SEMARANG SPATIAL PROFILE

DECEMBER 2022

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Disclaimer:
This document does not provide a definitive plan for the City of Semarang - rather it provides an exemplary process to demonstrate an effective planning process in this context.

Introduction to Semarang

National & Regional Setting

Semarang is an important economic, cultural and commercial city in Indonesia. It has the 5th largest metropolitan area and is the capital of Central Java province. In recent decades it has seen dynamic population growth – from 1 million to 1.7 million inhabitants in 20 years and is now Indonesia's 5th largest city. This expansion not only resulted in a strong economic development and a substantial growth in wealth, it also heightened a number of issues related to climate change and social inequity.

Similarly to other cities in Indonesia, Semarang lacks some necessary urban infrastructure, particularly in areas prone to environmental risks such as flooding. Underlying this suite of urban and climate challenges is a heritage of exploitative colonial rule, land reclamation, paradigm shifts in technology and transportation, economic crises, and shifting social fabric.

Urban History

The coastline where the present-day urban core of Semarang lies was once a natural edge sitting on alluvial soils deposited by the Semarang River and its tributaries. Prior to forced cultivation systems and land taxes in central Java established by a Dutch colonial system, a primarily agricultural economy supported a complex Javanese feudal governing state, organized into small villages.

From 1678 to 1942, Central Java Province was periodically under Dutch colonial jurisdiction, during which time the nation's first

infrastructure networks - water, transportation, energy, waste - were developed.

Location

Java is the world's most populous island, with 150 million inhabitants. The north coast of Java stretching from Jakarta to Surabaya and including Semarang, is seeing dramatic population increases. It is estimated that by 2025, nearly 67 % of Indonesia's population will live in cities.

Semarang is located on the northern coast of Java, in a strategic central location whereby

it is a key connector for domestic and international air, water and land transportation networks. Served by one of Asia's busiest and largest seaports, Semarang is an important international gateway to Central Java for transporting passengers and goods. In total, Semarang is Indonesia's third-largest port city. Java is characterized by densely forested volcanic mountains in the interior that slope downward to coastal plains.

Economy

The principal means of livelihood in Central Java outside of Semarang is agriculture.

SEMARANG IS A CULTURAL & COMMERCIAL HUB IN INDONESIA, **CAPITAL AND LARGEST CITY OF THE CENTRAL JAVA PROVINCE**

Industries produce textiles, ceramics, footwear, tires, electric bulbs, processed food, beverages, and other items. Roads and railways run parallel to the northern and southern seacoasts and connect Semarang with Tegal, Pekalongan, Magelang, Cilacap, and Surakarta.

Figure: Semarang's Indonesian Context

population estimate (2022)

- 10 million
- 5 million
- 1 million
- 0.5 million

Medan
2.4 million

1700 km

Manado

Jakarta
11 million

1100 km

Semarang
1.7 million

440 km

350 km

Makassar
1.4 million

Surabaya
3 million

Bandung
2.6 million

Yogyakarta

NTS
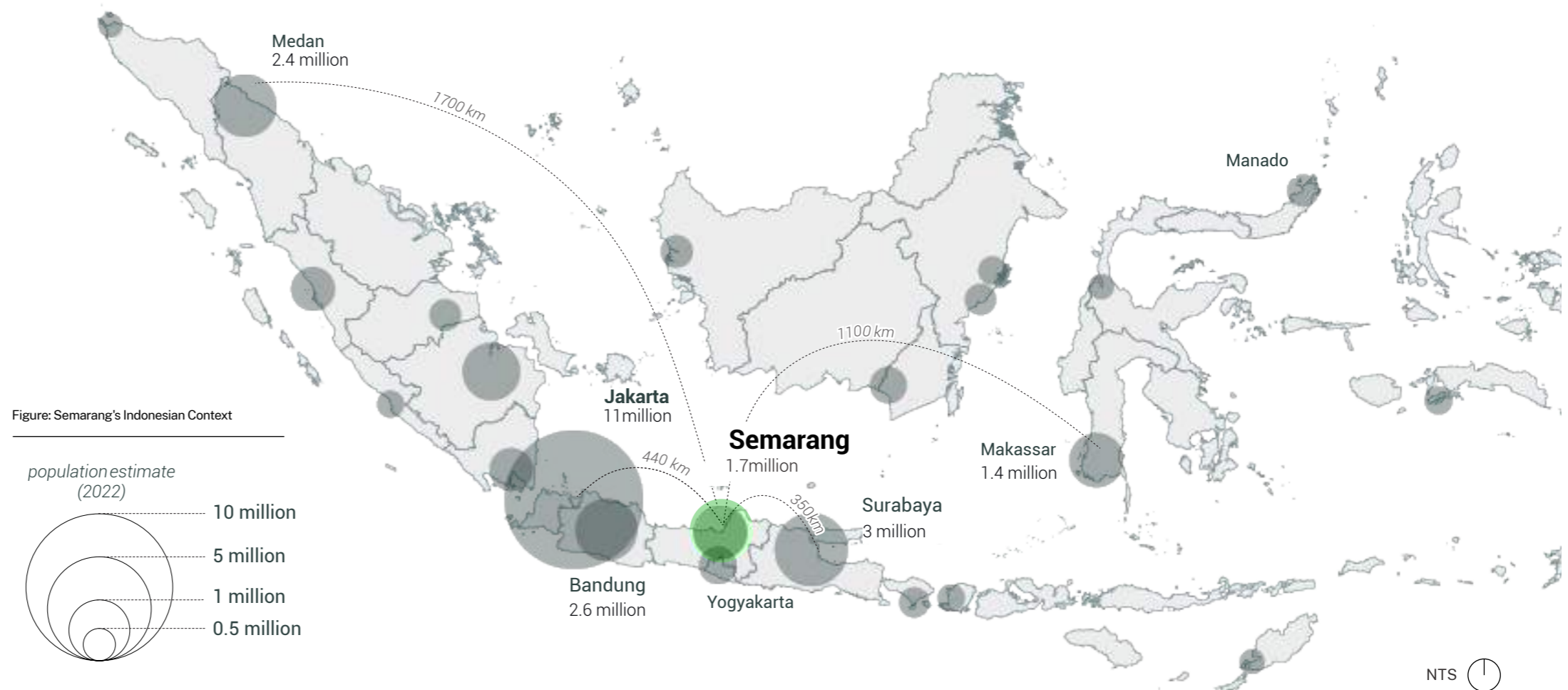
The City & Its People

NTS

Figure: Semarang City Boundaries

Geography

Semarang city is 373.8km² with 45-50% of land urbanized. The estimated population is 1.7 million inhabitants (2022) with an average increase of nearly l.9 % per year, and it is expected to continue densifying along both coastal and upland areas. In fact, the urban area has expanded from 15% of the City's area to 44% between 1999-2014. The city, divided into old and new sections, is just inland from the port and on the banks of the Baru River. Semarang sits at the centre of a larger urban metropolitan area which has an estimated population of over 6 million in 2020.

Culture & Demographics

Muslim Javanese and Sundanese are the principal ethnic groups in Central Java, and there also are many Indians and Chinese. Archaeological and historical remains, including temples, stupas, monasteries, and sanctuaries of the early Buddhist and Hindu periods, are located at Kalasan, Dieng, Borobudur, Sewu, Sukuh, Sari, Plaosan, Pawon, and Mendut.

Residents are predominantly Javanese (93%) with a significant Chinese presence (4%). 87% of the population practices Islamic traditions while 12% practice Christianity and 0.65% practice Buddhism.

Owing to its rich multicultural history, Semarang hosts many historic Dutch colonial and cultural buildings including Lawang Sewu (formerly the Dutch East Indies Railway Company), Gereja Blenduk (Blenduk Church) and Gedong Batu Temple (Sam Poo Kong – the oldest Chinese temple in Semarang). Semarang's Old Town is a well preserved Dutch colonial settlement.

Economics

Semarang serves as the main shipping port for Central Java and is the centre for regional government, industry, trade, education and tourism. In recent years, the city has faced an economic transition from an industry based economy to services and trade. Today, top employment sectors include utilities(14.7%); trade, services (13.6%); and financial services (13.1%).

There have been several sudden spikes in population growth: from 60,000 to 97,000 between 1880 to 1905 and nearly tripling to 280,000 by 1941. Ten years following World War II, without Dutch regulation of growth, the city's population doubled, from 331,000 to 645,000. The population has been on a steady upward slope since, notably following the 1960 Indonesian financial crisis when many migrants came from rural areas across Java and Sumatra to seek out jobs in an expanding industrial economy.

Human Development & Education

The Semarang Human Development Index (HDI) in 2021 was ranked first in Central Java at 83.55. This tracks with other indicators, including life expectancy, which continues to increase (77.6 years in 2021); literacy rate (98.2%, 2.3% higher than the national average); and the poverty rate (4.56% compared to 9.22% nationally). The unemployment rate did increase during the COVID-19 crisis, from 4.54% in 2019 to 9.57% in 2020. This is in line with national trends.

Semarang is home to key universities and schools. A notable state-owned university is Diponegoro University. Others include the Soegijaparanata Catholic University and Sultan Agung Islamic University.

Institutional Framework

Semarang City is headed by mayor, with a legislative assembly. Both mayor and members of assembly are elected by direct vote. Adminsitratively, Semarang is considered a municipality consisting of 16 districts (kecamatan), which are divided into 177 urban villages (kelurahan). For planning purposes, the city is divided into five urban areas: Central Semarang, East Semarang, West Semarang, South Semarang, and North Semarang.

Outlined below are common urban planning challenges facing developing cities.

Key Challenges for Effective Urban Planning & City Management

1. Integrated Planning

Currently, Semarang lacks an institutional framework to effectively integrate with federal and regional budgeting and data sharing.

2. Evidence-Based Decision Making

Causes of challenges are difficult to identify without adequate mechanisms to collect, integrate, manage and utilise evidence for better urban management.

3. Gender Equity & Social Inclusion (GESI)

Meaningful community participation can be emphasised in project development processes to ensure challenges and opportunities are addressed. Inclusive processes provide space for voices to be heard, including vulnerable and marginal groups.

4. Project Monitoring

Weak enforcement can compromise long-term success of urban projects. Thorough monitoring and enforcement applied to development projects and long-term commitment for their implementation and operation requires political backing from stakeholders.

5. Project Finance & Implementation

Lack of a sufficient project financing planning can pose significant challenges to development projects. Local governments' budget streams often rely on national government's transfer fund. Development of an operational business plan outlining alternative financing options will be required to minimise risk.

6. Environmental & Social Impact Assessment

Environmental and social impact assessments should be required to maximise positive impact from urban projects. For Semarang, the most pressing considerations relate to climate change, hazards and resilience. Impact assessments serve to pre-emptively identify and highlight potential negative results from projects, to be mitigated in future designs.

7. Technical Capacity

A lack of technical capacity within agencies and among partner contractors to implement sustainable urban projects can be a key challenge. Additionally, the information technology infrastructures may be inadequate to support sustainability goals. Coordination and management capacities are also essential for both the proposal development process and the sustained impact of any project. An existing capacity assessment addressing technical, managerial and participatory mechanisms is essential, resulting in a capacity building plan that extends into project monitoring.

Key Spatial Challenges

1 **Rapid & Low Density Sprawl**

Sprawl, informal areas without services, underutilised centres

2 **Transport & Connectivity**

Low transport take-up, over-investment in highways

3 **Inequitable Service Provision**

Lack of public open space or recreation within built-up areas
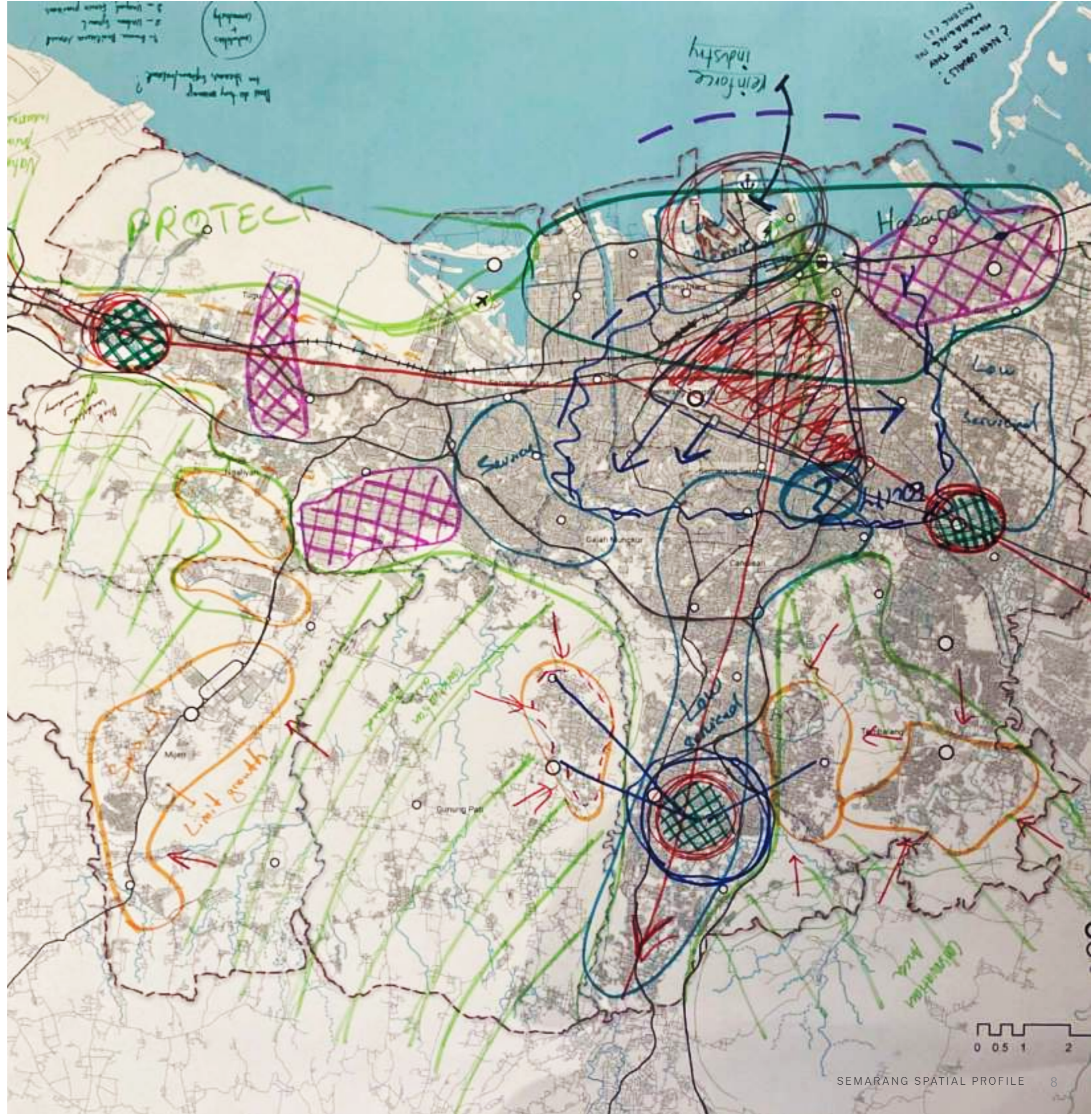
4 **Exposure to Natural Hazards**

Environmental degradation, flooding,sea rise, erosion, landslides, subsidence

5 **Environmental Impacts**

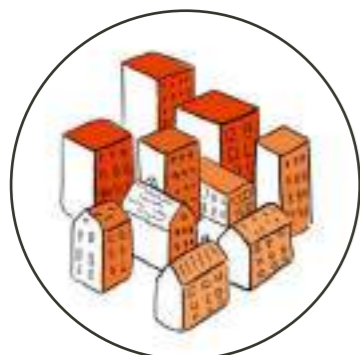*Blue and green grids, rivers, ravines and canal health, recreation amenity*

Objective: A more Sustainable Semarang

Compact City

Residents of the Compact City enjoy a highly efficient urban form characterized by walkable distances (15 minutes) to services. A highly walkable environment encourages walking and cycling, provides opportunities for people to interact and local businesses to emerge. Efficient public transport systems provide better accessibility for all, bringing multiple economic and environmental benefits. A Compact City is safe, comfortable and attractive for all residents.

- SDG Alignment: 2.4, 6.6, 11.2, 11.3, 11.6, 11.7, 15.1, 16.1

- New Urban Agenda: 34, 36, 37, 39, 43, 62, 67, 68, 69, 70

Connected City
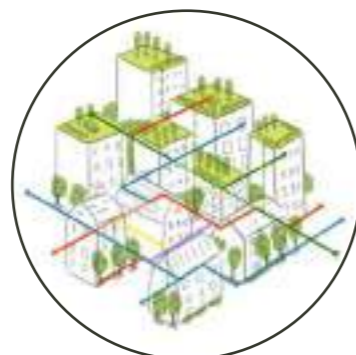
Residents of the Connected City leverage opportunities to thrive from a highly permeable, safe and pleasant street network where walking and cycling infrastructure is prioritised. This promotes walkable distances to key services, a variety of route options available and convenient travel between destinations and public transport secured. The Connected City is also integrated with blue and green grids to support the functionality of the ecosystem and recreation amenity.

- SDG Alignment: 3.6, 4.A, 9.1, 11.2, 11.6, 11.7, 16.1

- New Urban Agenda: 34, 36, 37, 39, 54, 62, 67

Inclusive City

The residents of the Inclusive City have equitable access to the city, to services, employment, public space, public transportation and any other opportunity provided. The urban environment supports physical, economic, cultural and social needs of all people and abilities, of all background and income level. Public spaces of the Inclusive City are welcoming to all the visitors and housing is affordable to attract a diverse range of residents.

- SDG Alignment: 5.1, 6.1, 10.3, 11.1, 11.2, 11.7, 16.1

- New Urban Agenda: 25, 26, 27, 31, 32, 33, 34, 36, 37, 39, 40, 43, 62

Vibrant City
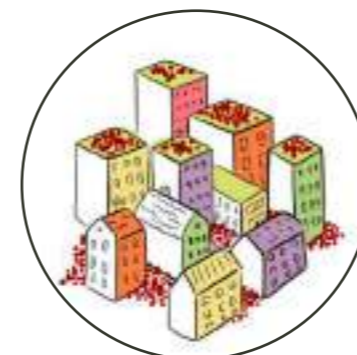
Residents of the Vibrant City have access to a diversity of activities, urban services and economic opportunities. Vibrant urban environments forms a place identity, facilitates social interaction, physical and learning activities and attracts people to live, work and spend time in a vibrant neighbourhood. Vibrant city provides an enabling environment for social, cultural, and economic capital, where urban character is emphasized, fostering a sense of local identity.

- SDG Alignment: 6.6, 8.3, 8.9, 11.2, 11.7, 16.1

- New Urban Agenda: 26, 27, 34, 36, 37, 38, 39, 40, 45, 53, 62, 68

Resilient City

Residents of the Resilient City are secure from immediate and chronic stresses within urban systems, while also being prepared for future challenges. The Resilient City provides continuous functionality of services and systems that are able to withstand potential crises and facilitate the recovery process. In addition to building adaptation to a rapidly changing world, resilient economic and urban forms are aligned with community resilience and well-being.

- SDG Alignment: 1.5, 2.4, 3.6, 6.1, 6.3, 6.6, 7.3, 9.1, 11 12.2, 12.5, 13.1, 15.1

- New Urban Agenda: 25, 31, 32, 34, 36-39, 43, 44, 62, 65, 67-70, 73, 77

Profile
Approach

The Rapid Planning Studio (RPS)

The methodology that was applied to achieve strategic spatial planning in Semarang, indonesia, is based on the UN-Habitat Integrated Planning Processs. This process was adapted to the context and needs of the city.

The RPS is an urban profiling approach rooted in **evidence-based spatial analyses**, that ties planning to financial frameworks and legal mechanisms to **achieve integrated outcomes**.

Analysis uses technical inputs to aid stakeholders to **make informed decisions** regarding the impact of current conditions and proposed scenarios for intervention, with **quantitative indicators for sustainable planning.**

The rationale of the RPS is to support improved urban planning capacities for cities to enable urban growth which is sustainable, resilient and provides adequate public infrastructure and services.

Objectives

- Rapidly simulate a planning process

- Provide a data-driven analysis of the city and identify key action areas

- Link spatial planning to capital investment planning

- Build local capacity and share best practices in sustainable urban development

Audiences

Primary Audience

- The main target audience for the RPS are cities that need enhanced competencies in urban planning

- Senior municipal staff

- Key technical officers from planning, public works, economic development, and finance

Additional Audience

- Mayors and decision makers

- Community representatives

- Academia, civil society

Benefits

- Effective way to link Capital Investment Planning to spatial planning

- Entry point to identify quick wins, strategic projects and locations

- Evidence-based, un-siloed approach

- Baseline for initiating a participatory process

- Guided by the SDGs

- Enhanced local capacity

- City Profile with: Key Challenges; Strategic responses including Spatial Plan and priority projects

What This Process Isn't

- In-Depth Participation Process

- In-Depth Qualitative Assessments

- In-Depth Analysis of Institution or Legislation Frameworks

- A Replacement for a Comprehensive Planning Process

The Process

Over 12-14 weeks, The RPS rapidly covers the first two phases of the planning process. The process sets a city up for transformational change by identifying opportunities and challenges, identifying opportunities for sustainable development and clarifyingh priority areas for investment by clearly linking priority urban projects with capital investment planning.

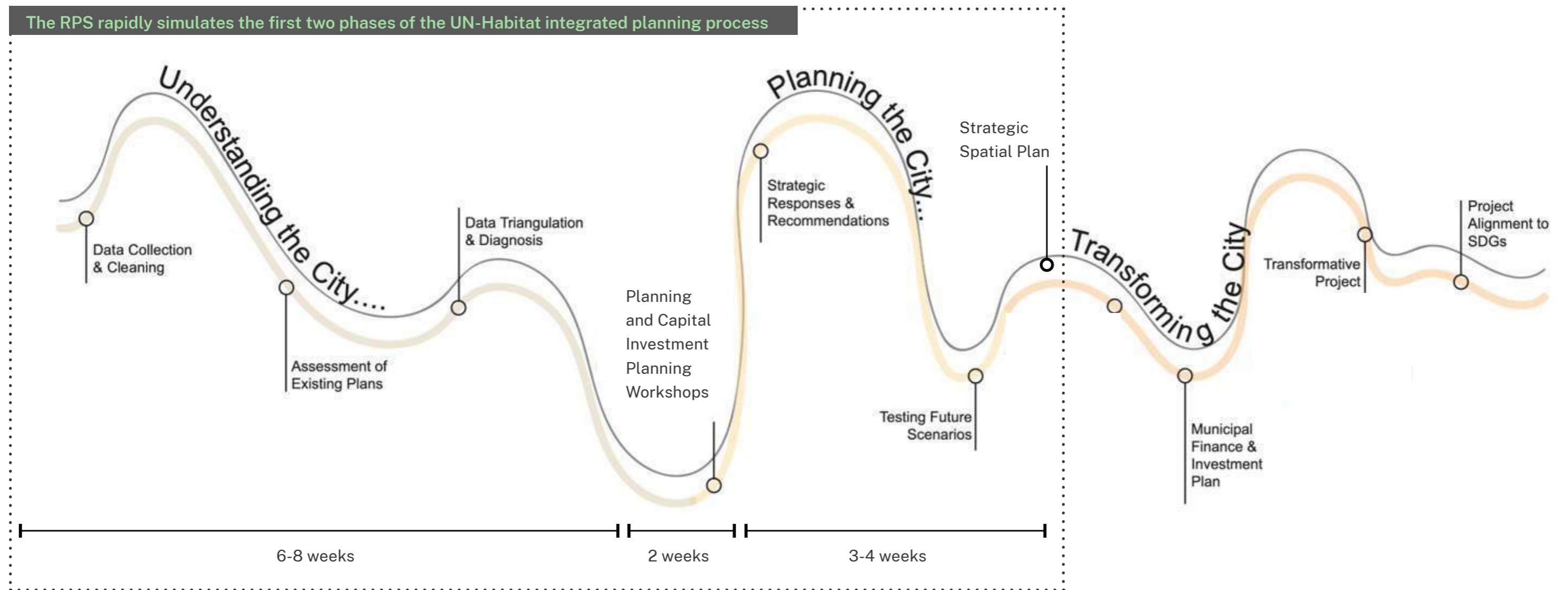## Step 1: Understanding the City

- Data gathering & cleaning
- Assessment of existing plans & priorities
- Evidence-based Spatial analysis
- Project indicator setting
- Rapid planning workshops (validation)

Step 2: Planning the City

- Visioning the future
- Strategic responses & actions
- Future scenarios
- Priority areas for investment
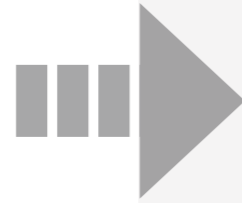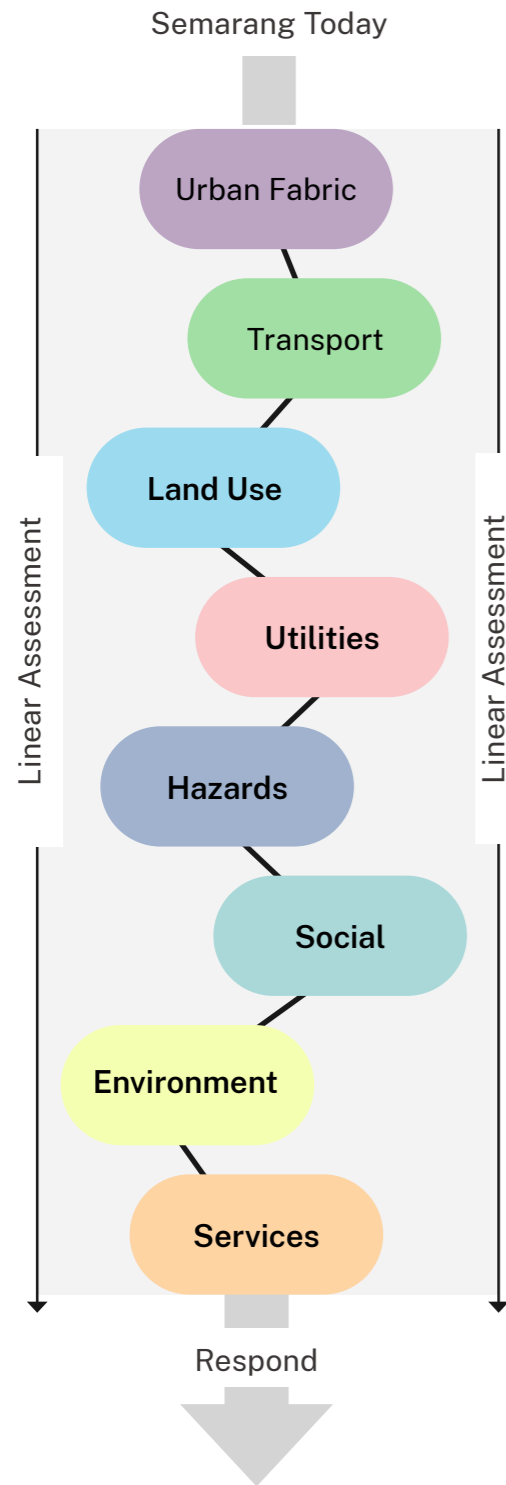- Links to capital investment planning

Step 3: Transforming the City

Step 1 and Step 2 are covered in the RPS to set a strategic framework for trnasforming the city. As such, Step 3 is not part of the RPS.

