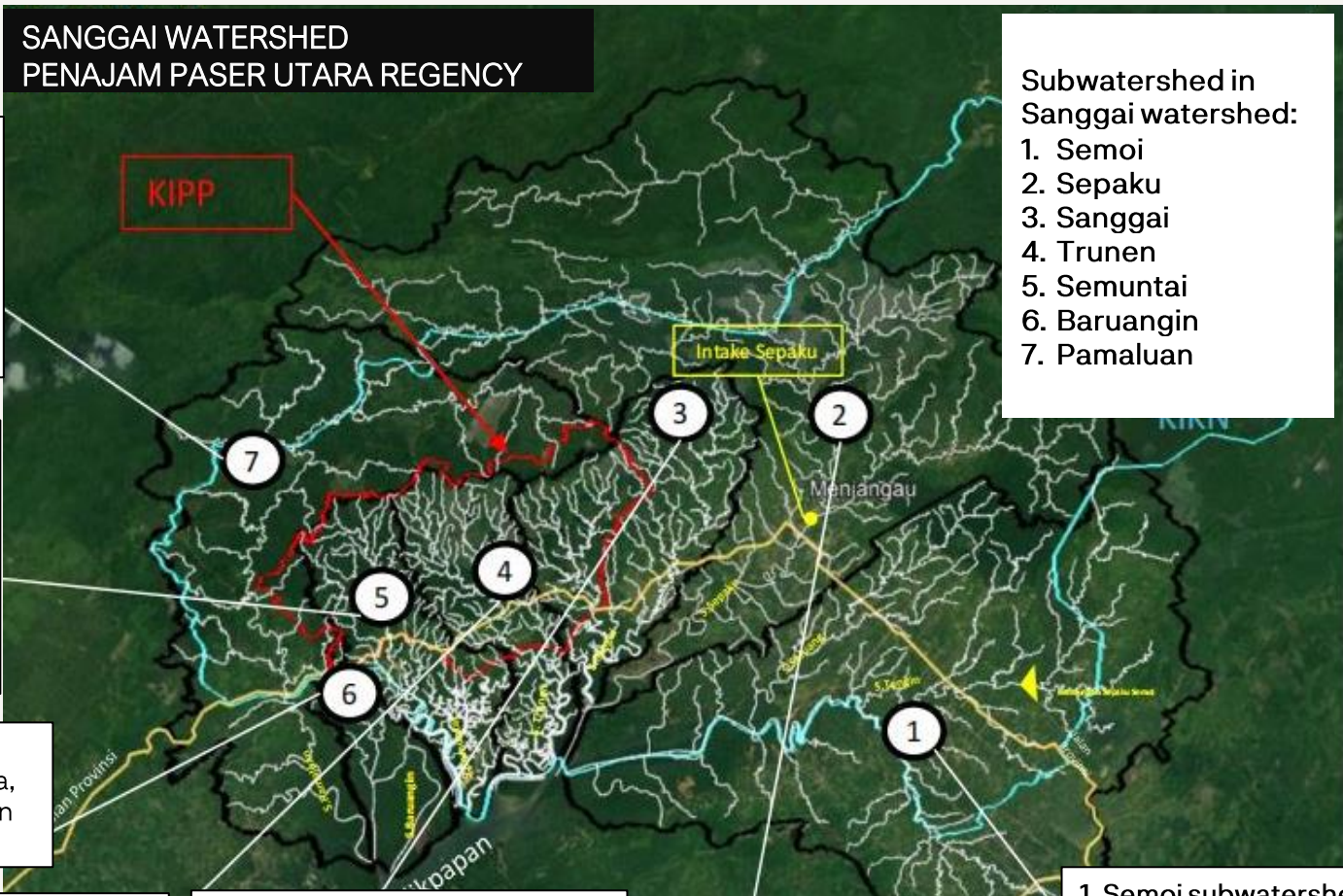
- Blue open space of ditches, river channels, water reservoirs as a hydrological unit
- From settlement scale (small retention) to city scale (reservoir)





# Nusantara as *Sponge City* – Sanggai Watershed Flood and Drainage Plan

Sanggai watershed is the biggest watershed in IKN. Flood Controlling Infrastructure is planned based on sub-watershed divisions in Sanggai Watershed