The RPS rapidly simulates the first two phases of the UN-Habitat integrated planning process
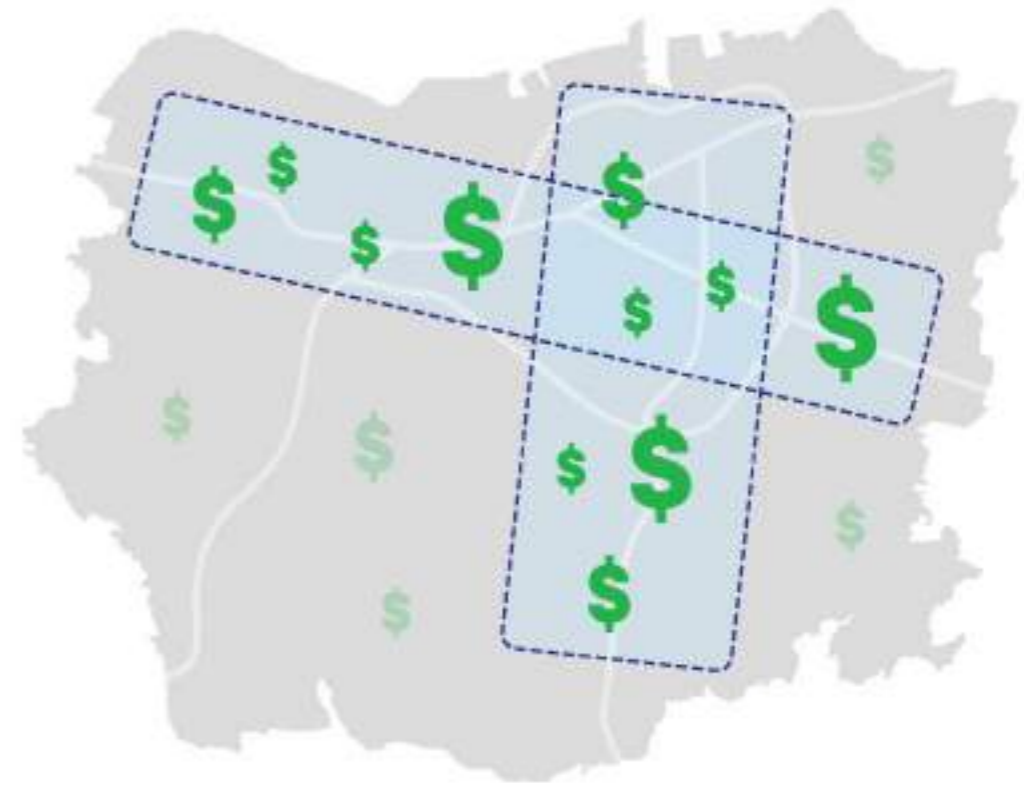
Assessment Approach

Spatially Informed Capital Investment Planning

**Capital Investment
Planning today**

**Spatially Informed Capital
Investment Planning with
short-medium term priorities
aligned with sustainability
principles**

RPS in Semarang

Workshops
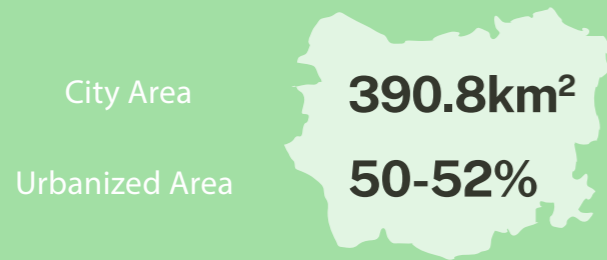
Knowledge Sharing

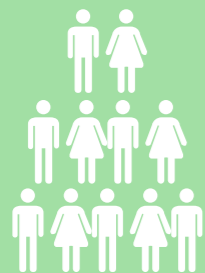**Site Visits**

Understanding Semarang

Key City Statistics
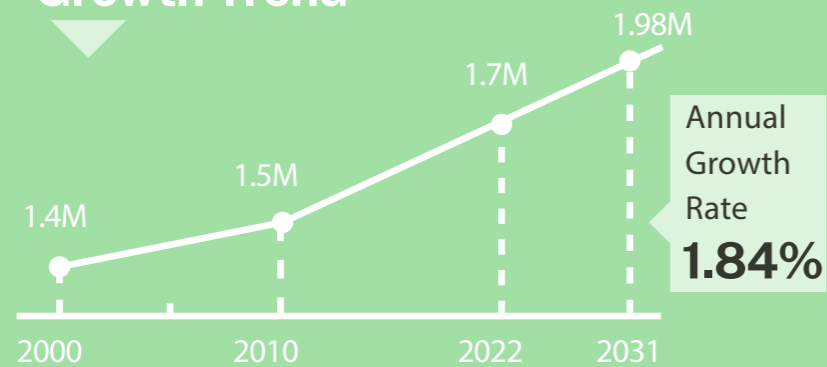
GEOGRAPHY

City Area **390.8km²**

Urbanized Area **50-52%**

CITY POPULATION

The built-up urban area of the region has 3.2M residents

City Population (2020)
1.7 Million

Growth Trend

1.4M (2000)
1.5M (2010)
1.7M (2022)
1.98M (2031)

Annual Growth Rate
1.84%

DEMOGRAPHICS

Median Age **29.1** years old
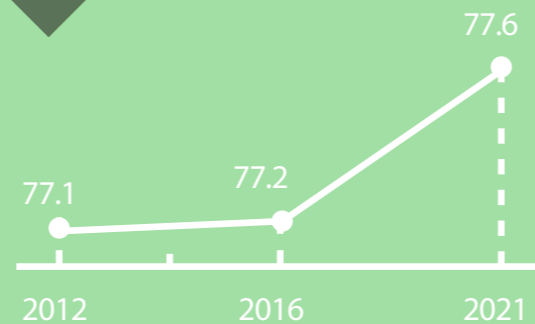
Ethnic Groups
93% Javanese
4% Chinese
3% Other

Religious Groups
87% Islam
12% Christianity
0.65% Buddhist

LIFE EXPECTANCY

Growth Trend

77.1 (2012)
77.2 (2016)
77.6 (2021)

ECONOMY

Economic Growth Rate **6.5%** 2022
(National: 5.02%)

Human Development Index **83.55**
highest in Central Java

Economic Activity

Key Sectors
Electricity, Gas, Water **14.7%**
Trade, Hotel, Restaurants **13.6%**
Financial Services **13.1%**

Unemployment Rate **9.57%** 2020
(up from 4.54% in 2019)

EDUCATION

Literacy Rate **98.2%**
(National: 95.9%)

Educational Attainment **24%** 2020

percentage of employment rate that earned a college degree

The vision set by the government aims to deliver a **safe, comfortable, productive, and sustainable urban space**

Background Document Review

Semarang Strategic Plan (2021)

Resilient Semarang (100 RC) & One Resilient Semarang (WaL)

Capital investment planning & Urban performance Assessment

Landuse, Structure and Strategy spatial plans

- The information from these plans, was reviewed and formed a key focus for the spatial analysis.

- The analysis will consider urban issues in relation to many of these priorities.
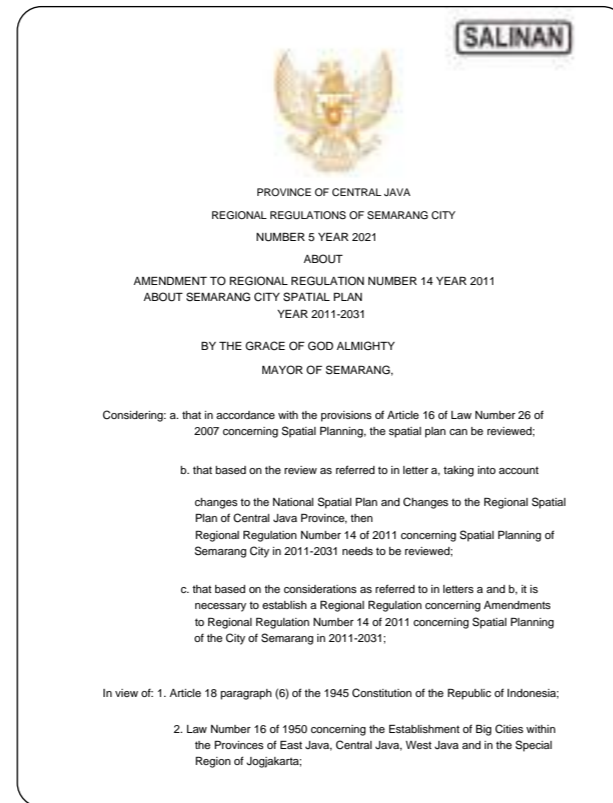
Semarang Strategic Plan (2021)

- The Strategic plan review (2021) outlined the updated key priorities for the cities development from 2021 to 2030.

- The information reviewed is used to understand how the city is prioritising development and in what forms.

- The forms of priorities set out in this document were used in relation to UN-Habitat objectives to identify overlaps and gaps.

Resilient Semarang (100 RC) & One Resilient Semarang (WaL)

- The Resilient Semarang report (2016) set out a series of multi-dimensional resilience recommendations for the city which was endorsed by the Mayor.

- The concept strategies developed under the Water as Leverage Project (2019) identified various interventions for integrated urban water management.

- The resilience strategy and its recommations were reviewed and fed into various aspects of the project analysis.

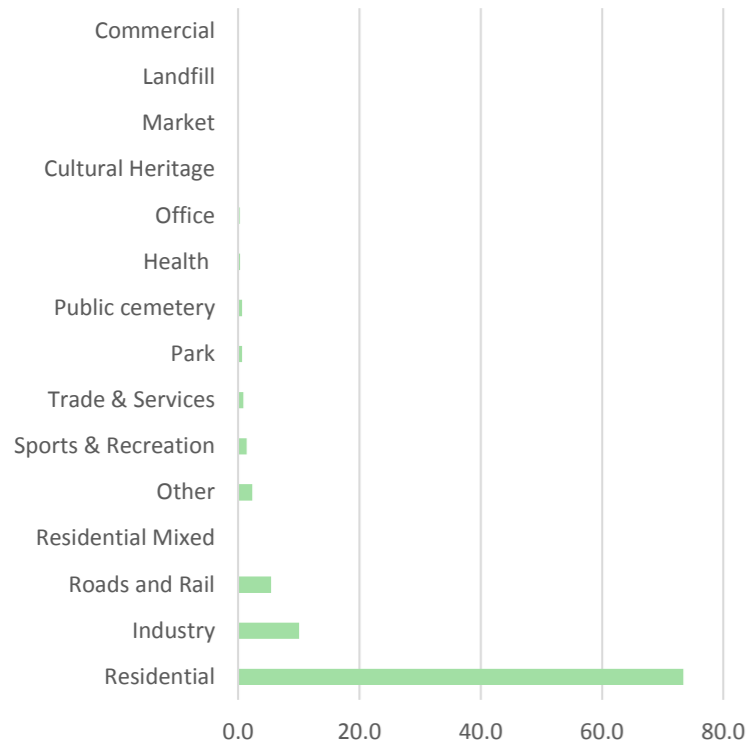## Capital investment planning & Urban performance Assessment

- The methodology and outlined analysis within the initial capital investment planning report and the urban performance assessment for Semarang outlined key areas for prioity interventions

- The documents were reviewed to compare the methodology and approach taken for this project's analysis
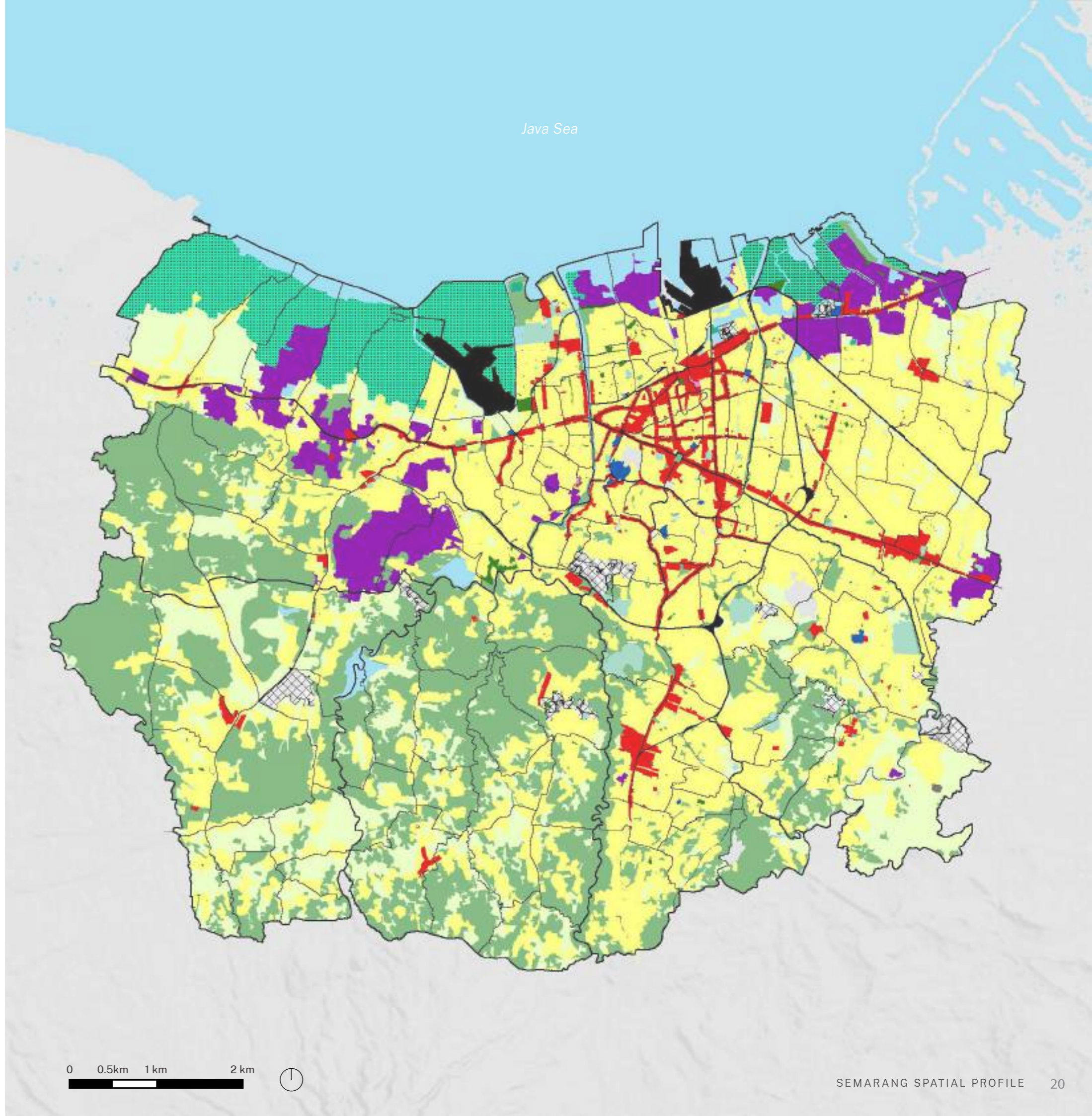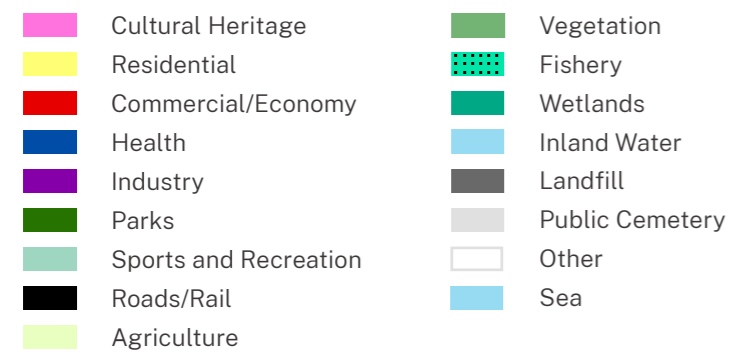
Existing Land Use

73% of the built up area of the city is dedicated to residential use. Currently little mixed usage, however change is proposed in the new spatial plan

BUILT-UP SEMARANG (%)

Categories (top to bottom): Commercial, Landfill, Market, Cultural Heritage, Office, Health, Public cemetery, Park, Trade & Services, Sports & Recreation, Other, Residential Mixed, Roads and Rail, Industry, Residential

Axis: 0.0, 20.0, 40.0, 60.0, 80.0

Legend

- Cultural Heritage
- Residential
- Commercial/Economy
- Health
- Industry
- Parks
- Sports and Recreation
- Roads/Rail
- Agriculture
- Vegetation
- Fishery
- Wetlands
- Inland Water
- Landfill
- Public Cemetery
- Other
- Sea

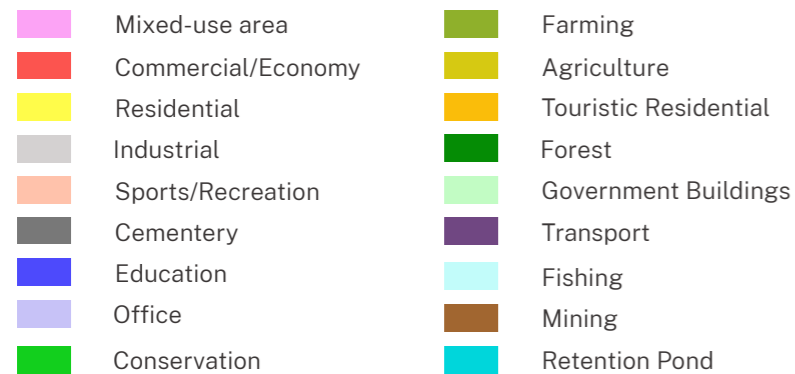*Java Sea*

Scale: 0, 0.5km, 1 km, 2 km
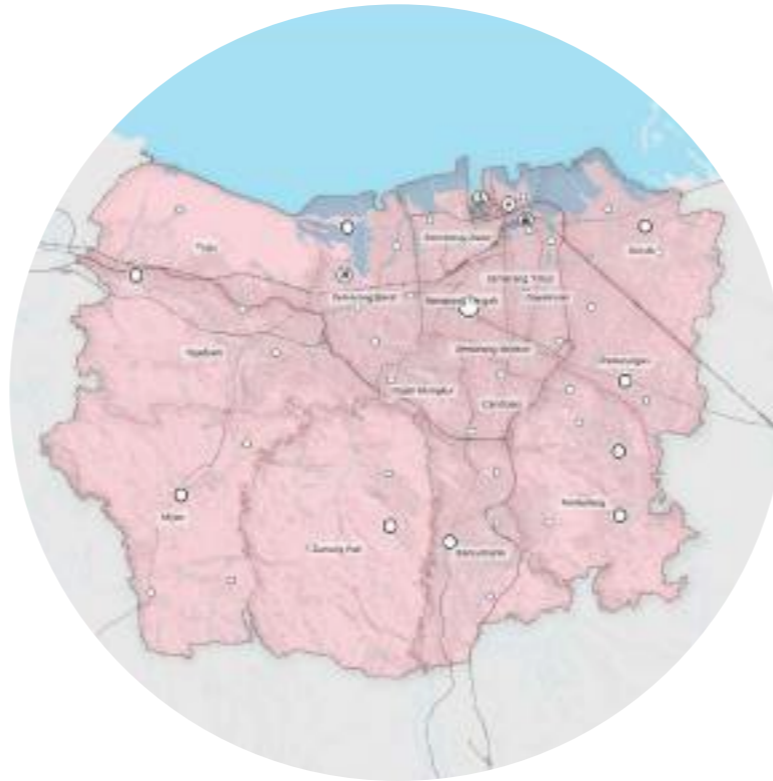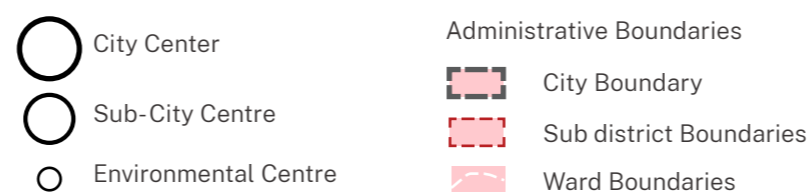
Planning Strategies

Future Land Use

Semarang's existing land use plan guides growth until 2031. This plan also features key infrastructure projects including the proposed ring roads, key conservation corridors along canals, riverines and other corridors and new residential, commercial and job areas to the city's southwest. There are also new land use zones related to farming, office, touristic residential, forest, conservaton and identification of the entire city core as a 'mixed-use area'.

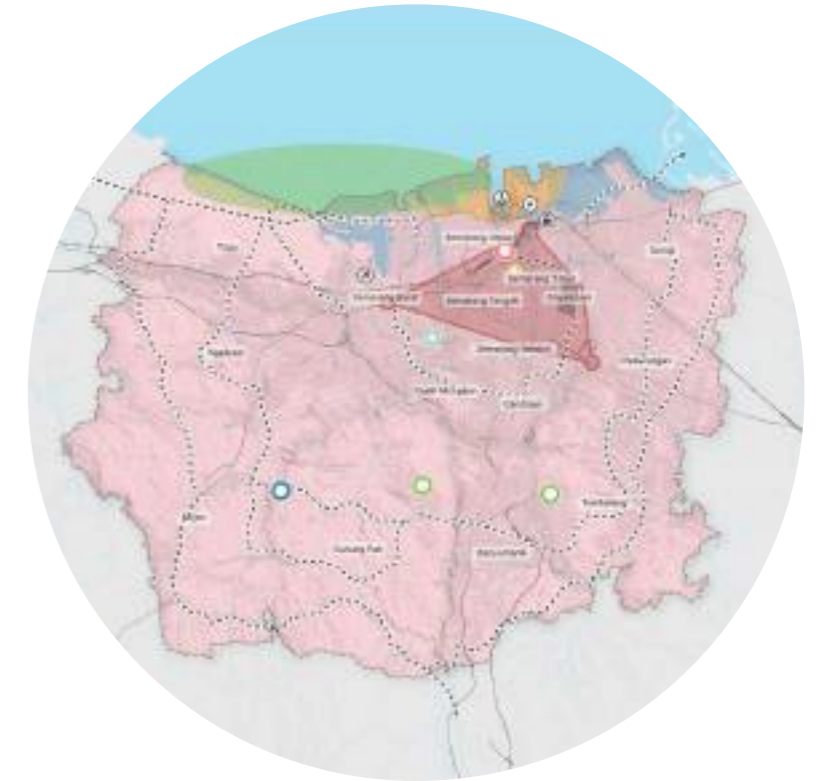|	
▨ Mixed-use area	▨ Farming
▨ Commercial/Economy	▨ Agriculture
▨ Residential	▨ Touristic Residential
▨ Industrial	▨ Forest
▨ Sports/Recreation	▨ Government Buildings
▨ Cementery	▨ Transport
▨ Education	▨ Fishing
▨ Office	▨ Mining
▨ Conservation	▨ Retention Pond

Strategic Planning Framework

Across Semarang's 16 districts, a hierarchy of centres is proposed - City Centre, Sub City Centre and Environmental Centre. City Centre is defined as: an economic, social, and/ or administrative service center serving the entire city and/or regional area. Sub City Centre is defined as a center for economic, social, and/ or administrative services serving sub-urban areas. Environmental centre is defined as a tertiary center for economic, social and/or environmental admin. services.

◯ City Center	Administrative Boundaries
◯ Sub-City Centre	▨ City Boundary
◦ Environmental Centre	▨ Sub district Boundaries
	▨ Ward Boundaries

Planning Priority Areas

There are several priority development areas which focus on Strategic Economic Growth Areas, Environmental Areas and Socio-Cultural Areas. The main urban core is designated as an overall strategic economic development area with several target areas within that relating to social cultural development zones, with the port as a second zone. The Western section of the coast, which currently has limited build up area is designated for beach reclamation.

| Strategic Socio-Cultural Areas	Strategic Environmental Areas
◯ Old Town Strategic Area	◯ Jatibarang Dam Area
◯ Great Mosque of Semarang	▨ Beach Reclamation Area
◯ Gedong Batu Area	Strategic Economic Growth Areas
◯ Education Cluster Areas	▨ Peterongan Area
▨ Great Mosque of Java Area	▨ Tanj Mas Port Area
	▨ Proposed Major Roads

Planned City Shaping Projects

A number of major urban development projects are currently planned or underway in Semarang. Major industrial and mixed use urban development projects include Kendal Industrial Park, Pearl of Java mixed use development, and BSP Industrial City and the ports expansion.

The Demak Sea Toll - which will enhance connectivity across the north east of the city. Semarang's road network development plan proposes establishing a Middle and Outer Ring Road. The status of these plans are as yet unclear

The main energy distribution grid is also highlighted on the plan, the implementation status of this is also unclear
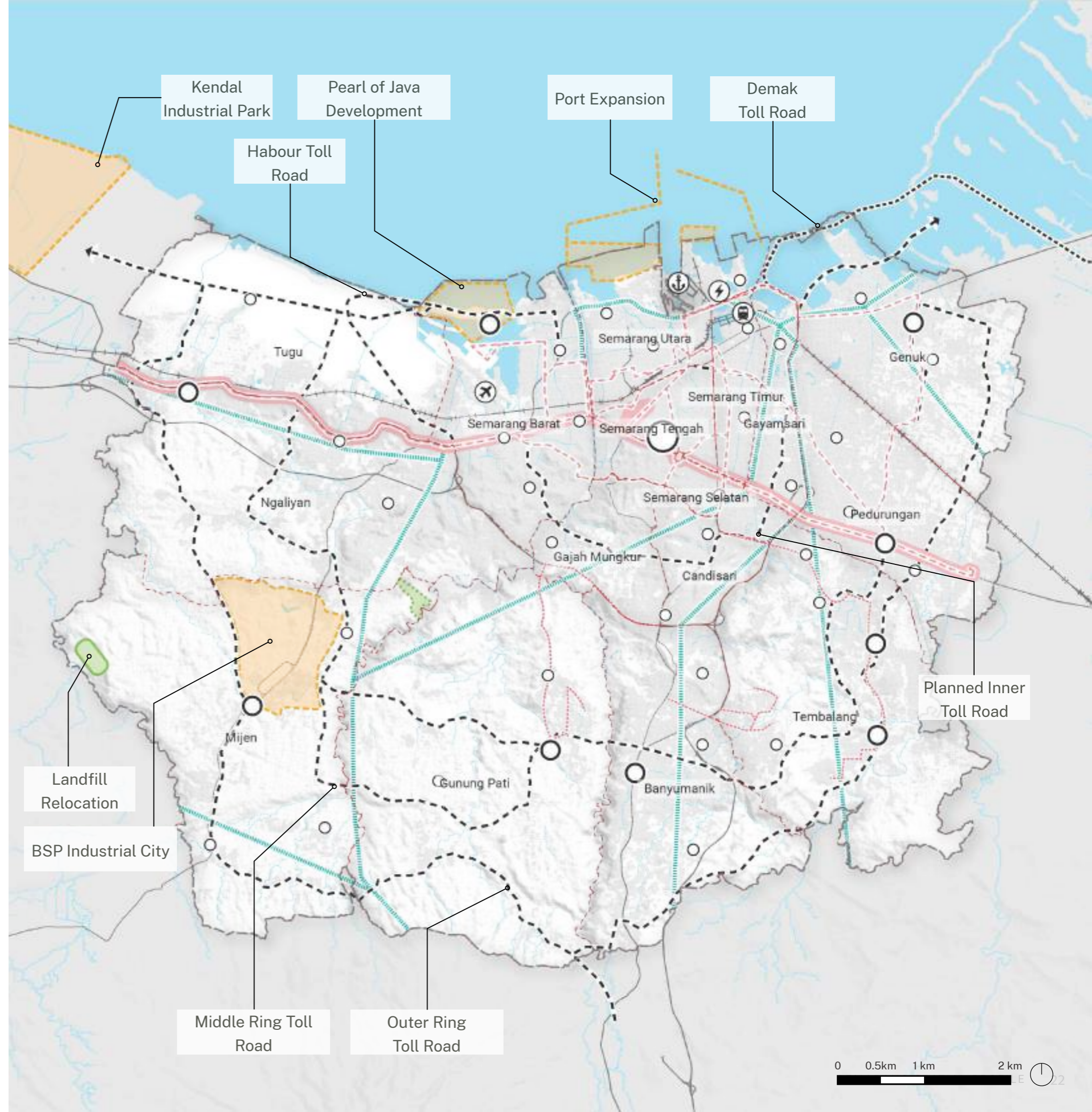
Legend

Planned Capital Projects

- Main Energy Grid Network
- Proposed Major Roads
- LRT Network
- BRT Network
- BLT Expansion
- Existing Primary Roads
- Existing Railways

Major Developments

- Major Development Areas
- Sanitation Projects

Administrative Boundaries

- City Boundary
- Sub district Boundaries

Kendal Industrial Park

Pearl of Java Development

Port Expansion

Demak Toll Road

Habour Toll Road

Tugu

Semarang Utara

Genuk

Semarang Timur

Semarang Barat

Semarang Tengah

Gayamsari

Ngaliyan

Semarang Selatan

Pedurungan

Gajah Mungkur

Candisari

Planned Inner Toll Road

Mijen

Tembalang

Landfill Relocation

Gunung Pati

Banyumanik

BSP Industrial City

Middle Ring Toll Road

Outer Ring Toll Road

0   0.5km   1 km   2 km

Opportunities
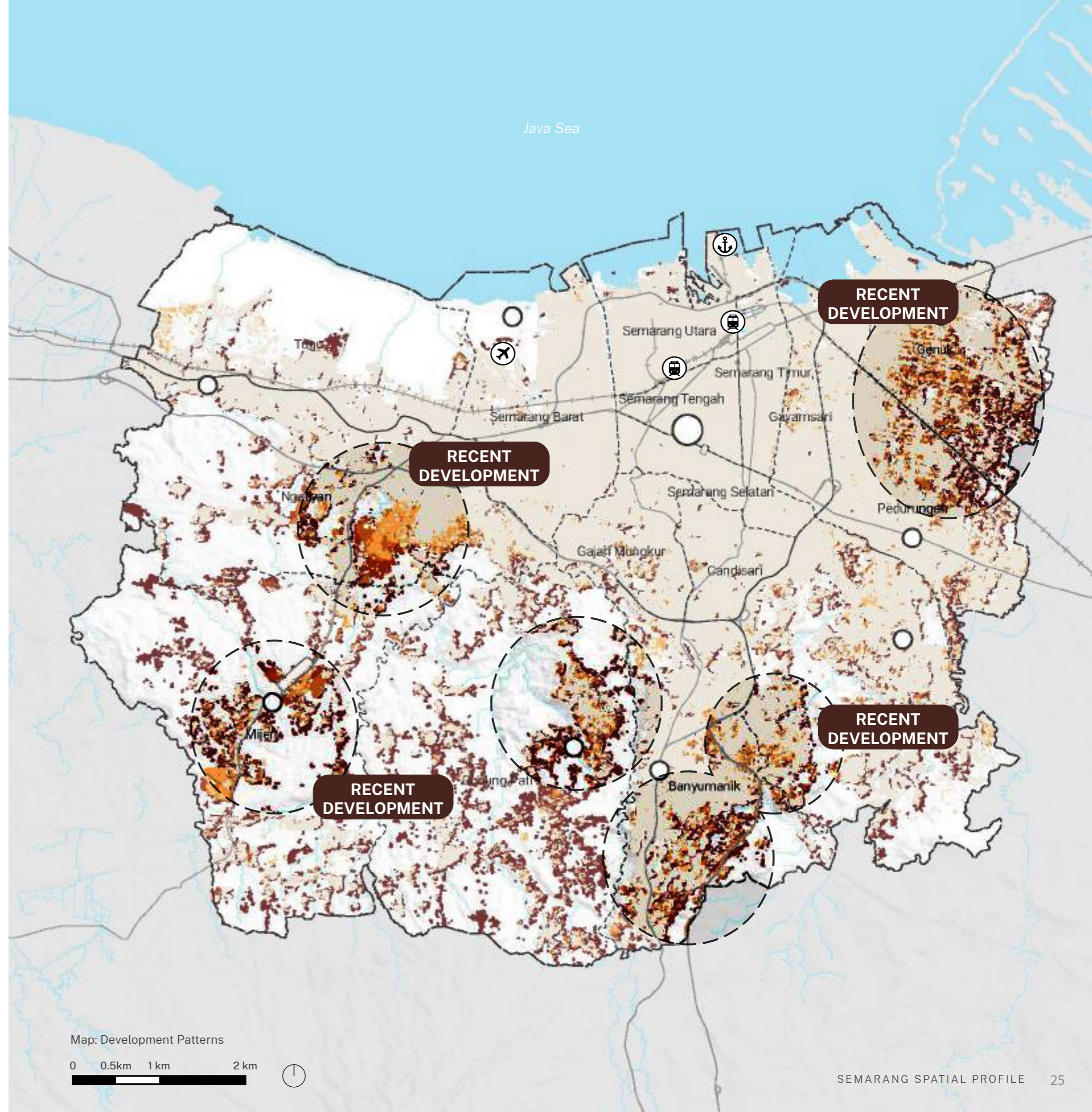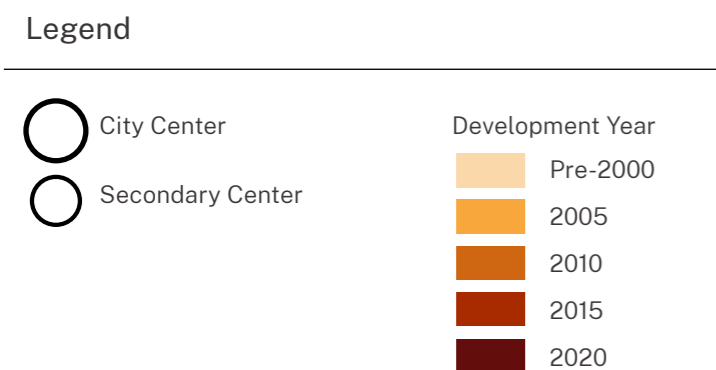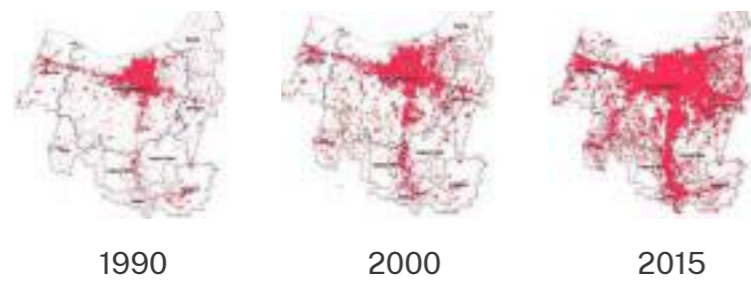# & Challenges

Indicator 01
Urban Fabric

Describes the physical characteristics of urban areas, including but not limited to development patterns, street permeability, population density

Development Pattern 1990-20

Recent development takes a variety of forms including planned and unplanned patterns. The location and type of recent development has many implications for Semarang, city services and residents.

- 15% of the City was urbanised in 1990

- 50.2% of the City is 'urbanised' in 2020

- 3x increase in urban area btwn 1990-20

- 55% population increase btwn 1990-20

1990   2000   2015

Legend

◯ City Center

◯ Secondary Center

Development Year

Pre-2000
2005
2010
2015
2020

Java Sea

RECENT DEVELOPMENT

RECENT DEVELOPMENT

RECENT DEVELOPMENT

RECENT DEVELOPMENT

RECENT DEVELOPMENT

Semarang Utara
Semarang Timur
Semarang Tengah
Gayamsari
Semarang Barat
Semarang Selatan
Gajah Mungkur
Candisari
Pedurungan
Genuk
Ngaliyan
Mijen
Gunung Pati
Banyumanik

Map: Development Patterns

0   0.5km   1 km   2 km

Population Density

Semarang's population density patterns follow common urban population patterns - higher density populations are found closer into the city's core and lower densities as you travel outwards. There are pockets of higher density to the south of the urban core in Banyumanik and Tembalang and to the western edge in Tugu and Ngaliyan.
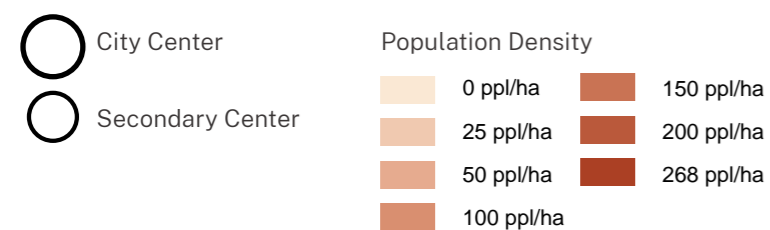
- 59.3 ppl/ha average population density

- 150 ppl/ha A minimum to consider for a sustainable neighbourhood may be recommended, depending on context

Highest Density District (Gayamsari)

Highest Population District (Pedurungan)

Legend

○ City Center

○ Secondary Center

Population Density

0 ppl/ha	150 ppl/ha
25 ppl/ha	200 ppl/ha
50 ppl/ha	268 ppl/ha
100 ppl/ha	

Java Sea

DENSITY POCKET

Tugu

Semarang Utara

Genuk

Semarang Timur

Semarang Tengah

Gayam

URBAN CORE

Semarang Barat

Semarang Selatan

Ngaliyan

Pedurungan

Gajah Mungkur

Candisari

DENSITY POCKET

Mijen

Tembalang

Gunung Pati

Banyumanik

DENSITY POCKET

Map: Street Population Density

0   0.5km   1 km   2 km
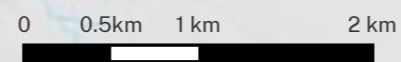
Poverty Distribution

The distribution of low income residents in Semarang broadly correlates with the city's overall population density. In general the highest density areas of the city, are also those with the highest proportion of low income residents.

The Poverty line in Indonesia is defined as the amount of money required to obtain 2,100 calories per day, and a small amount of basic non-food items. (Badan Pusat Statistik, BPS)

- 26.4% of population is below poverty level

KEY CHALLENGE

Slum dwellers and poor populations congregate highest within the urban core and close to the waterfront

Legend

○ City Center

○ Secondary

○ Tertiary

── Existing Primary Motorways/Roads

Poverty Density
- > 90 p/ha
- 75 p/ha
- 25 p/ha
- 20 p/ha
- 5 p/h

Slum Area

Map: Poverty Distribution

0   0.5km   1 km   2 km

Java Sea

URBAN CORE

59.3 p/ha
[Average Population Density]
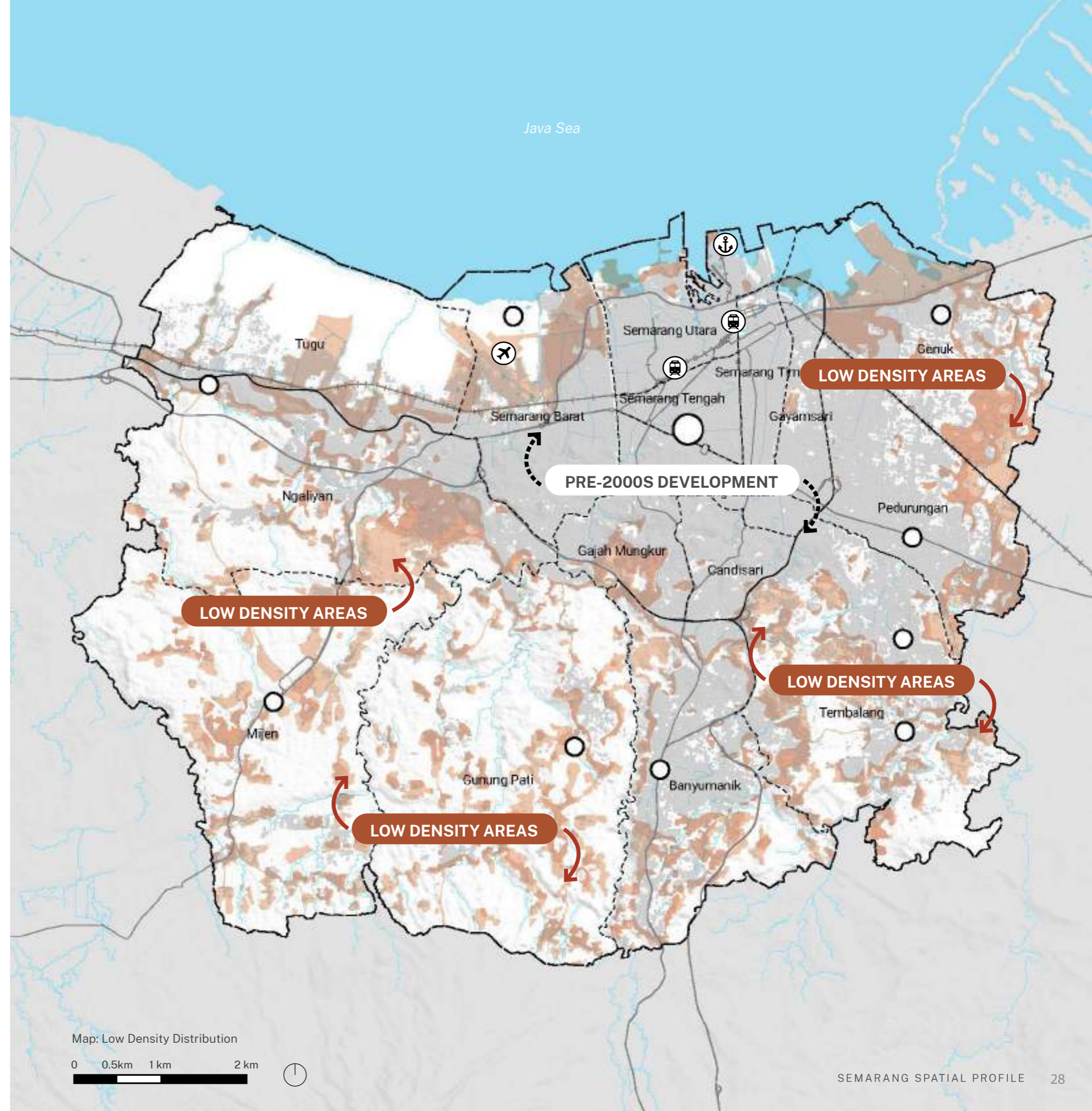
17.2 p/ha
[Average Vulnerable Population Density]

Low Density Distribution

The majority of lower density development in Semarang (>59ppl/ha) is in newer areas outside of the pre-2000's urban core. The majority of higher density development is in the core (88%).

- 58% of lower density development (below average density) found within newer development areas

- 12% of higher density areas are found within newer development sites

Pre-2000's development is more compact and includes higher population density than recent development patterns. As such, the City is becoming less compact.

Java Sea

Tugu

Semarang Utara

Semarang Tim

Genuk

LOW DENSITY AREAS

Semarang Tengah

Semarang Barat

Gayamsari

Ngaliyan

PRE-2000S DEVELOPMENT

Pedurungan

Gajah Mungkur

Candisari

LOW DENSITY AREAS

Mijen

LOW DENSITY AREAS

Tembalang

Gunung Pati

Banyumanik

LOW DENSITY AREAS

Legend

◯ City Center

◯ Secondary Center

▢ Pre-2000s Development

Population Density

0 ppl/ha

25 ppl/ha

50 ppl/ha

Map: Low Density Distribution

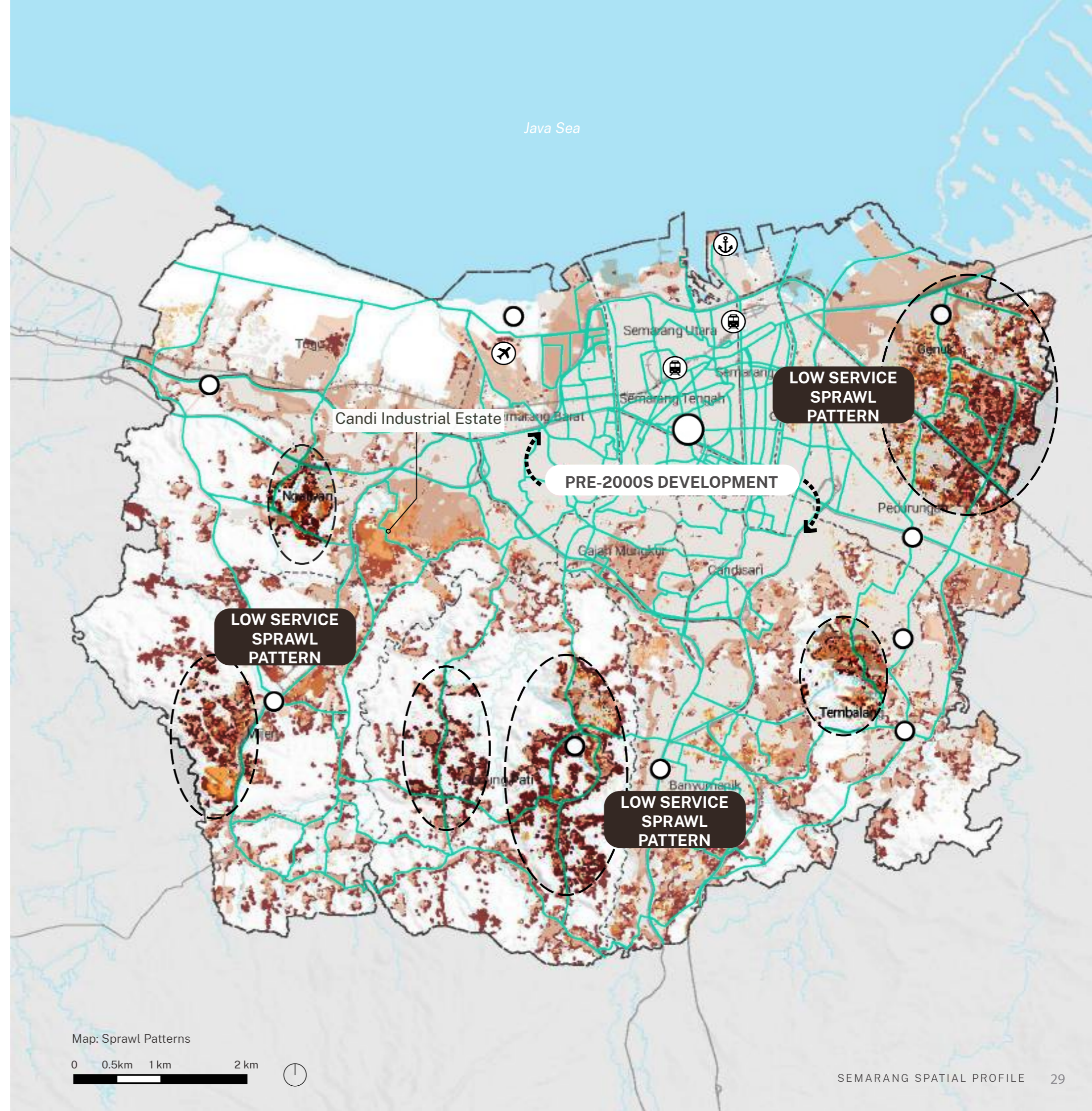0   0.5km   1 km   2 km

Sprawl Patterns

When low density areas, new development sites and water main servicing are overlaid, a pattern emerges showing higher density areas in the city's core benefits from efficient water services whereas areas on the periphery are lower.