- Subwatershed in Sanggai watershed:
1. Semoi
  2. Sepaku
  3. Sanggai
  4. Trunen
  5. Semuntai
  6. Baruangin
  7. Pamaluan

**7. Pamaluan subwatershed**  
Planned flood discharge

- $Q_{100} = 1059,6 \text{ m}^3/\text{dtk}$

Controller building:

- Dam
- Normalization & embankment

**5. Semuntai subwatershed**  
Planned flood discharge

- $Q_{100} = 325,4 \text{ m}^3/\text{dtk}$
- $Q_{100} = 325,4 \text{ m}^3/\text{dtk}$  (YAD)
- $\Delta Q = 26,9 \text{ m}^3/\text{dtk}$

Controller building:

- Retention pond (2 ponds)
- Bottom controller (12 controllers)
- Check dam (8 dams)

**6. Baruangin subwatershed**  
Baruangin subwatershed is the swamp area, so there is no controlling action in Baruangin river because of no settlement existence.

**4. Trunen subwatershed**  
Planned flood discharge

- $Q_{100} = 222,60 \text{ m}^3/\text{dtk}$
- $Q_{100} = 248,00 \text{ m}^3/\text{dtk}$  (YAD)
- $\Delta Q = 25,40 \text{ m}^3/\text{dtk}$

Controller building:

- Retention pond (3 ponds)
- Bottom controller (8 controllers)
- Check dam (18 dams)

**3. Sanggai subwatershed**  
Planned flood discharge

- $Q_{100} = 431 \text{ m}^3/\text{dtk}$
- $Q_{100} = 471,6 \text{ m}^3/\text{dtk}$  (YAD)
- $\Delta Q = 40,6 \text{ m}^3/\text{dtk}$

Controller building:

- Retention pond (5 ponds)
- Check dam (7 dams)
- Normalization & embankment

**2. Sepaku subwatershed**  
Planned flood discharge

- $Q_{100} = 1391,1 \text{ m}^3/\text{dtk}$

Controller building:

- Selamayu Dam (FS)
- Normalization & embankment

**1. Semoi subwatershed**  
Planned flood discharge

- $Q_{100} = 1066 \text{ m}^3/\text{dtk}$

Controller building:

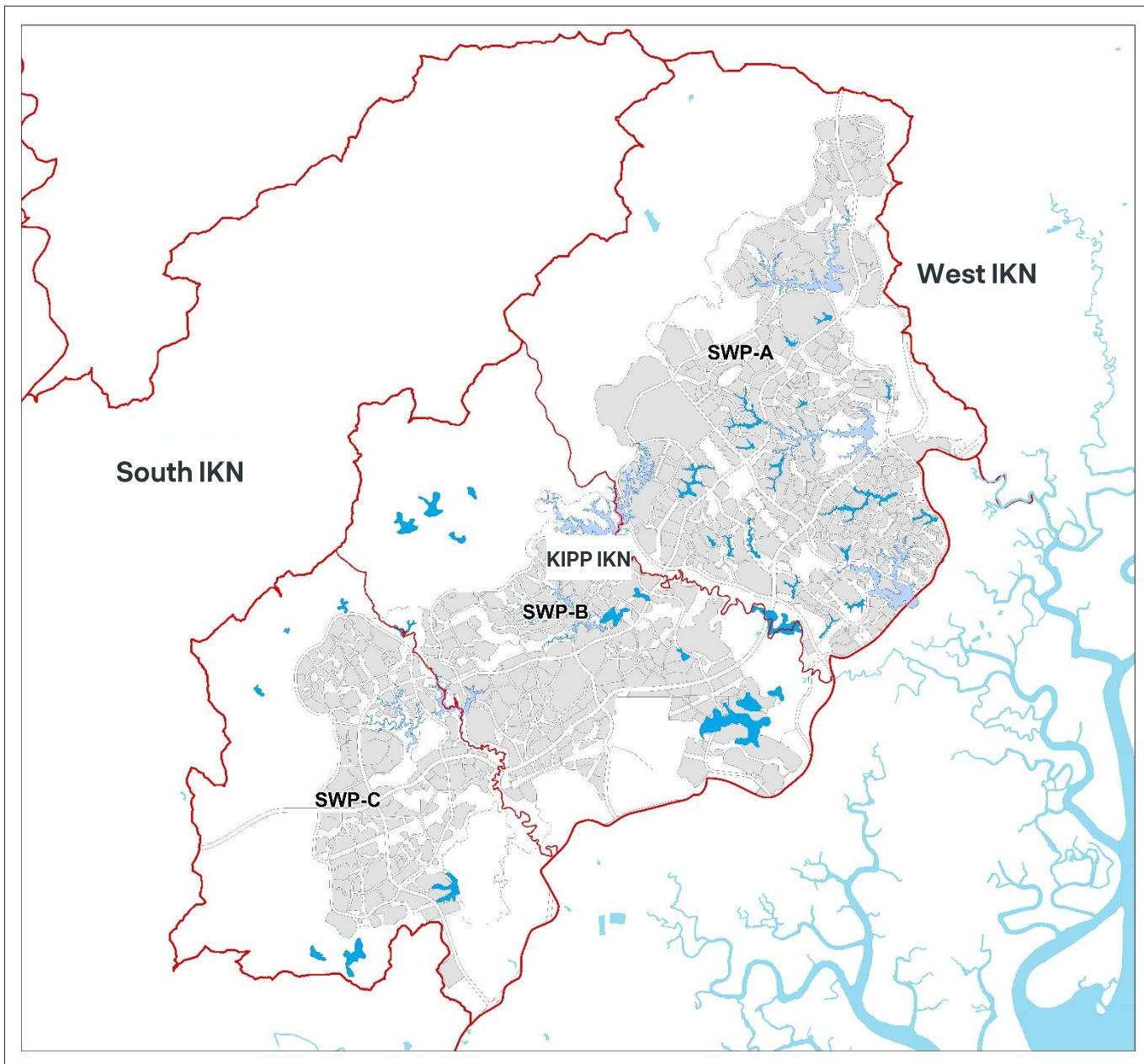
- Sepaku Semoi Dam (on progress)
- Retention pond (8 ponds)
- Normalization and embankment

Source: Ministry of PUPR, 2022







# Nusantara as *Sponge City* – Retention & Detention Ponds Plan in KIPP IKN



## Legend

-  Retention Ponds (Embung)
-  Detention Ponds

**Retention pond/basin** is designed to permanently hold water. Whereas **detention pond/basin** temporarily stores stormwater runoff.

Source: Ministry of PUPR, 2023





# Nusantara as *Sponge City* – Flood Controlling Infrastructure Progress

As of May 25<sup>th</sup> , 2023



**Sepaku Semoi Dam**  
*Rencana 91,72% | Realisasi 91,28%*



**Sepaku River Intake**  
*Rencana 94,13% | Realisasi 94,17%*



# Nusantara: Smart City

Building Nusantara as a city that is dynamic and inclusive, ready to face future changes, and leverage technology to improve productivity and quality of life

# 1

## Governance

- Digital Identification
- Data Exchange Layer
- Application's Layer

# 2

## Transportation & Mobility

- Intelligent Transport System
- City Logistics

# 3

## Living

- Pollution Control System
- Public Space and Safety System
- Health and Welfare System
- Disaster Response and Management

# 4

## Natural Resources & Energy

- Resource Management
- Energy Management & Digitalization
- Smart Forest & Green Management

# 5

## Industries & Human Resources

- SMEs Platform
- Urban Citizen Living Lab
- Technological Center
- Industries (Pharmacy, Machinery, Chemical)
- Smart Education
- Smart Tourism
- Digital Social Platform and Citizen Service Collaboration

# 6

## Built Environment & Infrastructure

- 5G Infrastructure
- Smart Infrastructure
- Smart Building
- Social Facilities, Commercial Facilities
- Smart Utilities