Increasing development is occurring in areas with lower urban services and in less compact patterns. This can result in more expensive services/km for the city and lower access for residents.

- 20.6km of water pipe services 100,000 people in high density areas in the core

- 35.2km of water pipe services 100,000 people in low density areas on the periphery

KEY CHALLENGE

Increasing development is occurring in areas with lower urban services and in less compact patterns. This can result in more expensive services/km for the city and lower access for residents

Legend

City Center

Secondary Center

Water Main Trunk Line

Population Density

0 ppl/ha

25 ppl/ha

50 ppl/ha

Development Year

Pre-2000

2005

2010

2015

2020

Java Sea

Candi Industrial Estate

LOW SERVICE SPRAWL PATTERN

PRE-2000S DEVELOPMENT

LOW SERVICE SPRAWL PATTERN

LOW SERVICE SPRAWL PATTERN

Map: Sprawl Patterns

0   0.5km   1 km   2 km

Existing & Planned Street Network

There is a plan for inner, middle & outer orbital roads within the City, as well as a Toll Road that will double as a sea wall to the city's east. It remains unclear the nature and extent of these roads and whether they will feature transport service, be integrated into their context or be grade separated.

- 168% increase in motorized vehicles in Semarang between 2005-14 (Central Statistics Agency Indonesia, 2018)
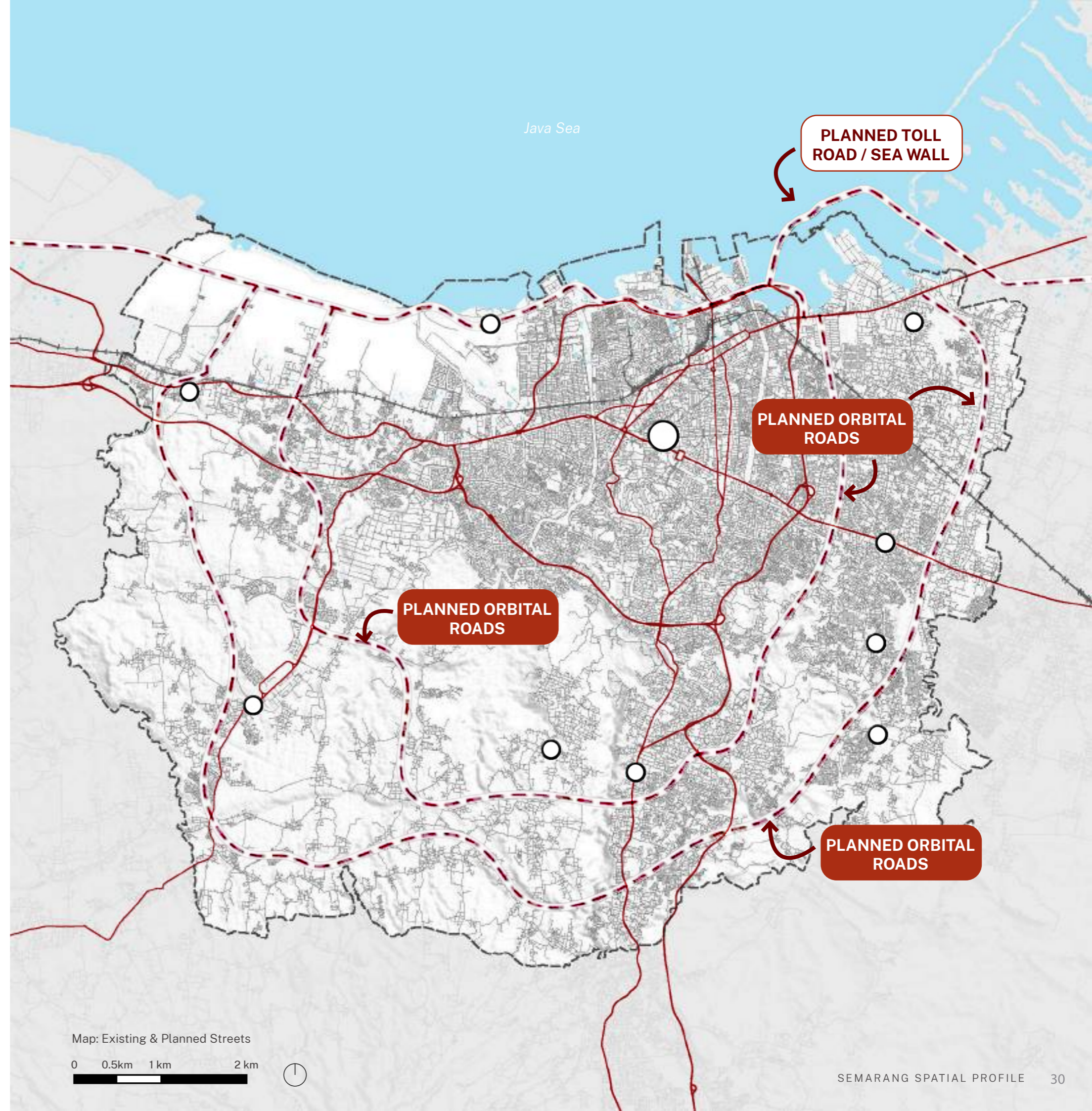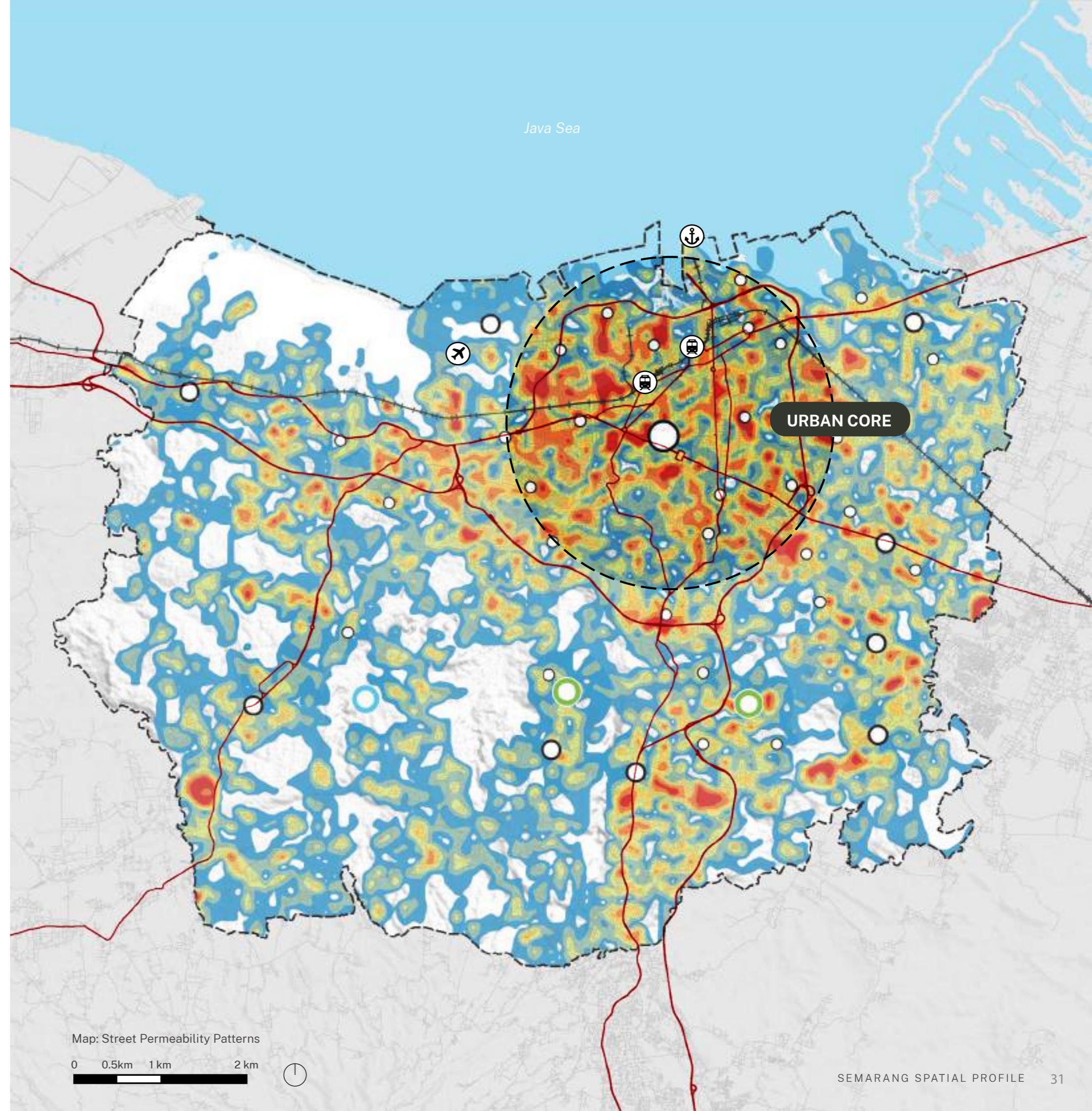
Legend

○ City Center

○ Secondary

Public Transport

—— Local Street

—— Regional Road

– – – Planned Orbital Roads

Java Sea

PLANNED TOLL ROAD / SEA WALL

PLANNED ORBITAL ROADS

PLANNED ORBITAL ROADS

PLANNED ORBITAL ROADS

Map: Existing & Planned Streets

0   0.5km   1 km   2 km

Street Permeability

There is a spatial inequality of permeability across the City, with the city's urban core more permeable and connected than the periphery.

- 9.7 is the average permeability score for urbanised areas in Semarang

- 11.7 is the average permeability score in the urban core, the highest in the City)

- 15% of the city's urbanised area is dedicated to street space (30% target)

Java Sea

URBAN CORE

Legend

◯	City Center
◯	Secondary
○	Tertiary
🟢	Education Center
🔵	Strategic Center

Permeability Index

🟦	0-2.1
🟩	2.1-3
🟩	3-5.1
🟨	5.1-9.9
🟧	9.9-20.8
🟥	20.8-45.9

Map: Street Permeability Patterns

0   0.5km   1 km   2 km

Permeability Patterns

More recent and unmanaged development on the edge of the City is less permeable than the core.

Such development patterns may discourage walking and cycling, decreases access to essential services, increases traffic congestion and increases inequity

KEY CHALLENGE

Newer development has lower permeability than established neighborhoods in the core which may mean services in those Centers are less accessible
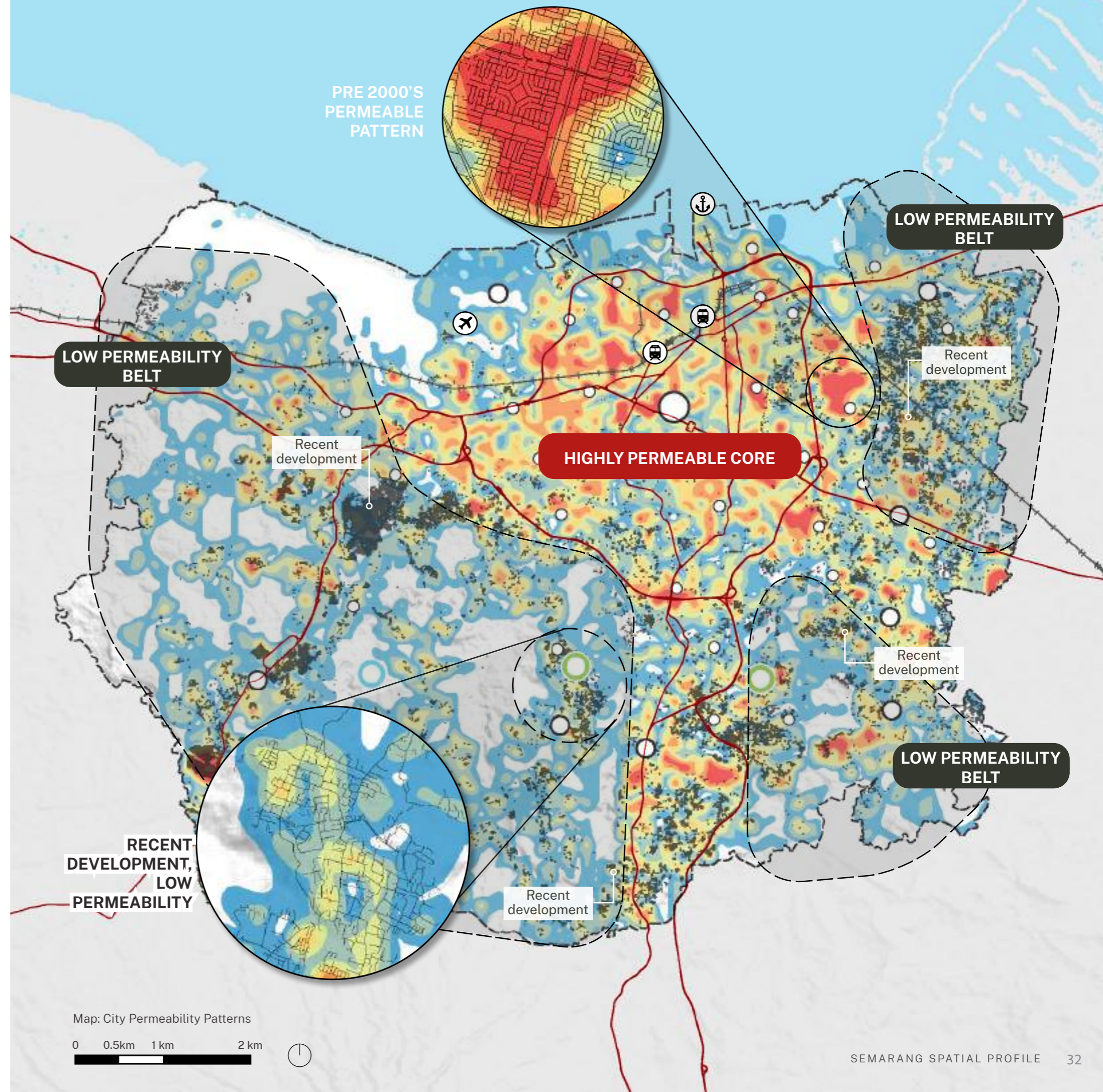
Legend

	City Center
	Secondary
	Tertiary
	Education Center
	Strategic Center
	Post 2000's Development

Permeability Index

	0-2.1
	2.1-3
	3-5.1
	5.1-9.9
	9.9-20.8
	20.8-45.9

PRE 2000'S PERMEABLE PATTERN

LOW PERMEABILITY BELT

LOW PERMEABILITY BELT

Recent development

HIGHLY PERMEABLE CORE

Recent development

LOW PERMEABILITY BELT

Recent development

RECENT DEVELOPMENT, LOW PERMEABILITY

Recent development

Map: City Permeability Patterns

0   0.5km   1 km   2 km

Activity Center Permeability

A key strategic goal of the City is to improve and increase provision of services/transport to Activity Centers. Yet outside of the city center, all but 1 have below average permeability, suggesting service seekers may have low quality access to services/transport outside the city center.

- 9.7 is the average permeability score for urbanised areas in Semarang.

- 6.8 is the average permeability score for Activity Centers

Activity Centers have lower permeability than the city average. In particular, centers on the City's periphery are lowest. Highly permeable activity centers is important to realise the city's strategic goals to increase services/transport in these areas.

Legend

City Center		Permeability Index	
Secondary			0-2.1
Education Center			2.1-3
Strategic Center			3-5.1
			5.1-9.9
			9.9-20.8
			20.8-45.9

Java Sea

LOWER PERMEABILITY CENTER

Walkable Catchment

City Center

HIGH PERMEABILITY CENTER

HIGH PERMEABILITY CENTER

Walkable Catchment

Walkable Catchment
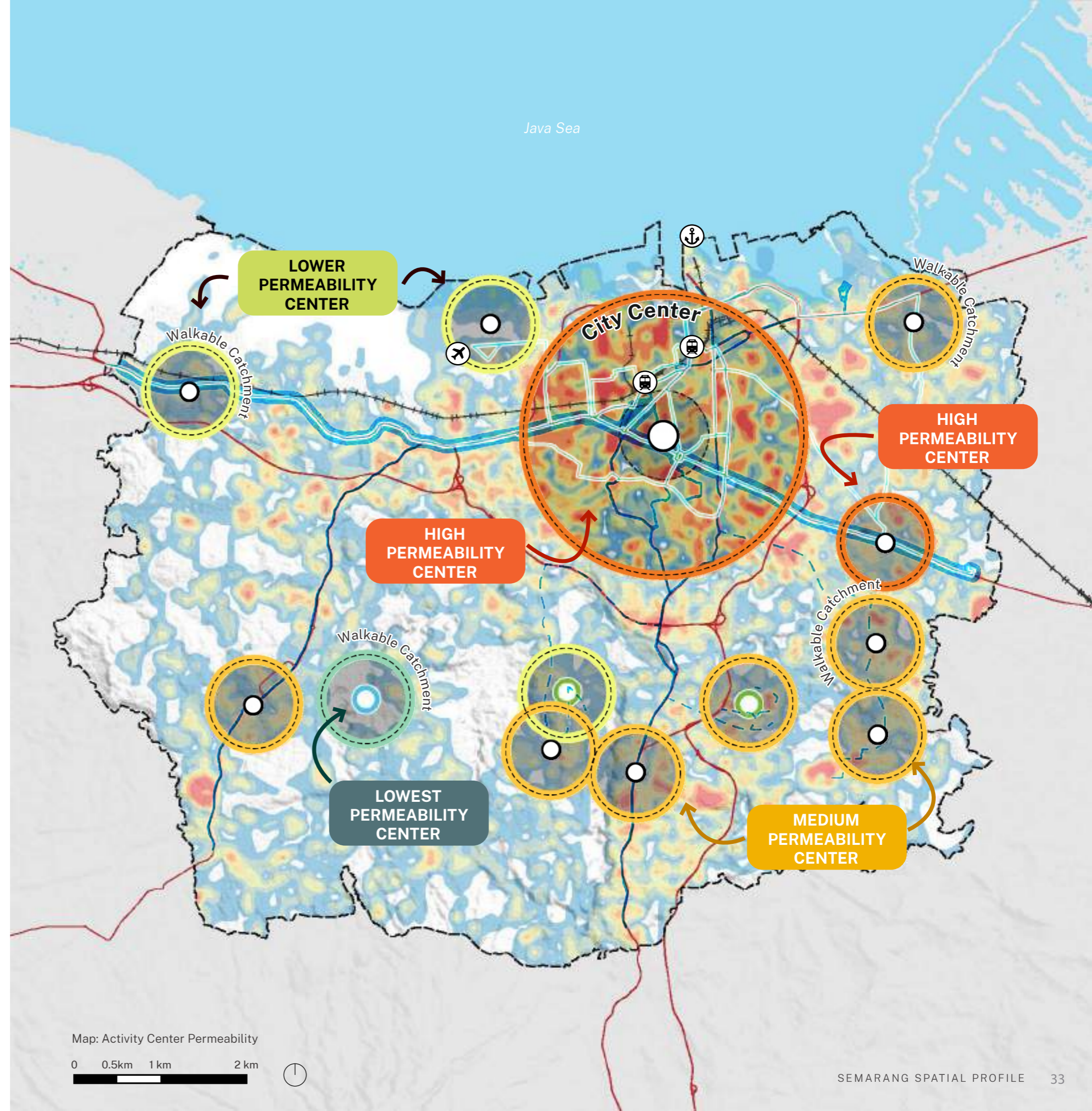
LOWEST PERMEABILITY CENTER

MEDIUM PERMEABILITY CENTER

Map: Activity Center Permeability

0   0.5km   1 km   2 km
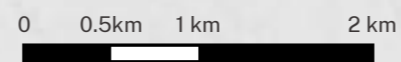
Key Findings

01 **Population and poverty density is concentrated in the city core**

Semarang's population density patterns follow common urban population patterns - higher density populations are found closer into the city's core and lower densities as you travel outwards. In total, the avergae density across the entire city is 59.3 ppl/ha which is lower than the 150 ppl/ha typically recommended for a sustainable neighbourhood may be recommended, depending on context

02 **Uncontrolled urban sprawl is s on the city's periphery**

The City's urbanised area has expanded nearly 40% between 2000-20, and at a greater clip than population growth (nearly 20%). Increasing development is occurring in areas with lower urban services and in less compact patterns. Further, peripheral areas in the south, east and west exhibit sprawl development patterns with low density and a lack of reliable water/other services

03 **Newer development is less walkable than older development**

Newer development has lower permeability than older, established neighborhoods in the City's core. Additionally, planned Activity Centers where there is to be a concentration of services and amenity have lower permeability than the City's average, with Centers in the south particularly low. Highly permeable activity centers is important to realise the city's strategic goals to increase services/transport in these areas.

04 **Planned Orbital Roads dominate transportation plans**

There is a plan for inner, middle & outer orbital roads within the City, as well as a Toll Road that will double as a sea wall to the city's east. It remains unclear the nature and extent of these roads and whether they will feature transport service, be integrated into their context or be grade separated.

Indicator 02
Public Transport

Looks at public
transport facilities in the
City, including available
statistic on who uses
public transport,
transport access and
transport integration
with key city services.
Semarang's existing and
planned public transport
systems include BRT,
BLT and LRT

Who Uses Public Transport?

49% of Trans Semarang bus riders utilise the system primarily for employment purposes

37% of Trans Semarang bus riders utilise the system primarily for education destinations

14% of Trans Semarang bus riders utilise the system primarily for other reasons

https://www.researchgate.net/publication/347801451_Transport_and_Communications_Bulletin_for_Asia_and_the_Pacific_Understanding_School_Travel_Behavior_and_the_Impact_of_Awareness_Raising_to_Promote_Resilient_Public_Bus_System_in_the_Coastal_City_in_In

20%

22%

58%

SEMARANG MODAL SPLIT (2020)

- Motorbike
- Private vehicle
- Other (including transport)

on Bus Trans Semarang routes;
source: https://iopscience.iop.org/
article/10.1088/1755-1315/409/1/012021/pdf

9%

39%

52%
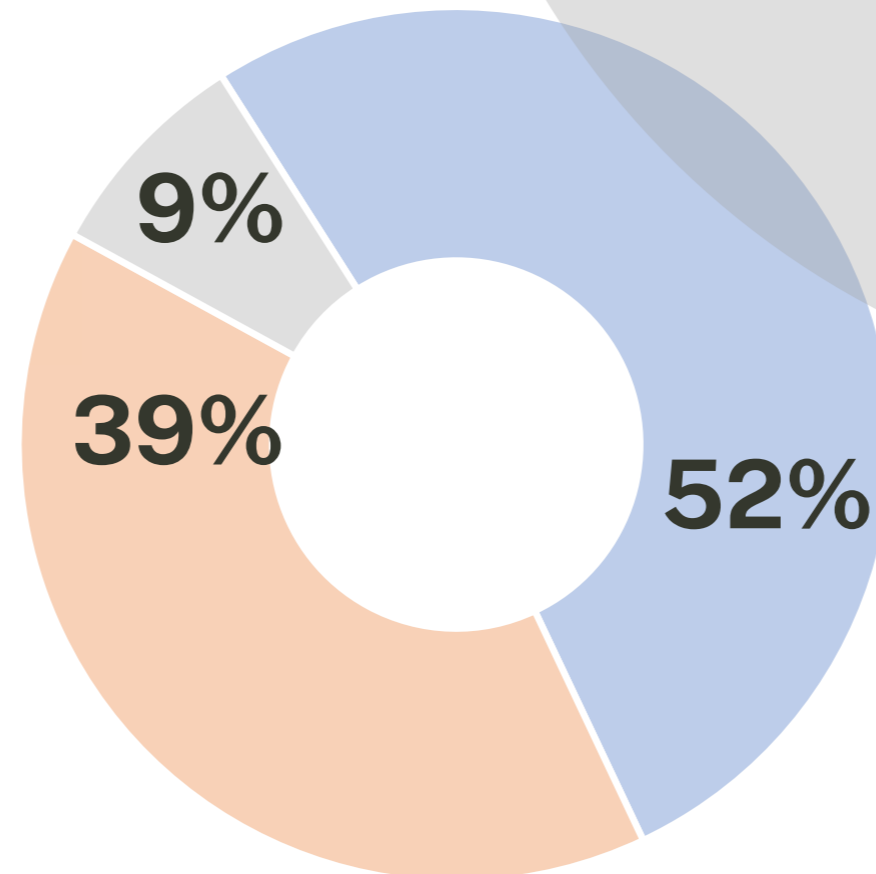
**BUS USERS' CAR
OWNERSHIP PROFILE (2021)**

- Motorbike only
- No car or motorbike
- At least 1 car

https://www.researchgate.net/
publication/347801451_Transport_and_
Communications_Bulletin_for_Asia_and_the_
Pacific_Understanding_School_Travel_Behavior_
and_the_Impact_of_Awareness_Raising_to_
Promote_Resilient_Public_Bus_System_in_the_
Coastal_City_in_In

Public Transport Access

Urban mobility in Semarang relies on road transport and the majority of people use private vehicles (80%) with 20% using public transport. Roads are dominated by motorcycles (58%), private cars (22%) and public transport (20%). The share of public transport consists of angkots (minibuses) (50%), quasi-BRT (also called Bus Light Transit - BLT; Trans Semarang) (40%) and regular buses (10%). There are plans to improve BRT (dedicated lanes) and build LRT.

84.6% of the population can access some form of public urban transport within a 15-minute walk. 59.5% of the population has access to the more direct Bus Light Transit (BLT) lines. Only 2.7% of the population need to walk more than 30 minutes to a transport stop.

The 'BLT' lines and feeder system do not have dedicated lanes. The lack of dedicated lanes, non-optimized departure frequencies, as well as a low quality of vehicles and stations/stops, are common obstacles to achieve high ridership.

Service Type	# within 15 min. walk	% within 15 min. walk	# within 30 min. walk	% within 30 min. walk
BLT	986,268	59.5	1,373,166	82.9
BLT Feeder	1,054,487	63.7	1,477,431	89.2
COMBINED ACCESS	1,400,910	84.6	1,611,335	97.3

Table: Population Accessing Public Transport

Legend

City Center

Secondary

Accessibility
15-minute walk
30-minute walk

Public Transport
Bus Light Transit (BLT)

BLT Feeder lines

BLT stop

Feeder Stop

Java Sea
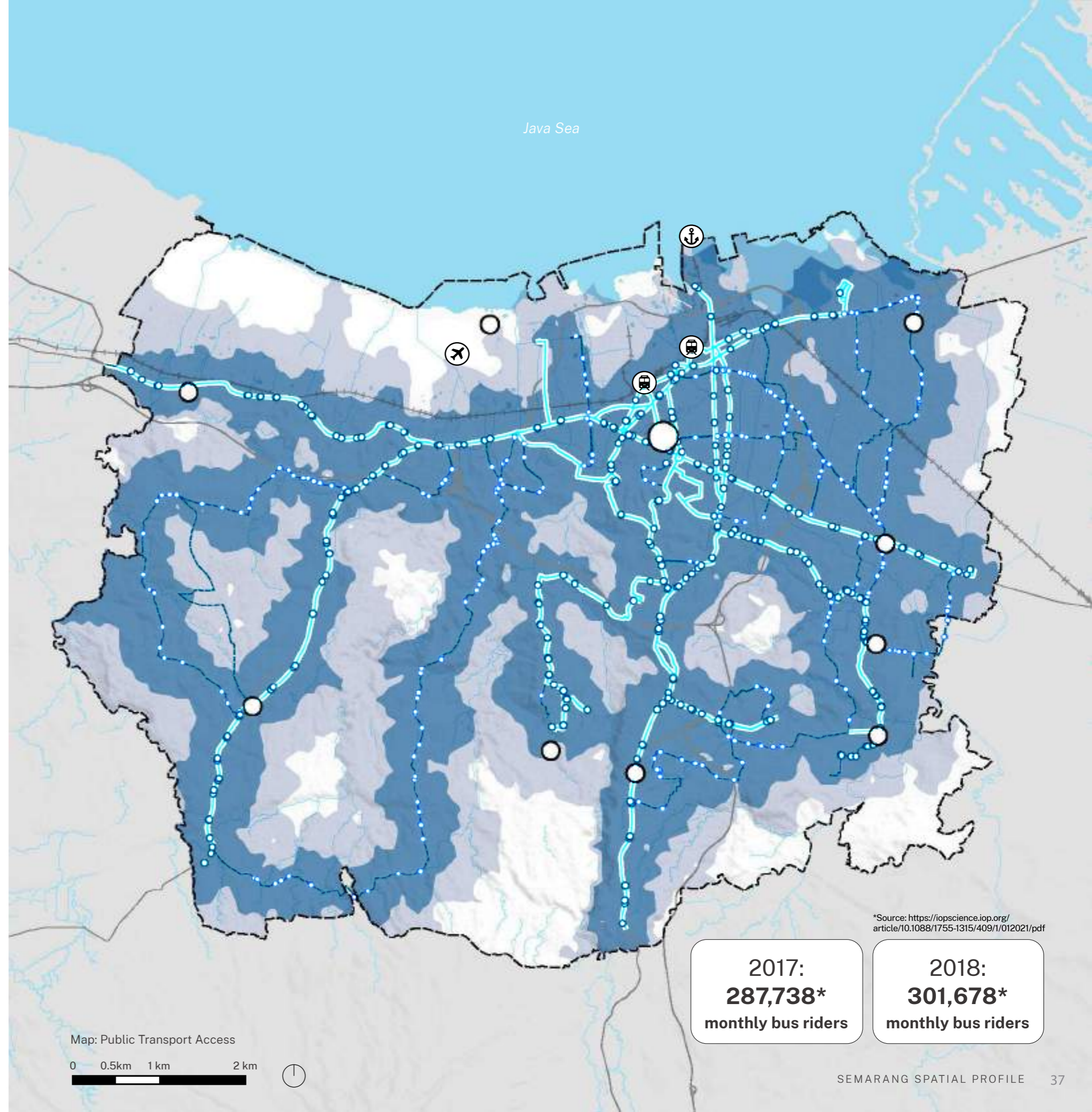
2017:
287,738*
monthly bus riders

2018:
301,678*
monthly bus riders
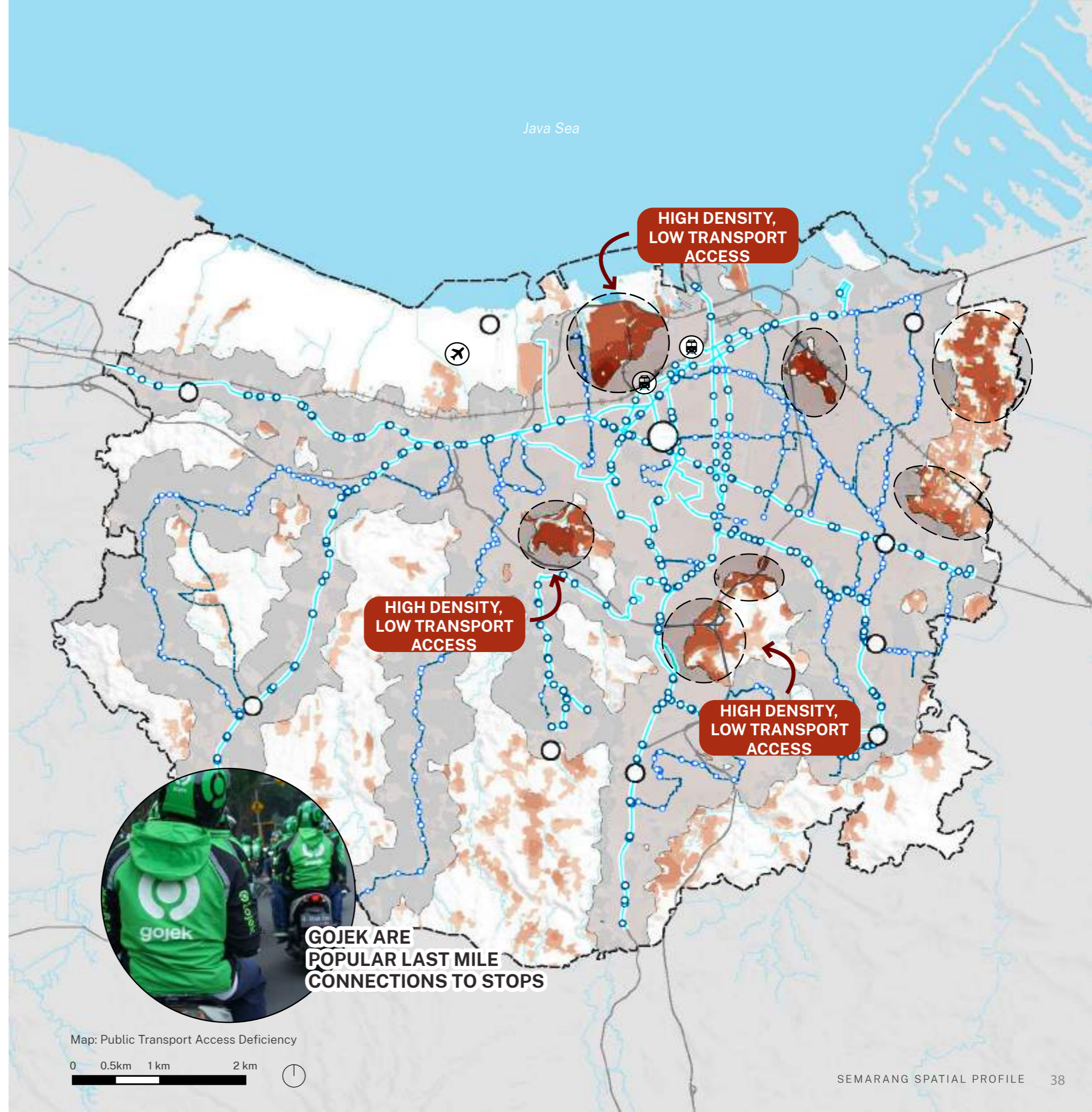
Map: Public Transport Access

0   0.5km   1 km   2 km

Public Transport Access
Deficiency

84.6% of the population can access some form of public urban transport within a 15-minute walk. 59.5% of the population has access to the more direct Bus Light Transit (BLT) lines. Only 2.7% of the population need to walk more than 30 minutes to a transport stop. There remains low access to public transport in small pockets around the city core where higher population densities exist but are not within 15-minutes walk of transport lines.

Java Sea

HIGH DENSITY, LOW TRANSPORT ACCESS

HIGH DENSITY, LOW TRANSPORT ACCESS

HIGH DENSITY, LOW TRANSPORT ACCESS

GOJEK ARE POPULAR LAST MILE CONNECTIONS TO STOPS

Legend

○ City Center

○ Secondary

Population Density
- 100 ppl/ha
- 150 ppl/ha
- 200 ppl/ha
- 268 ppl/ha

Accessibility
- 15-minute walk

Public Transport
- —— Bus Light Transit (BLT)
- --- BLT Feeder lines
- ○ BLT stop
- ○ Feeder Stop

Map: Public Transport Access Deficiency

0   0.5km   1 km   2 km
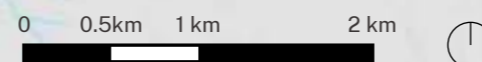
Public Transport
Integration *Deficiency*

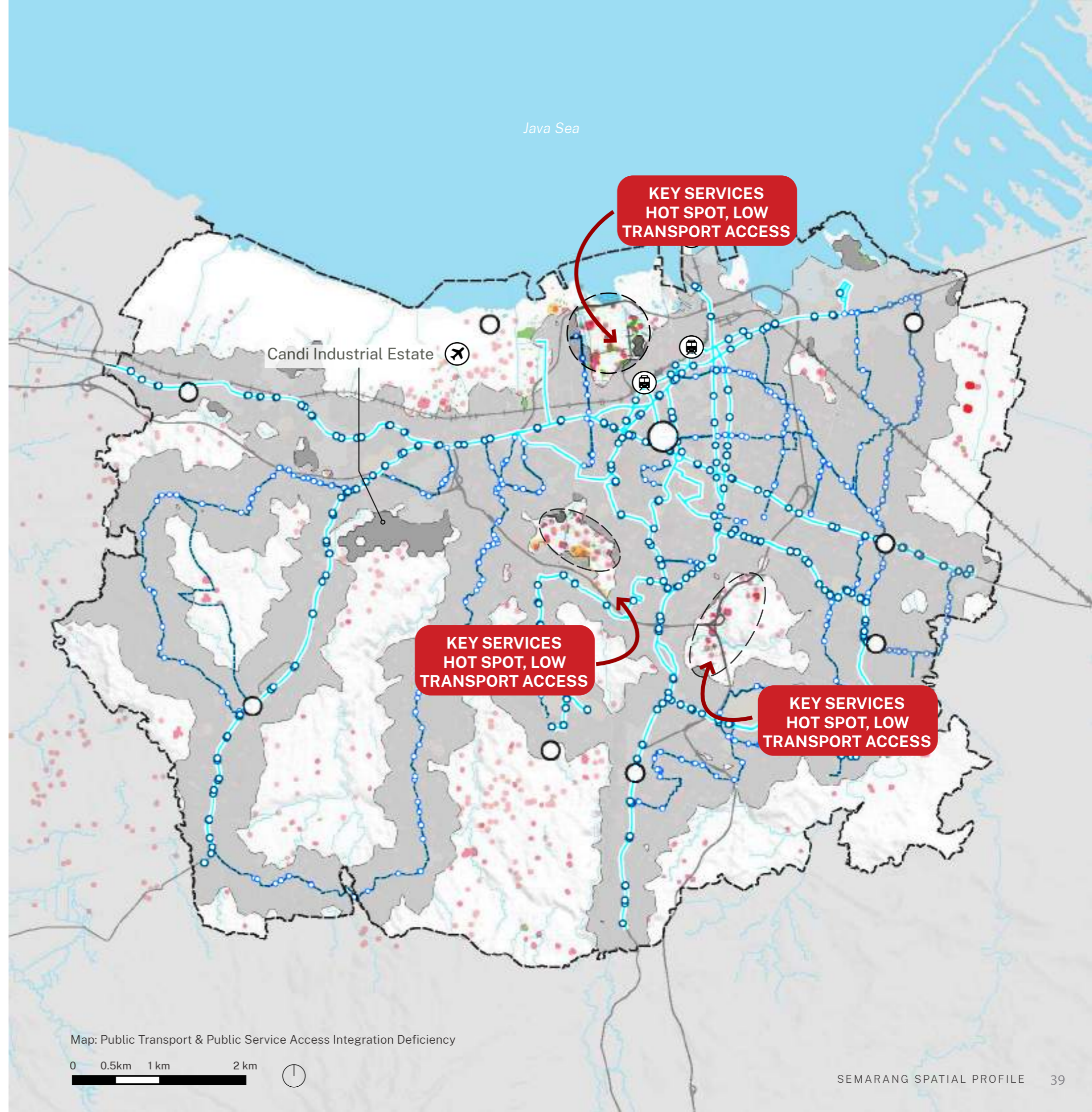The public transport network generally serves economic nodes and major hospitals well. Low public transport service to key services occurs in pockets to the city core's south and north. 3 notable key service hotspots remain underserved by public transport shown on the map to the right.

Facility/Node	% within 15 minutes walk	Avg. time to walk to from stop (min.)
Hospital	99.8	4.4
Puskesmas	89.8	7.9
Poyandu	79.3	10.3
Klinik	91.5	7.9
University	94.8	6.5
School	83.4	9.3
Kindergarden	84.5	9.1
Trade	96.0	5.3
Market	95.6	5.8
Office	97.9	5.8
Industry	68.0	12.9

Table: Key Services Accessible by Public Transport

Legend

○ City Center

○ Secondary

Key Services

⬤ Employment Node

⬤ University

○ Schools/Kindergarten

⬤ Puskesmas

⬤ Hospitals

Accessibility

▨ 15-minute walk

Public Transport

— Bus Light Transit (BLT)

--- BLT Feeder lines

○ BLT stop

○ Feeder Stop

Java Sea

KEY SERVICES HOT SPOT, LOW TRANSPORT ACCESS

Candi Industrial Estate ✈

KEY SERVICES HOT SPOT, LOW TRANSPORT ACCESS

KEY SERVICES HOT SPOT, LOW TRANSPORT ACCESS

Map: Public Transport & Public Service Access Integration Deficiency

0   0.5km   1 km   2 km
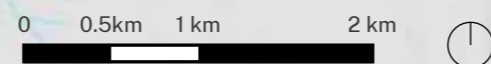
Orbital Roads Impact on Vulnerable Groups

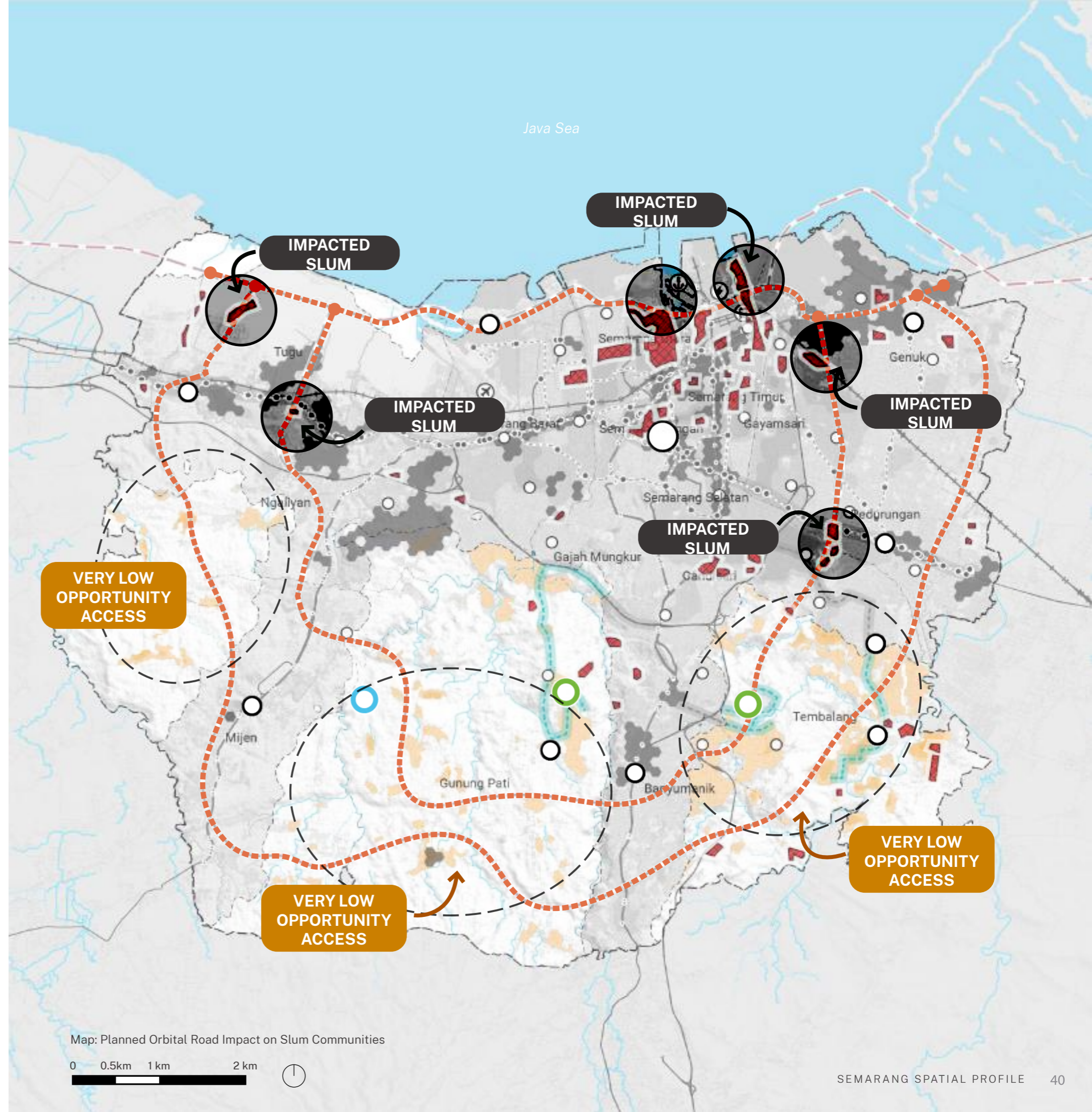Areas located outside a 30 minute walking distance to transport are most in need of access improvements. The Planned Orbital Roads may provide improved connection for more isolated low income population groups but more work is required to assess what form of public transit is viable on such roads given the low population levels and their planned routing on slum dwellers. Consideration must also be paid to ensure that planned orbitals do not exacerbate sprawl and speculative development in the peripheral areas.

Planned orbital roads may provide access to isolated poor populations but must not exacerbate sprawl or increase inequality.

KEY CHALLENGE

Planned orbital roads may provide access to isolated poor populations but must not exacerbate sprawl or increase inequality

Legend

City Center	Economic Node
Secondary	Slum Area
Tertiary	Planned Orbital Roads
Existing Primary Motorways/Roads	> 20 p/ha (low income)

Map: Planned Orbital Road Impact on Slum Communities

0   0.5km   1 km   2 km

Peak Traffic Congestion

During peak congestion (7-9AM; 5-7PM) there appears to be relatively few highly congestion areas on major roadways. There does not appear to be a clear correlation between population density and traffic congestion.