# 1 Smart Governance

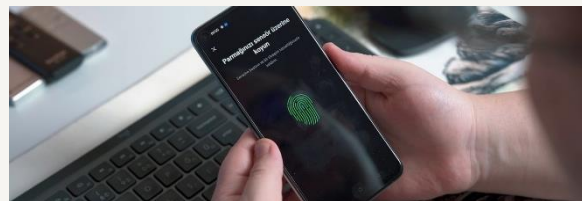
## Digital Identification



Civil Registers

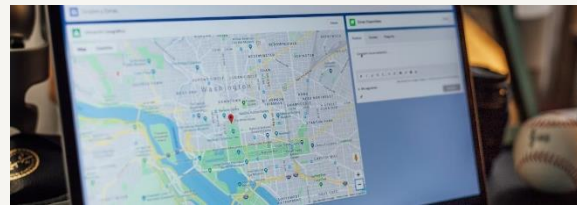


Secure ID Documents and Readers

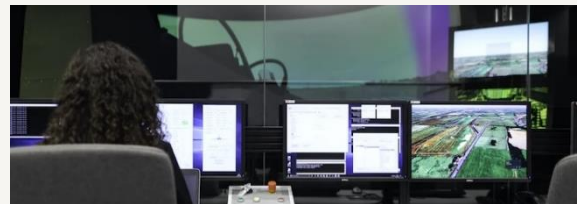


Digital Identities

## Data Exchange Layer



GIS-based Control



City Integrated Operation Center



Centralized Citizen Reporting System

## Application's Layer



Smart Permit



Smart Administration



E-Procurement



# 2 Smart Transportation & Mobility

## 2.1 Intelligent Transport System



Advanced Traffic and Parking Management System



Advanced Public Transportation System



Autonomous Driving System



Incident Management System



Commercial Vehicle Operation System



Electronic Payment System



Advanced Traveller Information System

## 2.2 Mobility-as-a-Service



Urban Air Mobility



## 2.3 Electric Vehicle Ecosystem



# 2 Smart Transportation & Mobility

## 2.4 Smart Logistics

### Smart Delivery



Autonomous Mobile Robots (AMRs)

### Smart Warehouse



IoT System in Logistics



Smart Labels



AI-enhanced Supply Chain Analytics



Logistic Tracking System



# 3 Smart Living



Pollution Sensors



Pollution Monitoring



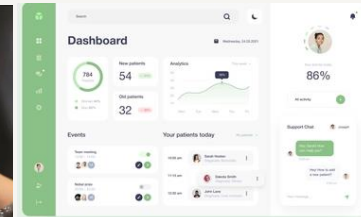
Live Report



Hologram Meeting



Emergency Response



Integrated Health Dashboard

## Pollution Control System

- Air Pollution Monitoring
- Air Pollution Controlling

## Public Space and Safety System

- Crisis Management
- Urban Safety and Mobility
- Disaster Prediction
- Public Wifi
- Environmental Sensors
- Interactive Displays

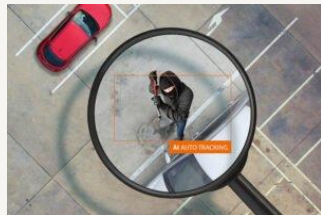


## Health and Welfare System

- Telemedicine
- Emergency Response
- Smart Healthcare
- Smart Working

## Disaster Response and Management

- Integrated Command center
- Weather Info and Alert Based on Rainfall Data



Suspect Detection



Crowd Management



Fiber Optic and Wifi



Integrated Command and Control Center



Live Density Report



Environmental Display



# 4 Smart Natural Resource and Energy

## 4.1 Resource Management

### 4.1.1 Smart Water Management

Smart Metering

Smart Water Quality Monitoring

Water SCADA



### 4.1.2 Smart Waste Management

Smart Bin

Smart Waste Fleet

Reduce, Reuse, Recycle Material Recovery Facility (3R MRF)