33% of Semarang's carbon emissions come from transportation (highest sector) (https://www.iurc.eu/wp-content/uploads/2021/10/04.Semarang-City.pdf)

Based on little data, there appears to be few major roads with high congestion during peak traffic hours, despite a significant increase in motor vehicle take up in recent years and low transport ridership. The City should consider whether new orbital roads will induce, not reduce, congestion, and instead focus on increasing transport service quality and quantity.
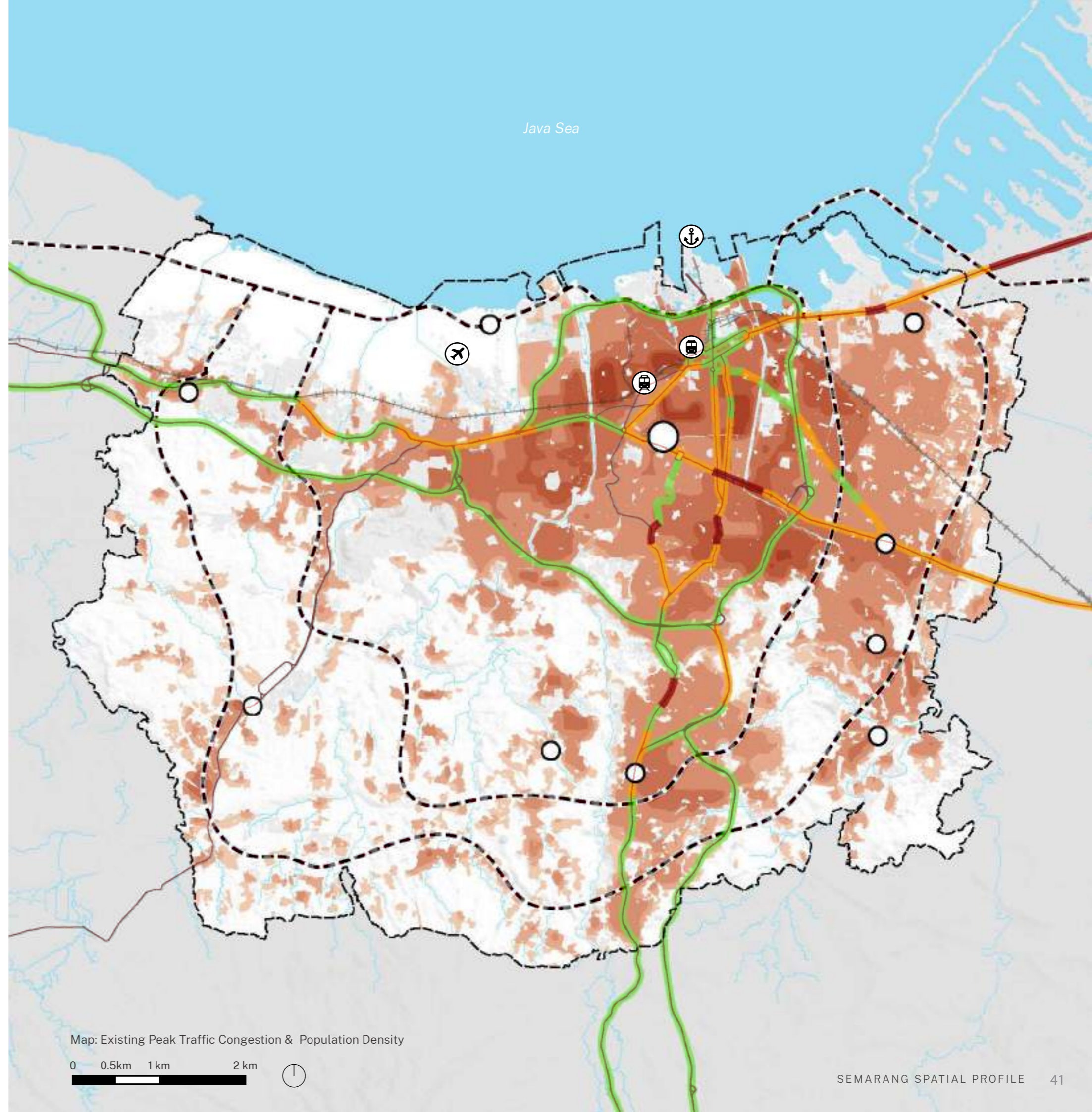
Java Sea

Legend

○ City Center

○ Secondary Center

- - Planned Orbital Roads

— Low Congestion

— Medium Congestion

— High Congestion

Population Density

- 0 ppl/ha
- 25 ppl/ha
- 50 ppl/ha
- 100 ppl/ha
- 150 ppl/ha
- 200 ppl/ha
- 268 ppl/ha

Map: Existing Peak Traffic Congestion & Population Density

0   0.5km   1 km   2 km
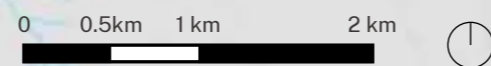
Key Findings

01 Existing BLT lines serve the majority of residents

BLT and BLT feeders provide convenient access to 84.6% of residets, with few notable high density population areas with deficient access. As the BLT system does not currently have dedicated lanes within the street right-of-way, service quality, frequency and efficiency remains unclear.

02 Key services are well accessed by existing transport lines

Many key services are well accessed by transport. There are gaps which may be serviced by existing BLT service, but the status of the service is unclear. 3 notable key service hotspots remain underserved by public transport. However all 3 may be already served by BLT lines (data unclear).

03 Work & school commuters are primary transport users

49% of Trans Semarang bus riders utilise the system primarily for employment purposes while 37% of bus riders utilise the system primarily for education (non-college) destinations. Thankfully, most schools and kindergartens are within walking distance of public transport lines.

04 Planned Orbital Roads may negatively impact vulnerable groups

Planned orbital roads may provide access to isolated poor populations but must not bisect slum locations without adequate considerations of human rights nor result in forced relocation of slum dwellers. Consideration must also be paid to ensure that planned orbitals do not exacerbate sprawl and speculative development in the peripheral areas.

Indicator 03
Economic Opportunity

Access to Economic Opportunity is a key parameter for the success of a city. Understanding economic activity, how it clusters and the spatial distribution of such clusters is critical to be able to intervene effectively with targeted investments.

Existing Economic Nodes

Semarang's economy is extremely important to Central Java as it is a key regional economic hub in Indonesia. Considering the port as infrastructure rather than an economic node, 18 economic nodes were identified in the city: bigger economic nodes concentrate in the city center while smaller trade & services and business areas are dispersed along Jl. Sultan Agung main axis.

The East-West economic corridor continues to expand South following the most recent sprawl. Most economically vibrant area of the city is the city centre (mainly trade & services and market areas) and along the northern half of the city where densification is also higher (both building and population wise). The major economic nodes are composed by trade & services and industrial activities;

- 46% of the population can access an economic node within a 15 minute walk

- 33.1% can access trade & services nodes within 15 mins walk

- 14.5% can access industrial nodes within 15 mins walk

- 14% can access commercial nodes within 15 mins walk

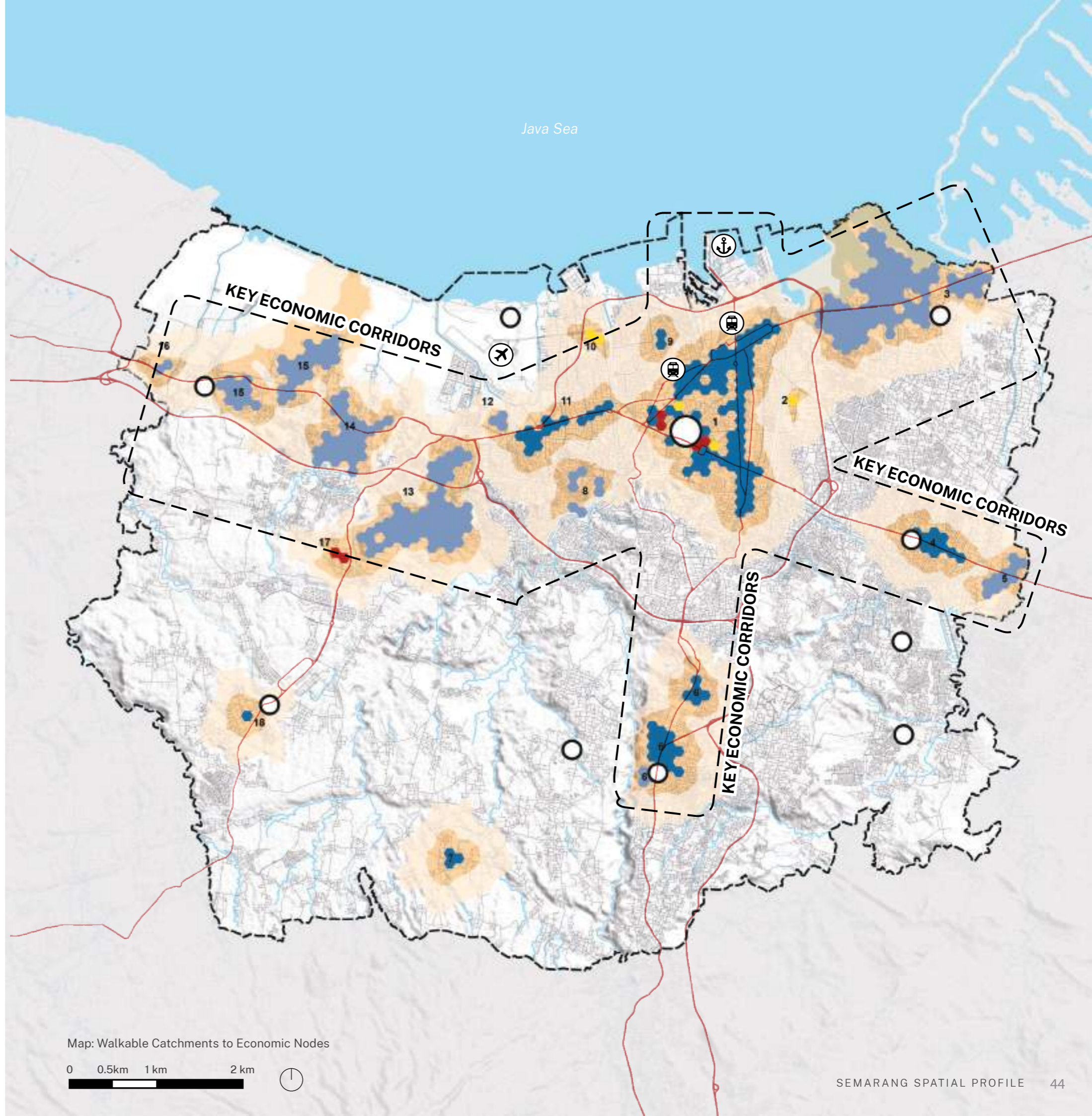- 18.4% can access business nodes within 15 mins walk
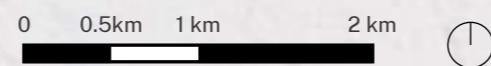
Legend

◯ City Center

◯ Secondary

Accessibility

15-minute walk

30-minute walk

Economic Node Activities

■ Trade & Services

■ Industrial

■ Commercial

■ Offices

Map: Walkable Catchments to Economic Nodes

0   0.5km   1 km   2 km

KEY ECONOMIC CORRIDORS

Java Sea

Strategic Economic Priority Areas

A key strategic priority of Semarang is to improve and increase provision of city services in the city centre – strategic area of economic growth;

Small to medium economic nodes (trade & services and business) are following recent sprawl patterns towards South.

Industrial clusters as Bandarharjo, Genuk and Kaligawe (red areas) are under threat from subsidence and flood risk (as elaborated under indicator XX). Given the scale of this area and the level of employment is likely provides, key investments in this are will be critical.

The Candi Industrial Estate (yellow area) to the west of the city is now becoming one of the largest and is still developing. As future industrial development takes place in Tugu and outside the city boundary where a major national government funded industrial park is planned, it will be important to consider the infrastructure connecting these clusters to well serviced mixed use residential areas through careful planning and public transport investment.

What is key for the cities development is to ensure that these economic nodes are able to thrive, by being made to be resilient, accessible to as much of the population as possible and well serviced in terms of utility infrastructure.

Map: Priority Economic Node Areas

Legend

- ◯ City Center
- ◯ Secondary
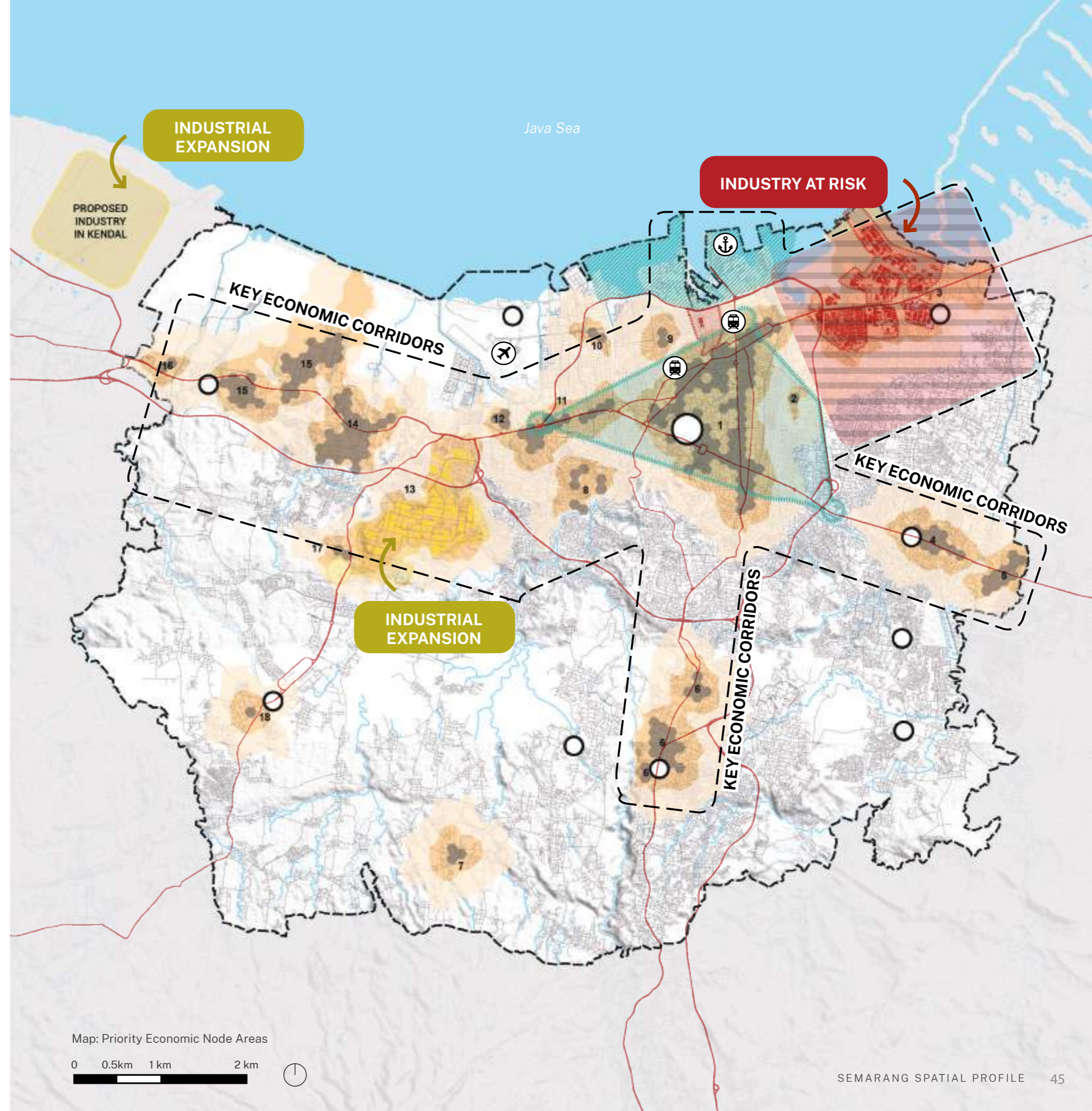
Accessibility
- 15-minute walk
- 30-minute walk

- ▦ Economic Nodes
- ▦ Industrial in expansion
- ▦ Industrial at risk
- ▦ Strategic areas of Economic Growth
- ▨ Strategic Port Area

Access to Economic Nodes
Deficiency (via walking)

Given that access to economic nodes is critical for livelihoods to flourish and economic activity to effectively take place, Semarang displays a number of areas of potential opportunity and deficiencies. In general however, more than 53% of th population live more than a 15 minute walk to an economic node and more than 25% have to walk further than 30 mins. As a result, sound public transport is of critical importance to the well functioning of the city and its economy.

On the periphery of the city core is where most of the opportunity for expansion of the economic nodes (dependent on the economic activity) or to consider as prime areas for public transport and social facility investment. They will likely become more desirable as the city grows, therefore offering opportunity for densification rather than on the city periphery.
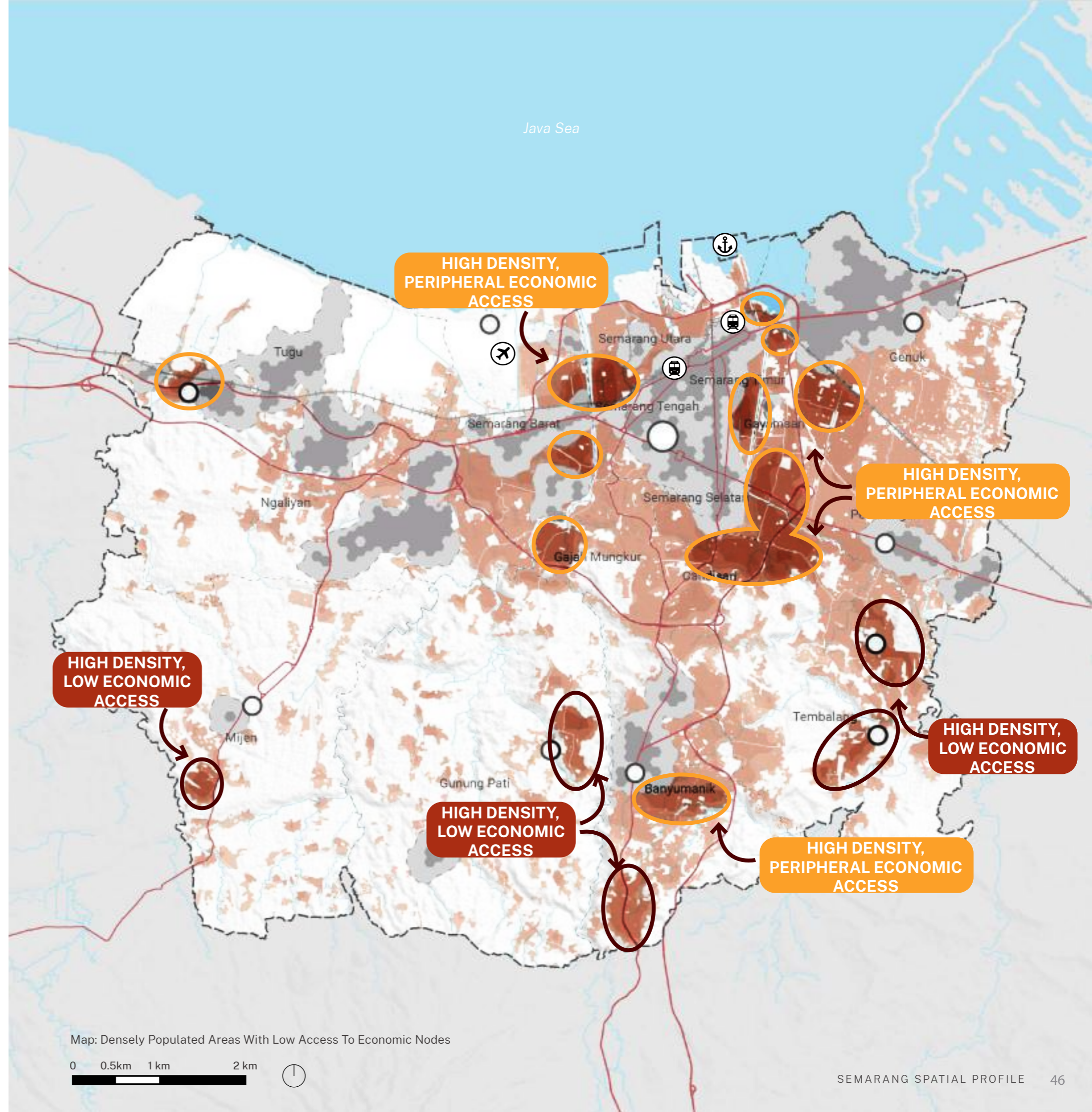
On the periphery of the overall city is where the most pressing deficiencies lie. In these areas there is substantial population clusters who are limited in terms of access to economic nodes.

KEY CHALLENGE

Significant amounts of highly populated areas are currently not within 15-minute walking distances of economic nodes

Legend

City Center

Secondary

Economic Nodes

15 minute walking catchment

Population Density
- 100 ppl/ha
- 150 ppl/ha
- 200 ppl/ha
- 268 ppl/ha

HIGH DENSITY, PERIPHERAL ECONOMIC ACCESS

HIGH DENSITY, PERIPHERAL ECONOMIC ACCESS

HIGH DENSITY, LOW ECONOMIC ACCESS

HIGH DENSITY, LOW ECONOMIC ACCESS

HIGH DENSITY, LOW ECONOMIC ACCESS

HIGH DENSITY, PERIPHERAL ECONOMIC ACCESS

Java Sea

Tugu

Semarang Utara

Genuk

Semarang Barat

Semarang Tengah

Semarang Timur

Gayamsari

Ngaliyan

Semarang Selatan

Gajah Mungkur

Candisari

Mijen

Gunung Pati

Tembalang

Banyumanik

Map: Densely Populated Areas With Low Access To Economic Nodes

0   0.5km   1 km   2 km

Key Findings

01 Sprawling economic Activity

Improving access to jobs is key for the cities long term economic wellbeing as well as to ensure equitable livelihoods. The sprawling nature of the economic nodes needs to be considered in relation to where populations are growing and where public transport investments can follow.

02 Industrial areas at risk to hazards

The Industrial areas to the north east are at risk from sea level rise and severe subsidence. Improvements in key resilience infrastructure will be key to retaining the viability of these economic nodes.

03 Excluded peripheral populations

Isolated clusters of population to the south, west and eastern peripheries are to some extent limited in terms of economic access. Public transport investments to the hubs in these areas are key to enabling universal access to economic opportunities.

Indicator 04
Social Facilities

This analysis allows practitioners to understand the number of people who can access existing key services (public space, health and education facilities) while highlighting their strategic distribution. This can inform decisions related to resolving under and oversupply.

Social Facilities Opportunity Index

An opportunity index provides a composite overview of the access to various social facilities in Semarang, specifically public open space, education facilities and healthcare facilities. The opportunity index methodology is a useful to equally measure access within a 15 minute walk to various amenities for all residents across the city.

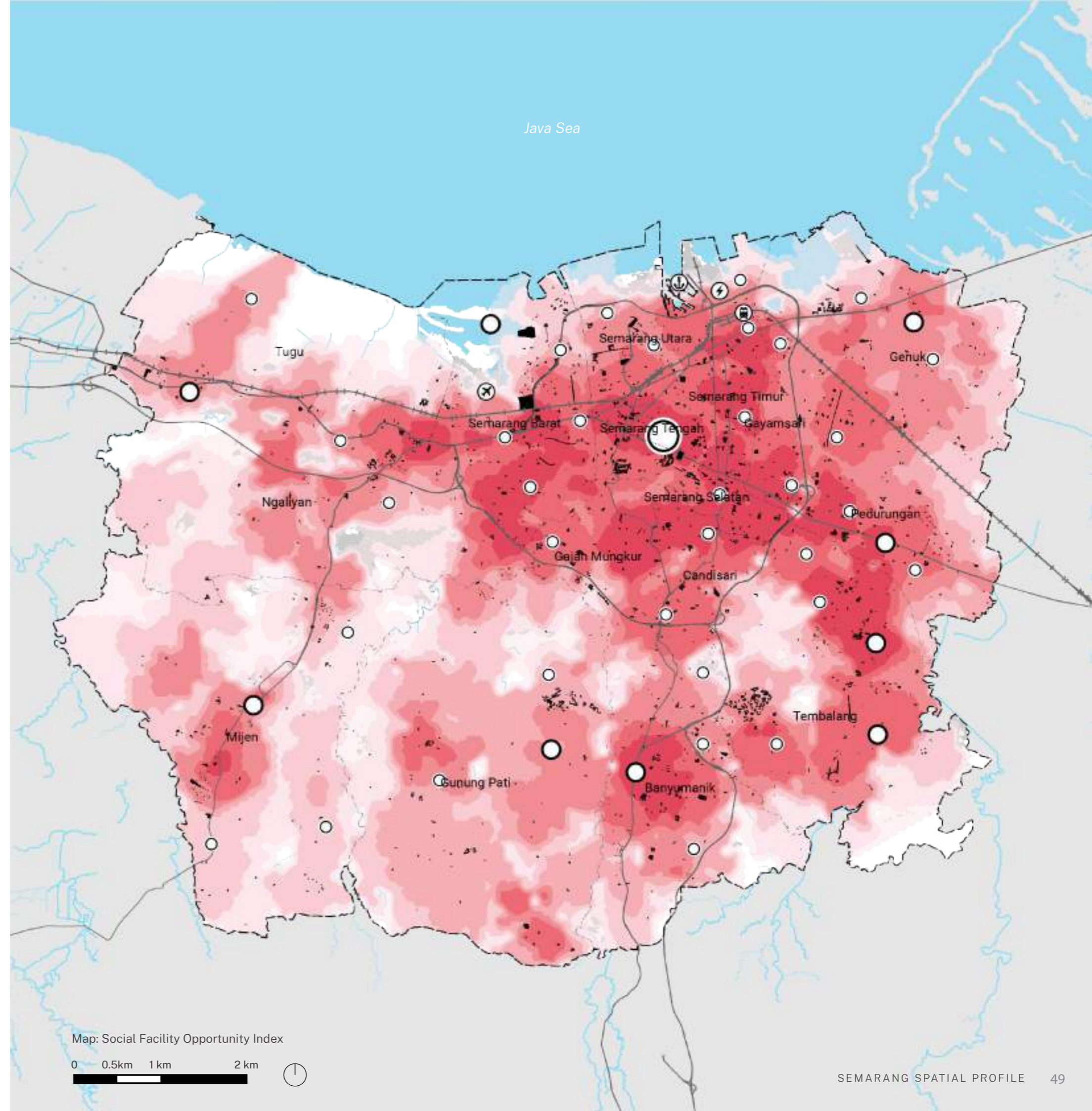The opportunity index for social facility therefore shows a spectrum of areas that demonstrate access within 5 minutes to anywhere between 1-10 type of amenity. At each end of the spectrum, those areas that are shown as dark pink on the map, have up to 7 types of social facility within a 15 minute walk and those areas that are shown as white, have no type of social facility within a 15 minute walk. The higher the index the more "opportunity" these areas offer to potential users.