### 4.1.3 Smart Wastewater Management

Smart Rain & Storm Water Management

River Pollution Monitoring

Greywater Recycling

Water SCADA



## 4.2 Energy Management & Digitalization

4.2.1 Smart Grid

4.2.2 Smart Energy Market

4.2.3 Vehicle to X Ecosystem

4.2.4 Storage System





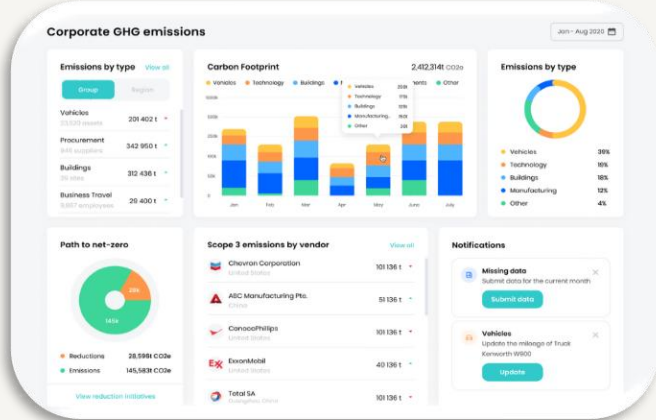
# 4 Smart Natural Resource and Energy

## 4.3 Smart Forest and Green Management

### Carbon Stock and Emissions Monitoring

4.3.1

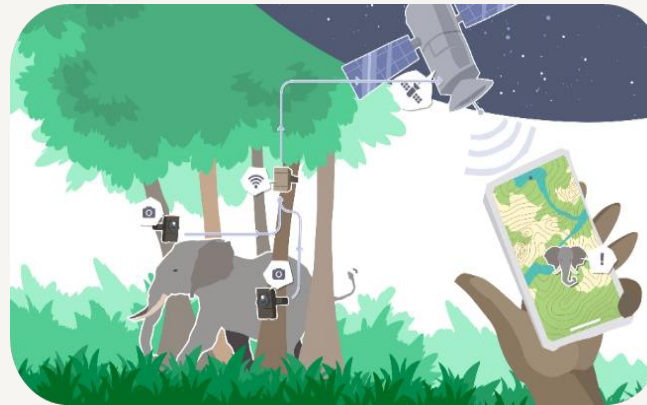
- Carbon Monitoring
- Carbon Emissions Calculator



### Smart Forest Biodiversity Monitoring

4.3.2

- IoT sensor
- Trap Camera
- Dashboard Database



### Precision Farming

4.3.3

- Data analytics capabilities
- Location optimization for crops farmers
- Automated fertilizer & water
- Remote monitoring & control
- Smart feeding management
- Disease detection & prevention

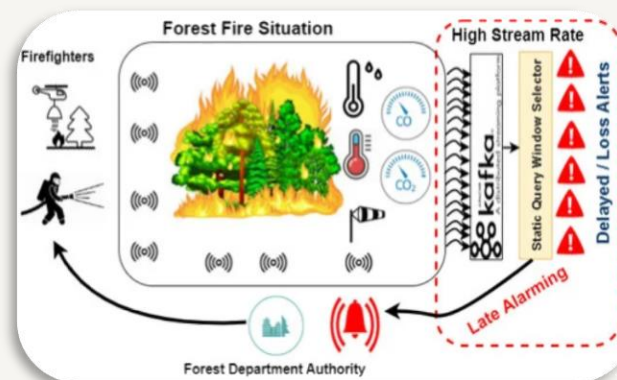


Sahal et al, 2021

### Smart Forest Fire Management

4.3.4

- Forest fire hotspot monitoring
- Forest fire emergency alert system
- Forest fire tracking capability





# 5 Smart Industries and Human Resources

## Industries



**Local SME's Support Platform**



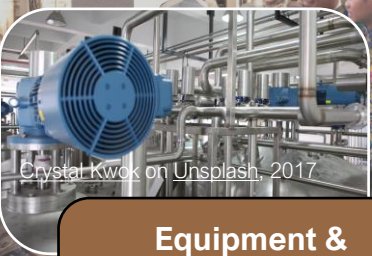
**Urban Citizen Living Lab**



**Technological Demonstration Center**



**Chemical & Pharmacy Center**

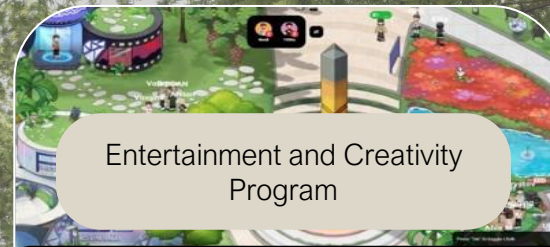


**Equipment & Machinery Center**

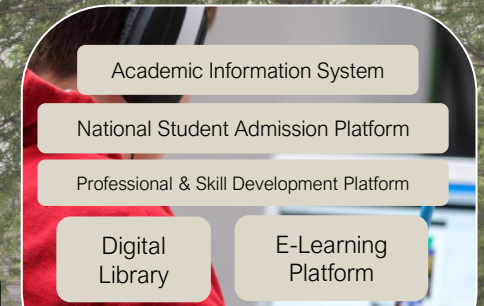


**Smart Tourism**

## Human Resources



**Digital Social Platform**



**Smart Education**



**Citizen Service Collaboration**



# 6 Smart Built Environment & Infrastructure

5G Infrastructure

Denny Müller on Unsplash, 2020

Smart Infrastructure

Denis Nevozhai on Unsplash, 2016

Smart Building

J.C. Gellidon on Unsplash, 2018

Social Facilities

Urban Design Development, Ministry of PUPR, 2022

Commercial Facilities

Urban Design Development, Ministry of PUPR, 2022

Smart Utilities

Doris Morgan on Unsplash, 2021

Smart Construction

Evgeniy Surzhan on Unsplash, 2021

GIS-Based Monitoring



Building Automation and Management System



fymt.com, 2021

IoT-sensing in Monitoring



TechRepublic, 2022

Digital Twin



TechRepublic, 2022





# Nusantara’s Smart Building Guideline

The preparation of the Smart Building Guidelines document aims to provide reference standards for the development of smart buildings in IKN. This document discusses sustainable development in the context of the Nusantara, the principles of Smart Building, sustainable management of resources (energy, water and air), as well as implementation guidelines in the Capital City of the Nusantara.

**NUSANTARA'S SMART BUILDING GUIDELINE**

[ikn.go.id/BangunanCerdas](https://ikn.go.id/BangunanCerdas)

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**Green and Digital Transformation**  
Nusantara Capital Authority

**Building Automation & Management System**

**Control Room & Data Center**

**FTTR**

**Digital Twin**

**Lighting System**

**Communication System**

**Energy System**

**Resource System**

**Mobility System**

**Security System**

**Safety System**

**HVAC System**

Basic Requirements (Blue box) | Scope Requirements (Orange box)

Tabel 5. Matriks Fitur Bangunan Cerdas Berdasarkan Klasifikasi BGN

Fitur	Klasifikasi Non-BGN									
	1	2	3	4	5	6	7	8	9	10
Sistem Manajemen Gedung Terpadu	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruang Kontrol dan Pusat Data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fiber-to-the-Room (FTTR)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Digital Twin				✓	✓				✓	✓
Kontrol Akses Tanpa Sentuh	+	+	+	✓	✓				✓	✓
Manajemen Pengunjung				+	+				+	✓
Sistem Interkom	+	+	+	✓	✓				+	✓
Papan (Signage) Digital & Audio Visual				+	+				+	✓
Pembaca Meter Otomatis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pembaca Sub-Meter Otomatis	+	+	+	+	+	+	+	+	+	+
Penyeimbang Beban Listrik	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stasiun Pengisian Kendaraan Listrik Umum				✓	✓			+	✓	+
Sistem Tanggap Bencana Aktif	+	+	+	✓	✓	+	+	✓	✓	+
Sistem Pemadam Kebakaran Cerdas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tombol Darurat	+	+	+	✓	✓	+	+	✓	✓	+
Pemeliharaan Perangkat Keselamatan Kebakaran				+	+				+	+
Perlindungan Bahaya Hewan	+	+	+	+	+				+	+
Pemantauan Kualitas Udara Dalam dan Luar Ruangan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sistem Pendingin Udara	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pemurnian Udara dan Pemantauan Filter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ventilasi Berbasis Permintaan (DCV)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sistem Deteksi Iklim	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sistem Pencahayaan Cerdas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eskalator dan/atau Autowalk Cerdas				✓						+
Elevator Cerdas				✓						✓
Sistem Parkir Cerdas				+	+		+	+	+	+
Pengawasan Video Cerdas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sistem Penguncian Cerdas	✓	✓	✓	✓	✓	✓	✓	✓	✓	+
Gerbang Virtual				+	+					+
Pemantauan Hunian	+	+	+	✓	✓	+	+	+	✓	+
Pengelolaan Air Cerdas	✓	✓	✓	✓	✓	✓	✓	✓	✓	+
Dispenser Air Minum Cerdas				+	+					+
Saluran Limbah Cerdas				✓	✓					✓
Tempat Sampah Cerdas				+	+				+	✓
Toilet Cerdas				+	+				+	✓