For Semarang, it is clear that the core of the city (in darker pink) provides substantial access to a diverse array of social facilities within a 15 minute walk. The areas that may need investment in various forms of social facility are in Tugu, Genuk.

The majority (79.3%) of the population have good opportunity to access a range of facilities of between 4-6, but nearly 10% have less than 3 within a 15 minute walk. In the following pages, the specific facility sectors are elaborated in more detail to highlight deficits in access and provision.

Legend

City Center	
Secondary	
Tertiary	
—	Existing Primary Motorways/Roads
■	Social Facility

Opportunity Index

■	7 facilities in 15 mins
■	6 facilities in 15 mins
■	5 facilities in 15 mins
■	4 facilities in 15 mins
■	3 facilities in 15 mins
■	2 facilities in 15 mins
■	1 facility in 15 mins

Map: Social Facility Opportunity Index

0   0.5km   1 km   2 km
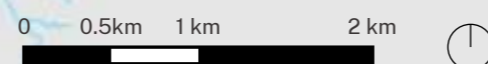
Public Space Access
Deficiency

Public space is a critical enabler for an inclusive city as a platform to build safer and cohesive communities, reduce spatial inequalities, and bring nature back to the city.
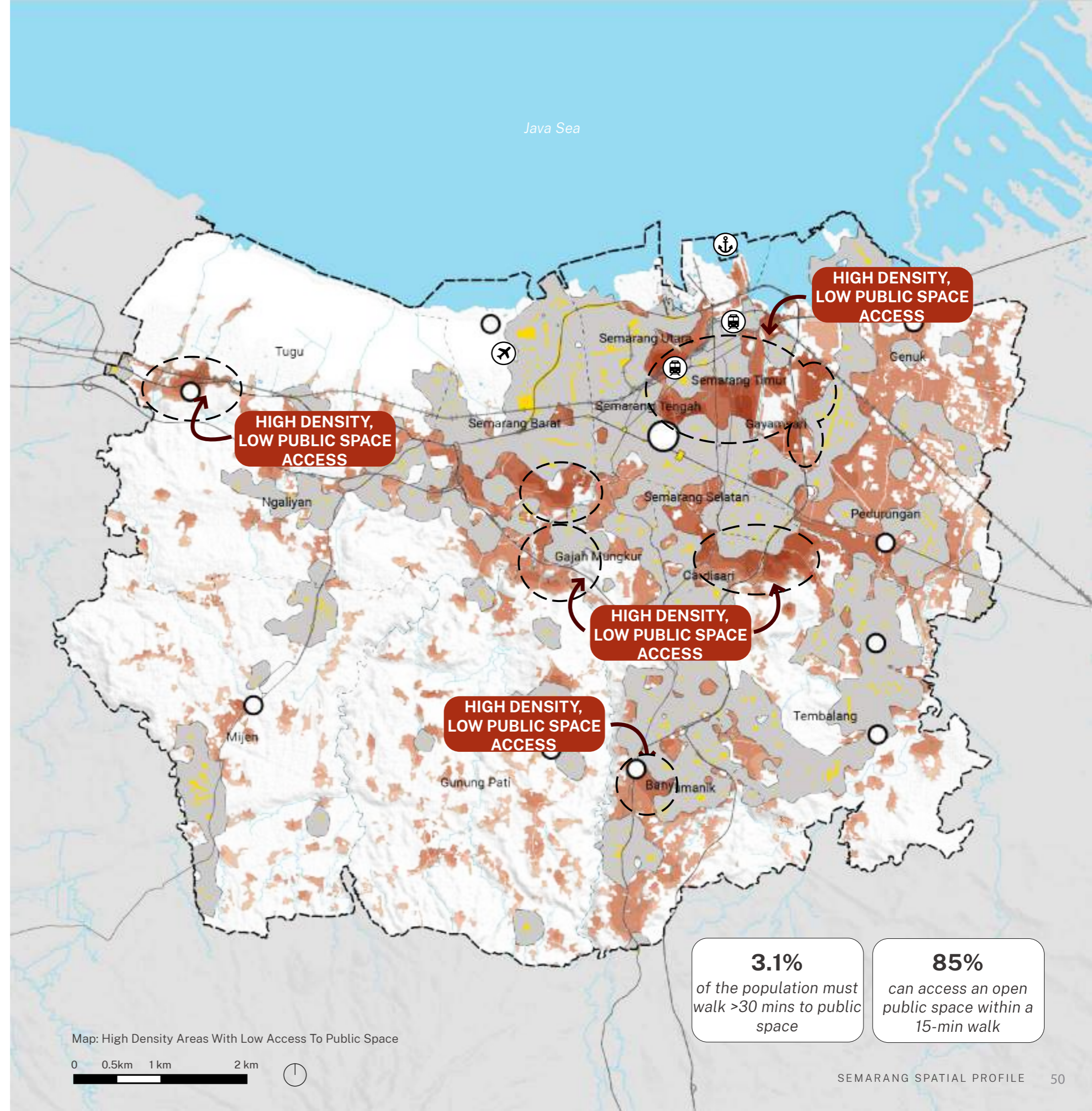
Public Space in Indonesia is defined only as green open space (RTH) and does not include plazas, streets, and sidewalks. The Semarang City Government has identified green open space as one of its key indicators for measuring environmental quality and natural resource management.

Acknowledging that the UN-Habitat definition is broader and includes plazas, leisure and sports facilities for example, 10-15% of the total urban area is still recommended to be allocated to public space (not including streets and sidewalks). Even with this more expansive definition, only 0.7% of the city is dedicated to public space and additional 1.2% to recreation leaving it, far below the recommended 10-15%

85% of the total population of Semarang can access an open public space within a 15-minute walk but 3.1 % of the population must talk than 30 mins. The key areas of public space deficit (residents with low access to open space) is typically found, mostly around the periphery of the urban core and interlaced between large infrastructure areas such as roads and rail yards.

Legend

○ City Center

○ Secondary

Accessibility
▨ 15-minute walk

▨ Public Spaces

Population Density
▨ 100 ppl/ha
▨ 150 ppl/ha
▨ 200 ppl/ha
▨ 268 ppl/ha

Map: High Density Areas With Low Access To Public Space

0   0.5km   1 km   2 km

HIGH DENSITY, LOW PUBLIC SPACE ACCESS

3.1%
of the population must walk >30 mins to public space

85%
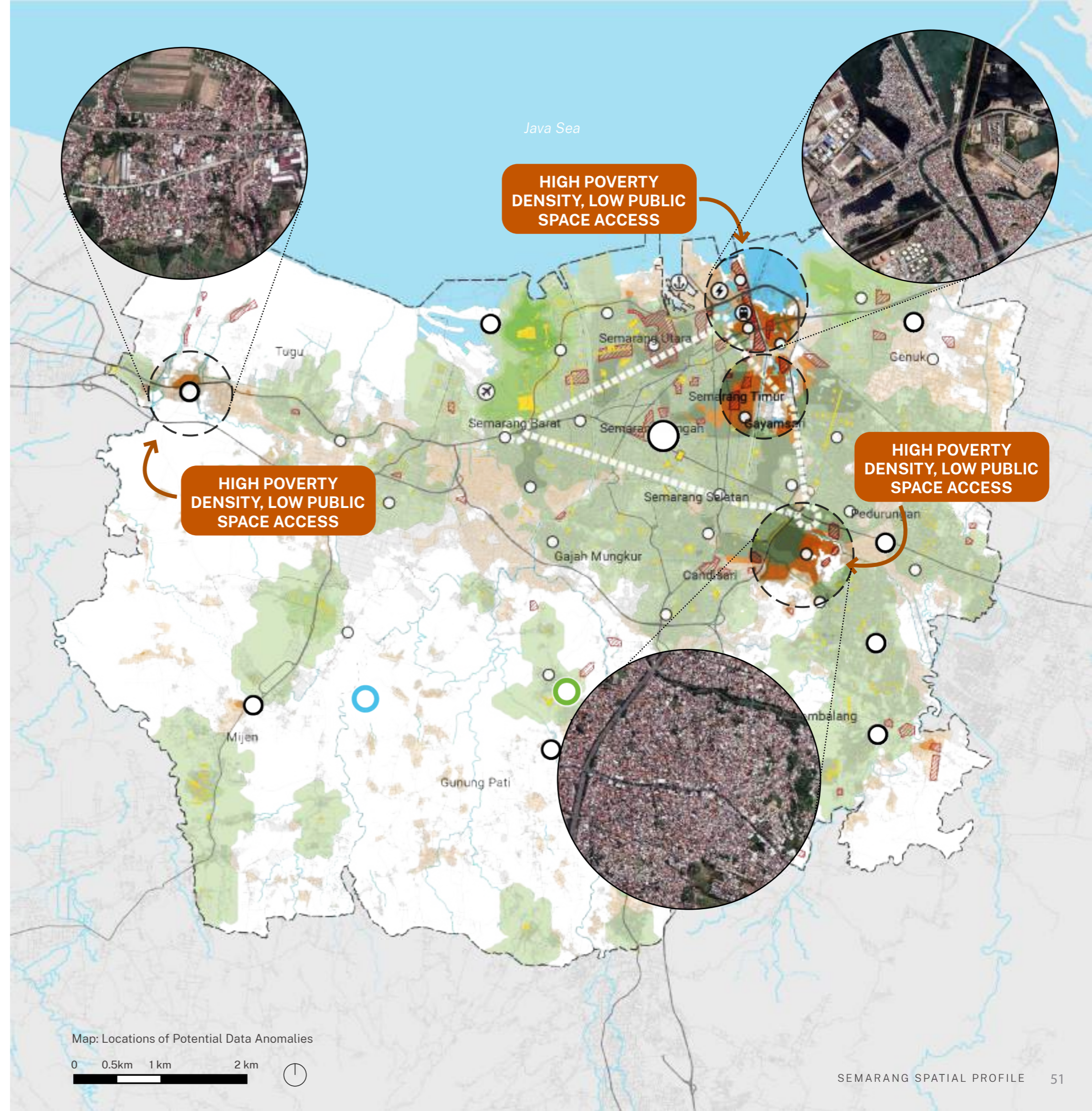*can access an open public space within a 15-min walk*

Vulnerable Group & Public Space *Deficiency*

Public spaces should provide amenity to all residents in the city, regardless of income level or demographic. However in many contexts, slum dwellers or the poor have limited or no access to public space, despite living in cramped conditions and having limited means to access non-public spaces.

The spatial distribution of higher levels of poverty and slums tends to sit within the main urban core, in close proximity to the waterfront in addition to several peripheral areas. Particularly affected areas include:

The Port-adjacent areas with the largest slums and where a significantly high density of vulnerable population hemmed in by the encroaching sea are in severe need of de-congestion and public space, with linkage to water management.

The Great Mosque Area in the urban core, the Candisari residential area on and the planned sub centrel of Tugu share similar challenges of high density of vulnerable population with very low access to public space.

Java Sea

HIGH POVERTY DENSITY, LOW PUBLIC SPACE ACCESS

HIGH POVERTY DENSITY, LOW PUBLIC SPACE ACCESS

HIGH POVERTY DENSITY, LOW PUBLIC SPACE ACCESS

Tugu

Semarang Utara

Genuk

Semarang Timur

Semarang Barat

Gayamsari

Semarang Tengah

Semarang Selatan

Pedurungan

Gajah Mungkur

Candisari

Mijen

Gunung Pati

Mbalang

Legend

○	City Center
○	Secondary
○	Tertiary
—	Existing Primary Motorways/Roads
◆	Existing Public Spaces
◇	Slum Area

Poverty Density
- > 90 p/ha
- 75 p/ha

Public Space Acces/Capita
- 30 - 60 m2
- 15 - 30 m2
- 5 - 15 m2
- 0.2 - 5 m2
- 0.1 - 0.2 m2

Map: Locations of Potential Data Anomalies

0   0.5km   1 km   2 km
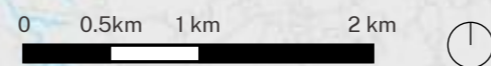
Public Space Access
per capita

Whilst the majority of the city's residents have access to public space, this is not fully representative of the way in which residents utilise such assets in a city. As such, the measure of the access per capita in relation to the amount of public space is also assessed. In this case, the city is shown to be under-performing

As demonstrated in the total land allocation of public space, there is limited provision of public space across the city, with many areas suffering from a particularly severe public space deficit. As a consequence, even if residents are within walking distance to a public space, the public spaces are likely to be over-crowded or undersized. This is demonstrated by the analysis which shows that 98% of the residents of Semarang have less than 5m2 of designated public space per capita within a 15 minute walk.

The city's plans to strategically invest in key sub-city centres across the territory offers a chance to help resolve this by ensuring the investment in additional high quality public spaces
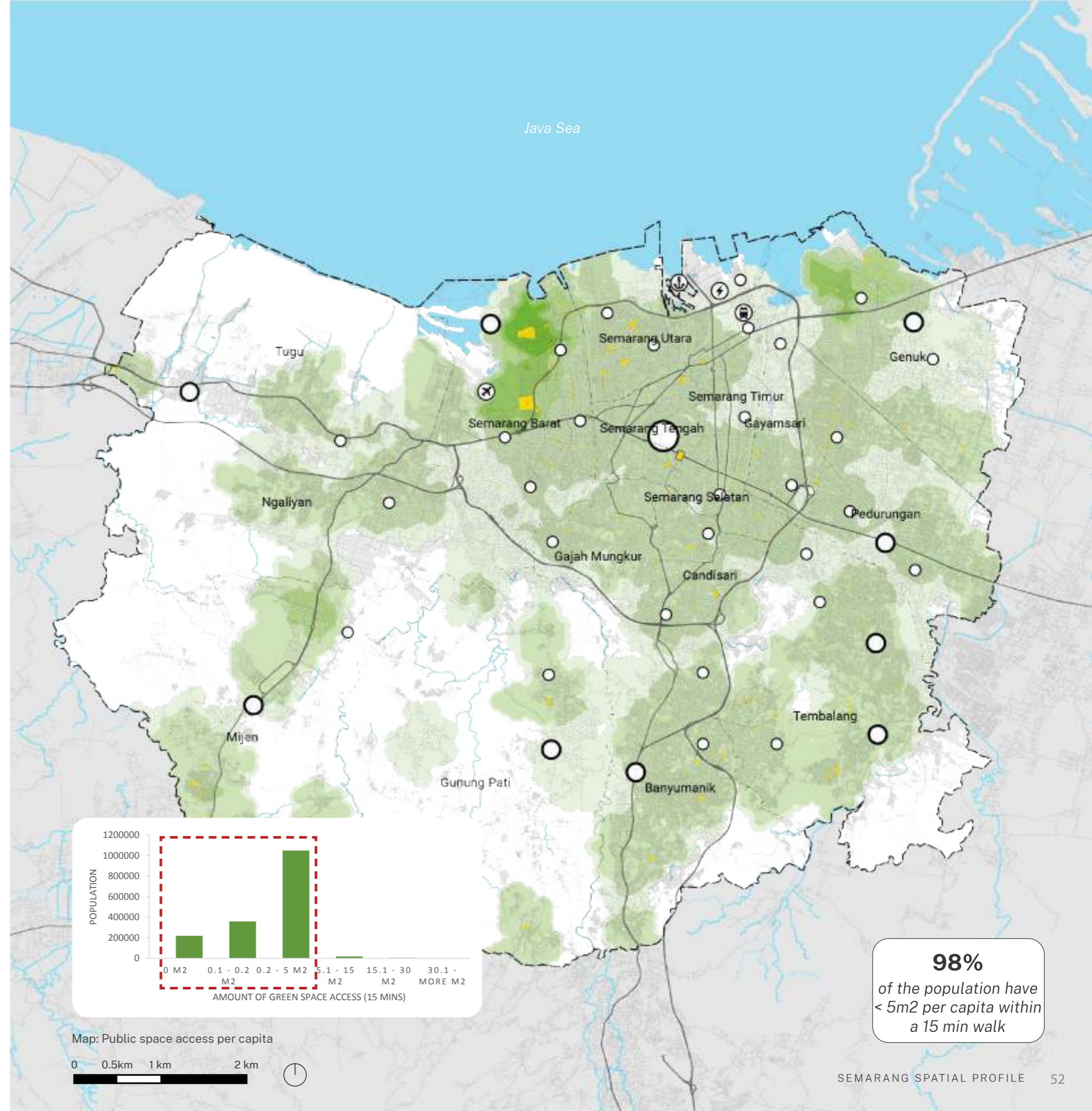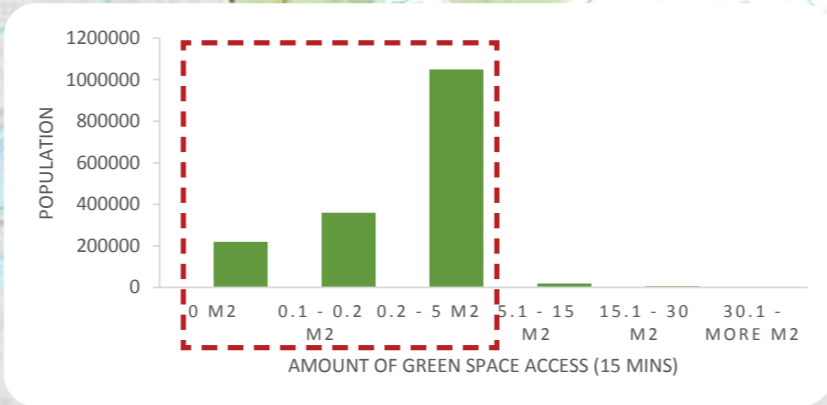
Legend

○ City Center

○ Secondary

○ Tertiary

— Existing Primary Motorways/Roads

◆ Existing Public Spaces

Public Space Access Per Capita

- 30-60 m2
- 15-30 m2
- 5-15 m2
- 0.2-5 m2
- 0.1-0.2 m2

Java Sea

Tugu · Semarang Utara · Genuk · Semarang Barat · Semarang Timur · Semarang Tengah · Gayamsari · Ngaliyan · Semarang Selatan · Pedurungan · Gajah Mungkur · Candisari · Mijen · Tembalang · Gunung Pati · Banyumanik

Chart axis — POPULATION vs AMOUNT OF GREEN SPACE ACCESS (15 MINS): 0 M2, 0.1-0.2 M2, 0.2-5 M2, 5.1-15 M2, 15.1-30 M2, 30.1-MORE M2

Map: Public space access per capita

0   0.5km   1 km   2 km

98%
of the population have < 5m2 per capita within a 15 min walk

Potential Data Concerns

Further analysis of the spatial data shows that the three largest clusters of public space area are either large unprogrammed green areas with limited or no public access or with very low residential densities adjacent. They may be publicly owned or accessible but are poorly located in the periphery of the city and thus provide limited benefit per capita to the city as a whole.

It is recommended that a full public open space audit in line with the Indonesian definition is carried out to be able to fully assess the deficit.

It was acknowledged by the stakeholders during the workshops in November 2022 that access to public open space is perceived to be a challenge in the city. A key element restricting the development of new public open spaces is available land. As such, there remain opportunities in the strategic development of the central core to densify in carefully allocated areas, by allowing additional floor area etc to developers in return for the provision of public space.

KEY CHALLENGE

> The city is under performing in terms of public space provision, and unclear data suggests this may be worse than the analysis suggests.
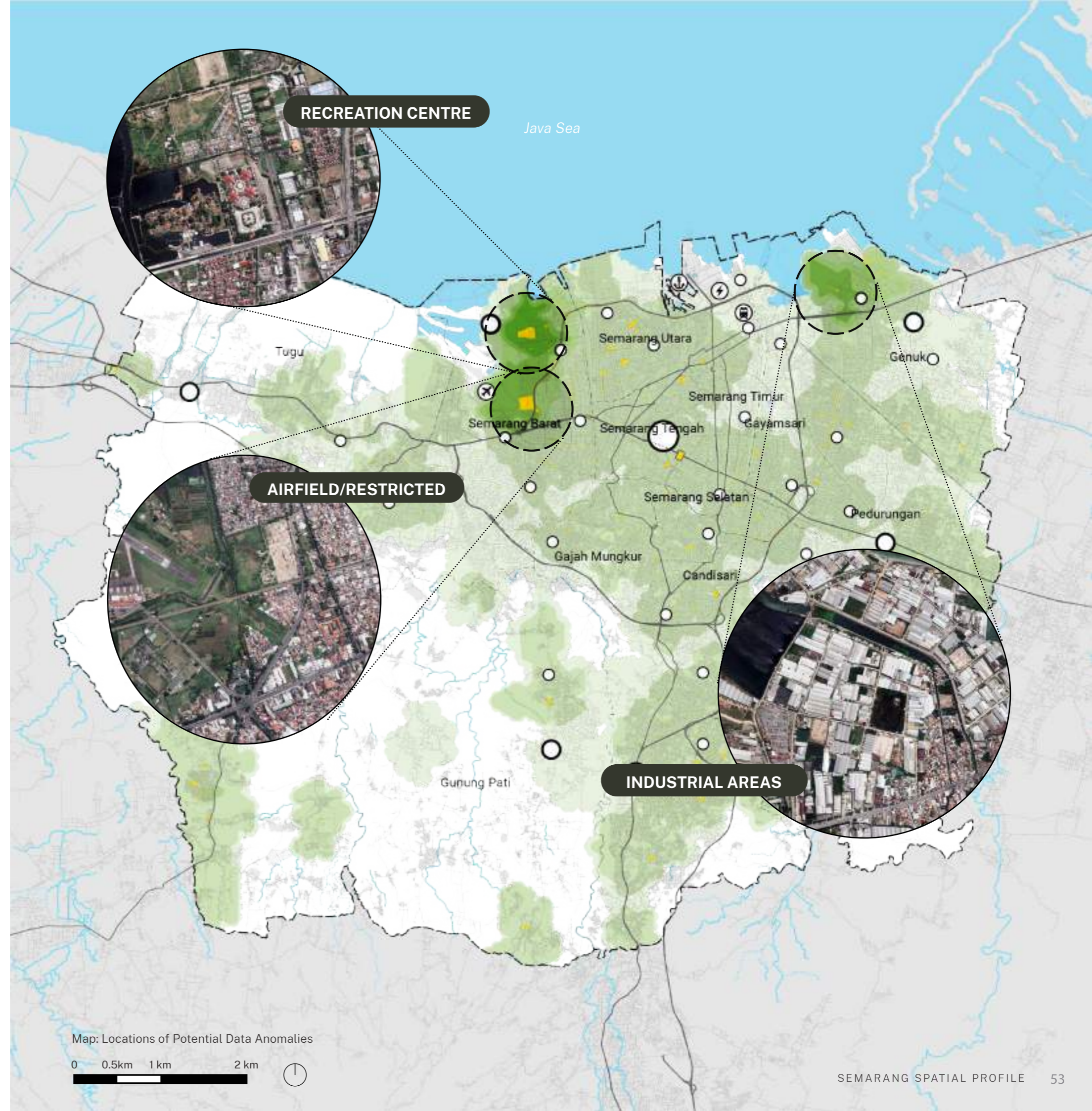
Map: Locations of Potential Data Anomalies

Legend

◯	City Center
◯	Secondary
○	Tertiary
—	Existing Primary Motorways/Roads
▰	Existing Public Spaces

Public Space Access Per Capita

- 30 - 60 m2
- 15 - 30 m2
- 5 - 15 m2
- 0.2 - 5 m2
- 0.1 - 0.2 m2

RECREATION CENTRE

Java Sea

AIRFIELD/RESTRICTED

INDUSTRIAL AREAS

Access to Education

Kindergartens

Important for families is close access to a kindergarten from a parent or carer's home or place of work.

- 97.8% of the population can access a kindergarten and primary schools within a 15 minute walking distance.

This indicates a high walkable access to primary education facilities within the city.