Tabel 5. Matriks Fitur Bangunan Cerdas Berdasarkan Klasifikasi BGN

Fitur	Klasifikasi BGN		
	Sederhana	Tidak Sederhana	Khusus
Sistem Manajemen Gedung Terpadu	✓	✓	✓
Ruang Kontrol dan Pusat Data		✓	✓
Fiber-to-the-Room (FTTR)	✓	✓	✓
Digital Twin		✓	✓
Kontrol Akses Tanpa Sentuh	-	✓	✓
Manajemen Pengunjung		-	✓
Sistem Interkom	+		✓
Papan (Signage) Digital & Audio Visual		+	✓
Pembaca Meter Otomatis	✓	✓	✓
Pembaca Sub-Meter Otomatis	+	+	+
Penyeimbang Beban Listrik	✓	✓	✓
Stasiun Pengisian Kendaraan Listrik Umum		✓	✓
Sistem Tanggap Bencana Aktif	+	✓	✓
Sistem Pemadam Kebakaran Cerdas	✓	✓	✓
Tombol Darurat	-	✓	✓
Pemeliharaan Perangkat Keselamatan Kebakaran		+	+
Perlindungan Bahaya Hewan	-	+	+
Pemantauan Kualitas Udara Dalam dan Luar Ruangan	✓	✓	✓
Sistem Pendingin Udara	✓	✓	✓
Pemurnian Udara dan Pemantauan Filter	✓	✓	✓
Ventilasi Berbasis Permintaan (DCV)	✓	✓	✓
Sistem Deteksi Iklim	✓	✓	✓
Sistem Pencahayaan Cerdas	✓	✓	✓
Eskalator dan/atau Autowalk Cerdas		✓	+
Elevator Cerdas		✓	✓
Sistem Parkir Cerdas		+	+
Pengawasan Video Cerdas	✓	✓	✓
Sistem Penguncian Cerdas	✓	✓	✓
Gerbang Virtual		+	+
Pemantauan Hunian	+	✓	✓
Pengelolaan Air Cerdas	✓	✓	✓
Dispenser Air Minum Cerdas		+	+
Saluran Limbah Cerdas		✓	✓
Tempat Sampah Cerdas		+	✓
Toilet Cerdas		+	✓

## Smart Building Technology Feature Completion Matrix

009/SE/Kepala-Otorita IKN/VIII/2023

# Nusantara’s Smart City Master Plan Document

## Blueprint for Digital Transformation Strategy for Nusantara



The Smart City Blueprint document begins with an identification of the background and vision of the Capital City of the Nusantara, a World City for All.

Furthermore, the formulation of the features and scope of smart city development is carried out by identifying user personas to map the potential of residents who will live, work, and visit the IKN based on demographic analysis and IKN development plans based on Presidential Regulation No. 63 of 2022.

Next, identification of application domains is mapped into **6 smart city domains**, along with identification of a number of **67 smart features** that exist in each domain and subdomain of Nusantara smart city





# Nusantara in 2024

A fully-functioning city ecosystem in 1A

Center of government supported by key infrastructure and facilities to support the livelihood of its residents



**Remaining time: 354 Days**





# NUSANTARA

Capital City of Indonesia

## Nusantara Smart Building Guideline



**Nusantara Capital City Authority – Jakarta Office**  
Menara Mandiri Tower II, Floor 27  
Jl. Jend. Sudirman Kav 54-55, RT.5/RW.3, Senayan,  
Kebayoran Baru, Jakarta Selatan 12190, Indonesia

**Nusantara Capital City Authority – Balikpapan Office**  
Pantai Mentari Compound  
Jl. Mulawarman 6, Manggar, Kec. Balikpapan Timur  
Kota Balikpapan 76116, Kalimantan Timur

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