Map: Walkable Catchments to Kindergartens

0   1 km   2 km
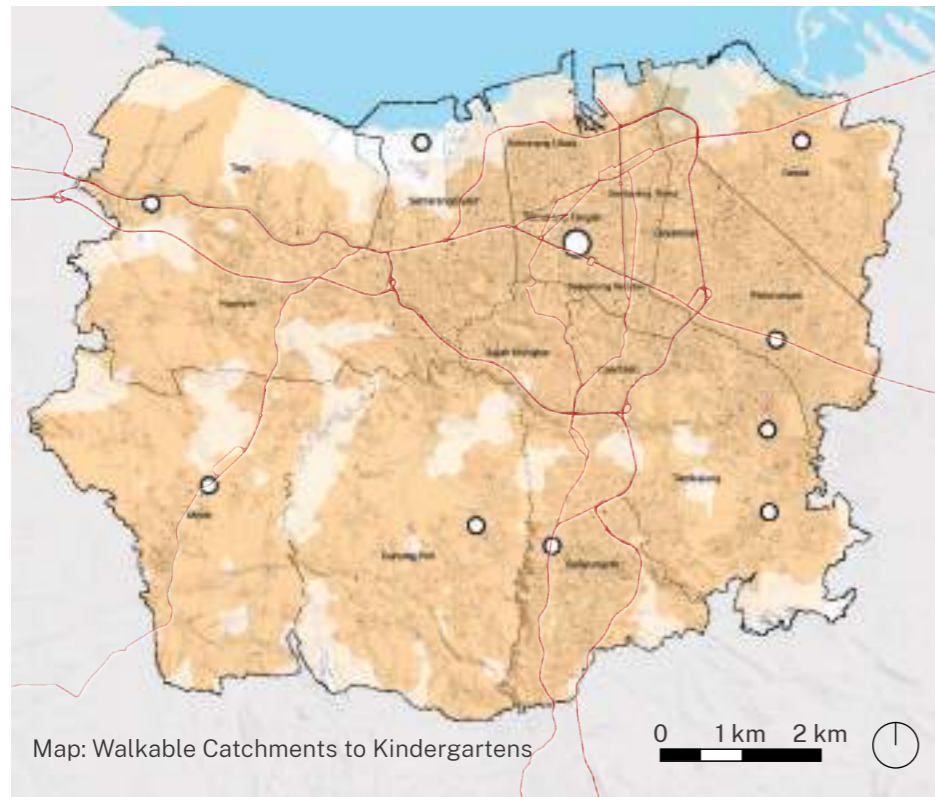
Legend

○ City Center   ■ Kindergartens

○ Secondary

Accessibility

▢ 15-minute walk

▢ 30-minute walk

Schools

Schools are the most prevalent and easily accessible of all education types

- 98.1% can reach a school within a 15-minute walk.

This indicates a high level of accessibility to education facilities within the city;

Map: Walkable Catchments to Schools

0   1 km   2 km
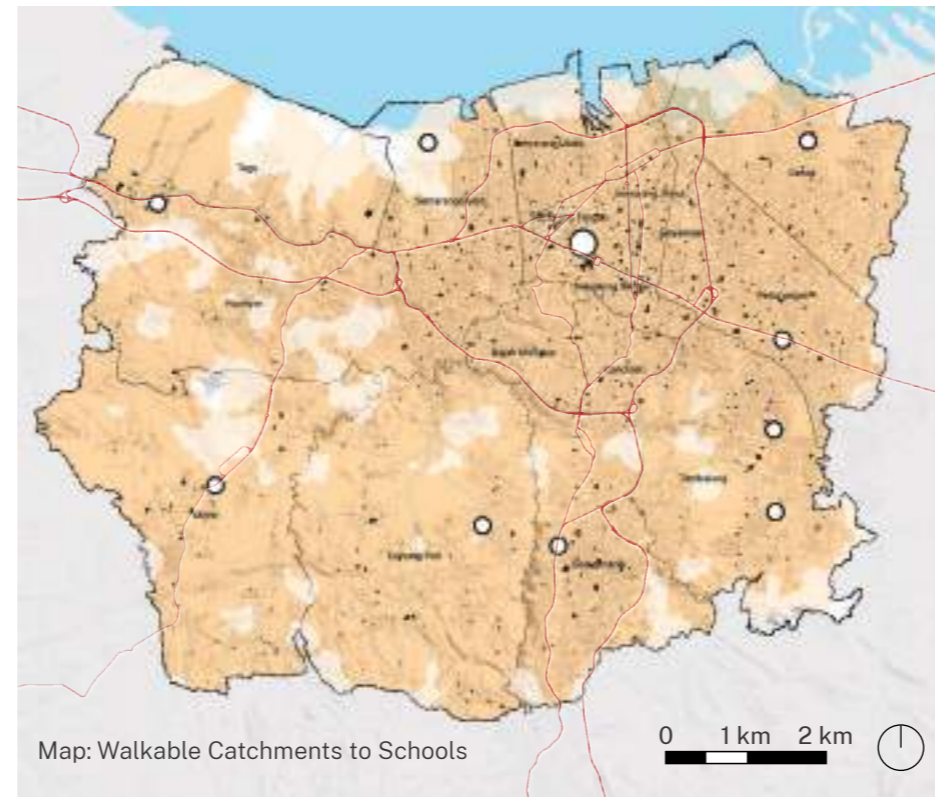
Legend

○ City Center   ■ Schools (all levels)

○ Secondary

Accessibility

▢ 15-minute walk

▢ 30-minute walk

Universities

Universities and tertiary education institutions are key to helping the city achieve its aim for a more qualified labour force. The facilities are distributed broadly across the city. Whilst only 30.5% of the population can access university-level facilities within a 15-minute walk, given the nature of the facility, this is less important. Traveling to universities may be more common via transport, motorbike or private car. Linkages to public transport is therefore key.
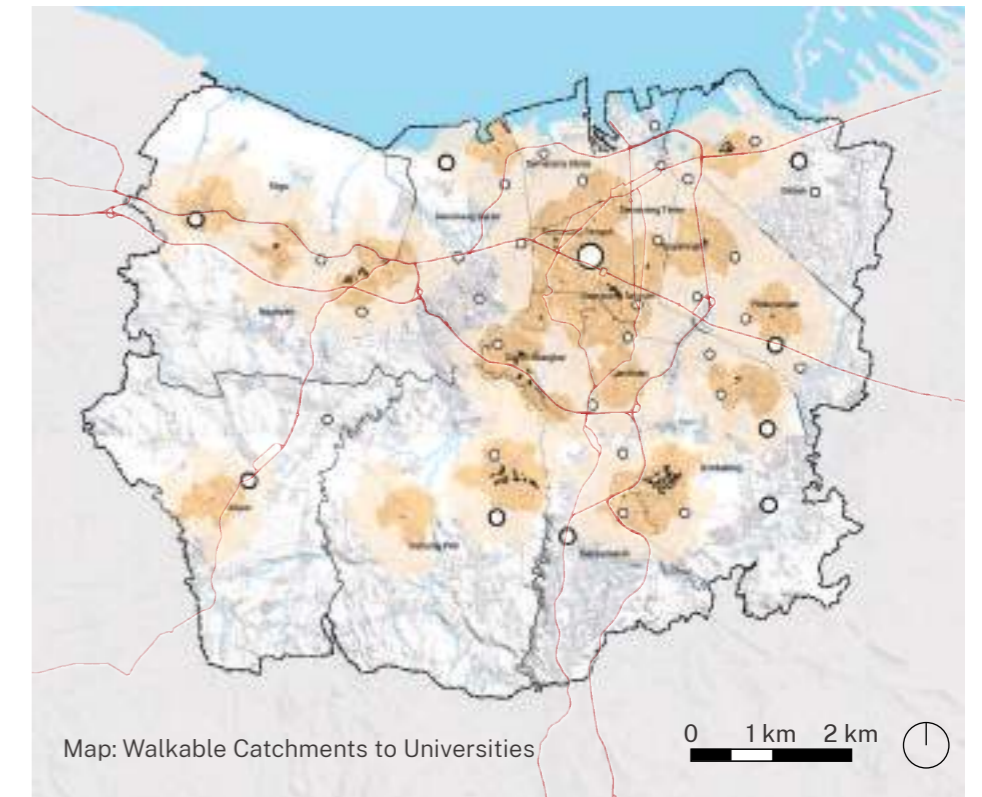
Map: Walkable Catchments to Universities

0   1 km   2 km

Legend

○ City Center   ■ Kindergartens

○ Secondary

Accessibility

▢ 15-minute walk

▢ 30-minute walk

Education Access
Deficiency

Semarang is performing very well in terms of access to education. As such, more than 98% of the population can access education facilities within 15 mins. Low access to education facilities occurs only in fragmented pockets to the south of the city.

There is also also no correlation between distribution of education facilities and low income residents or slums.
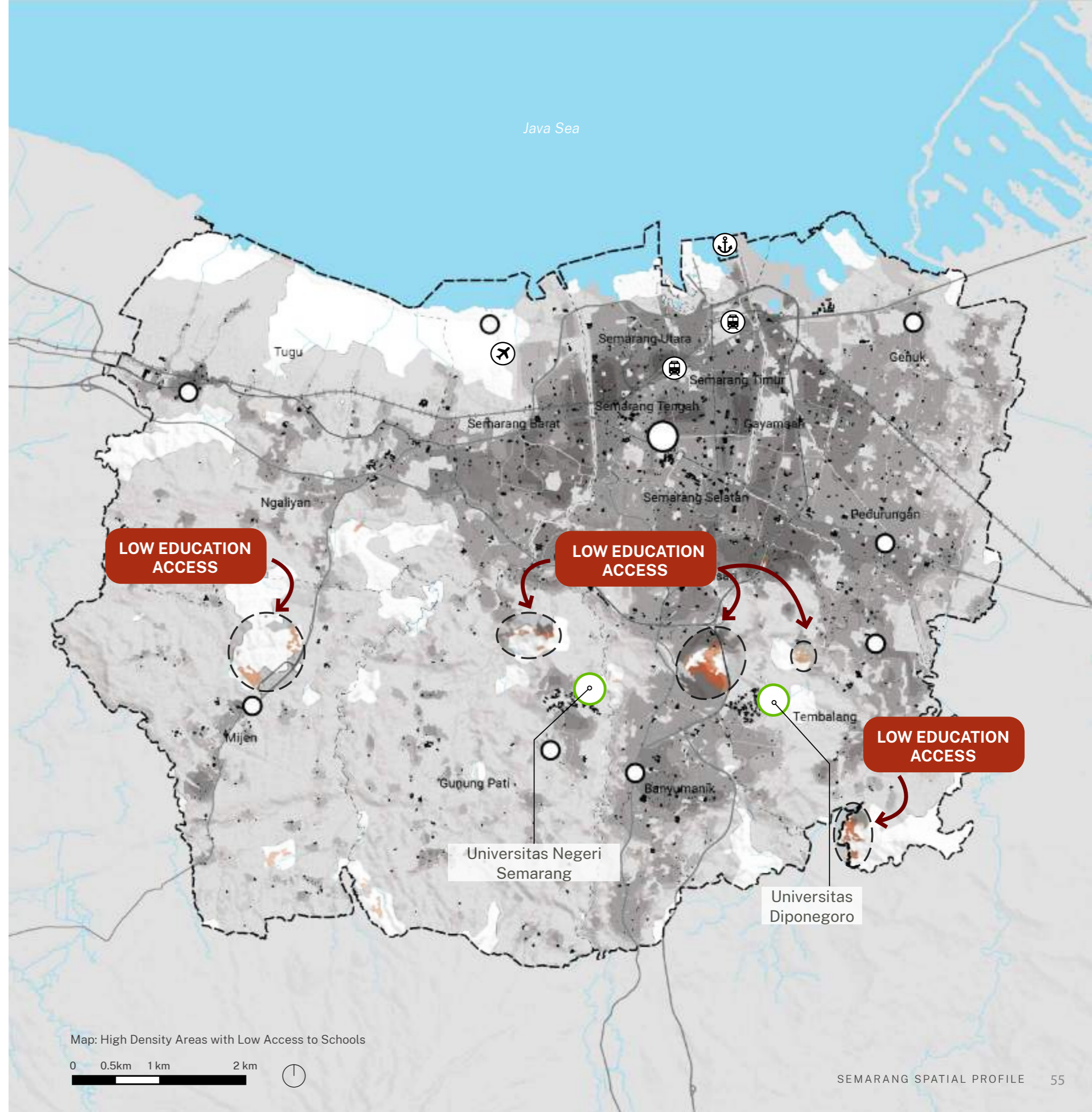
Further qualitative analysis should be done to assess the student/teacher ratio and student/classroom ratio to inform future education facility investment.
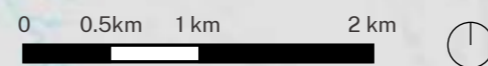
KEY CHALLENGE

Although the vast majority of residents can access public education facilities within 15-minute walk, there remains small pockets of densely populated areas with low access worth investigating deficiencies further.

Legend

City Center

Secondary

All Schools

Accessibility

15-minute walk

Population Density

100 ppl/ha
150 ppl/ha
200 ppl/ha
268 ppl/ha

Java Sea

LOW EDUCATION ACCESS

LOW EDUCATION ACCESS

LOW EDUCATION ACCESS

Universitas Negeri Semarang

Universitas Diponegoro

Map: High Density Areas with Low Access to Schools
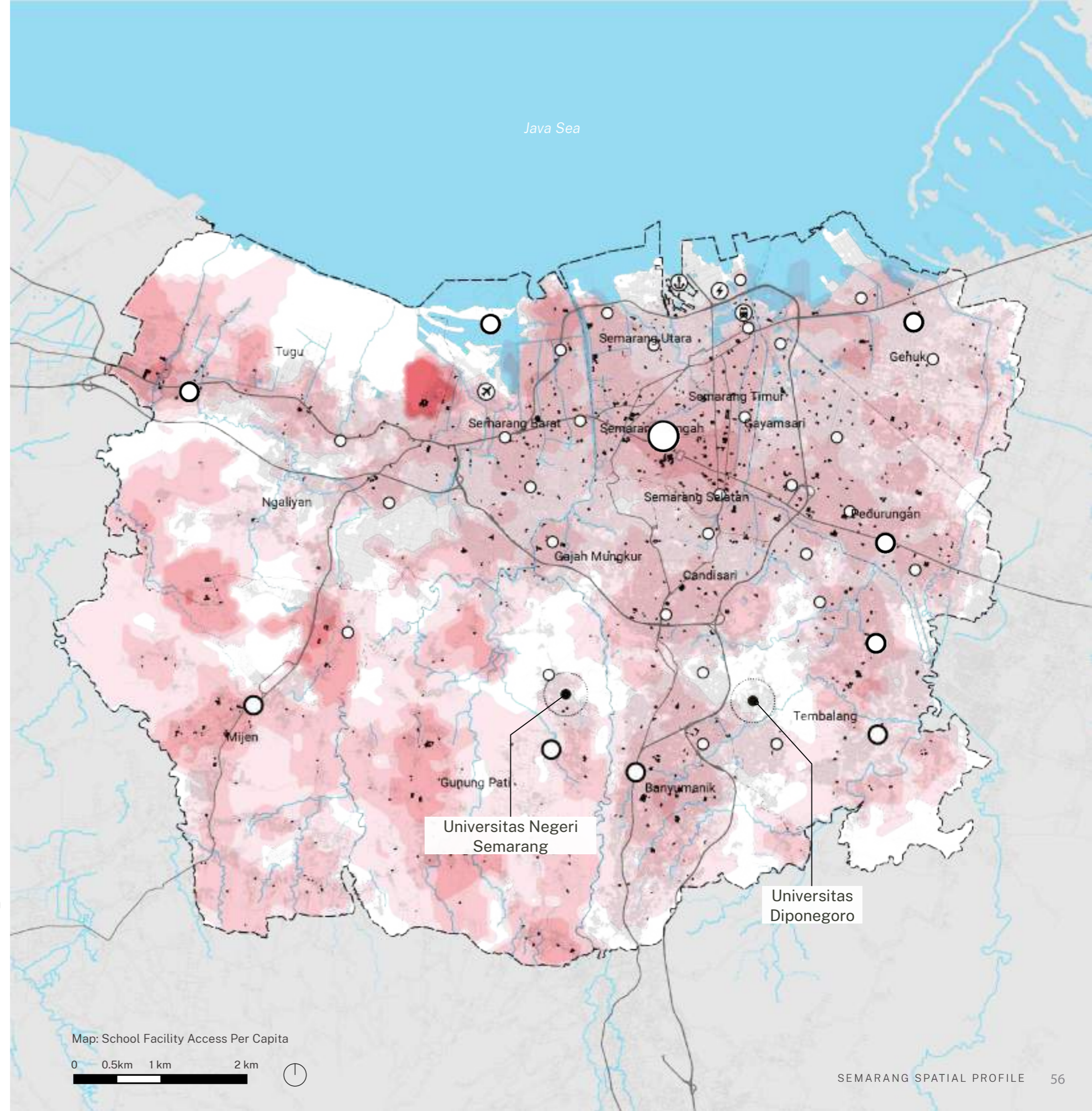
0   0.5km   1 km   2 km

Education Access
per capita

As the majority of low income residents are within 15 min. walk of education facilities, the per-capita access to education facilities is necessary. However there is unclear data regarding the precise number of schools.

From the analysis shown, whilst there is almost universal access to education facilities, it appears that there are substantial areas of the city with access to very limited amount of school building area per capita, suggesting potential over subscription. 93% have <1.5m2 per capita of school area within 15 minutes walk. This can be seen in the areas of light pink.

It may be important therefore to in invest in new education infrastructure in areas outside urban core. This is important as enabling growth in diplomas & university graduates is a key city priority therefore ensuring equal access to secondary and tertiary education for low income residents is important.
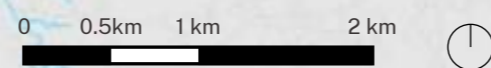
Furthermore, although access to education is generally equal, attention should be paid to slum areas and low area provision per capita of schools. This will help to assess the extent to which the vulnerable groups are accessing particularly oversubscribed educations facilities, if at all.

Legend

○ City Center

○ Secondary Centre

◉ Planned Education Cluster

— Existing Primary Motorways/Roads

◆ Existing School Buildings

School Space Access/Capita

▢ 9 - 28 m2
▢ 4.5 - 9 m2
▢ 1.5 - 4.5 m2
▢ 0.5 - 1.5 m2
▢ 0.1 - 0.5 m2

Java Sea

Universitas Negeri Semarang

Universitas Diponegoro

Map: School Facility Access Per Capita

0   0.5km   1 km   2 km

Access to Primary Health Facilities

Kliniks

Ensuring walkable zccess to the most basic primary healthcare facilities such as Kliniks is critical as part of enabling wellbeing.

- 85.4% or residents are able to access kliniks within a 15 minute walk, and 97.5% within a 30 minute walk.

Given the high coverage, investments in the urban periphery could improve access.

Map: Walkable Catchments to Kliniks

0   1 km   2 km
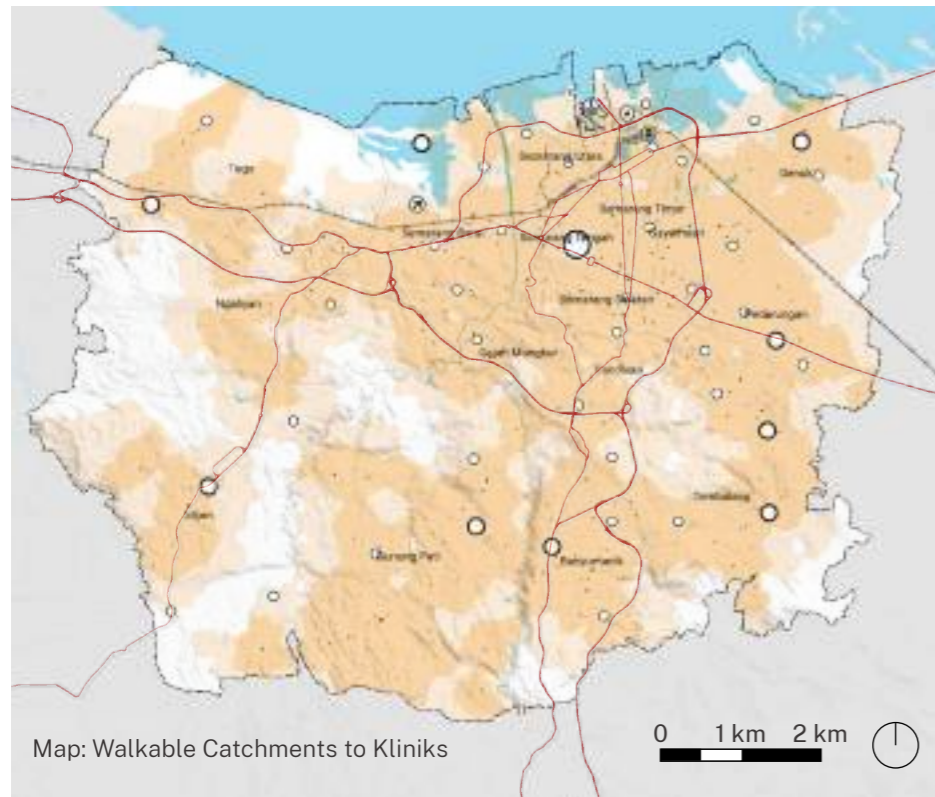
Legend

○ City Center   ▪ Klinik

○ Secondary

Accessibility

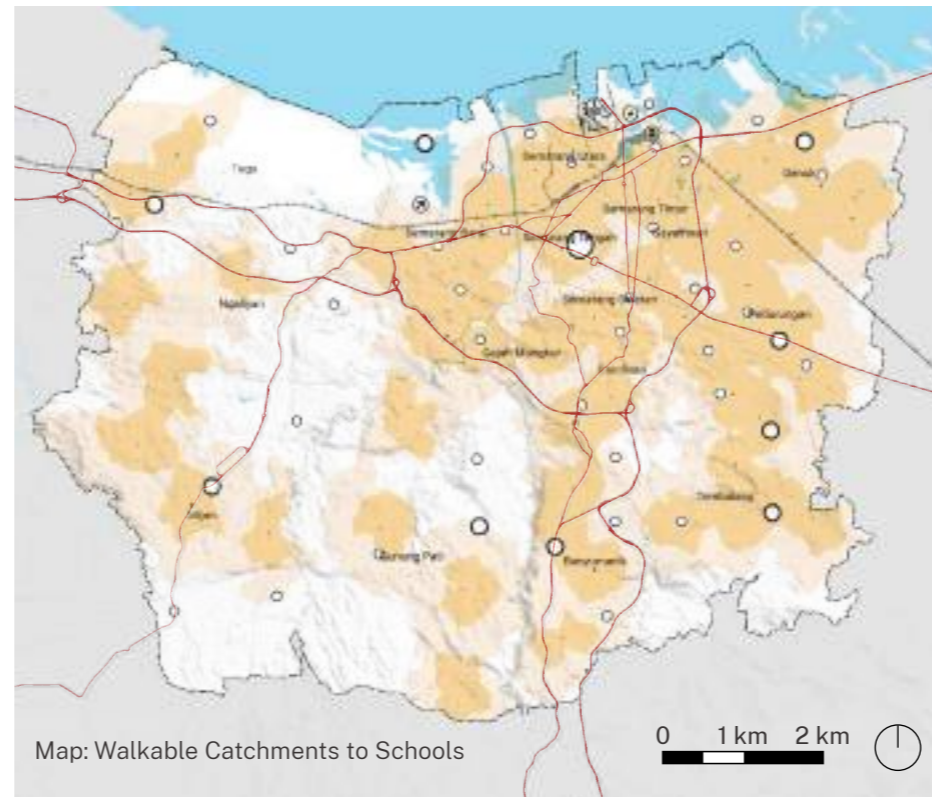▪ 15-minute walk

▪ 30-minute walk

Puskesmas

Puskesmas are government-mandated community health clinics They provide healthcare for the population on sub-district level.

- 66% of the population can reach a puskesmas within a 15-minute walk, and 92% within a 30 minute walk.

This indicates that very basic coverage is close, however there is likely to be areas where new puskesmas are required.

Map: Walkable Catchments to Schools

0   1 km   2 km

Legend

○ City Center   ▪ Puskesmas

○ Secondary

Accessibility

▪ 15-minute walk

▪ 30-minute walk

Hospitals

Hospitals are key major facilities in the city which are to ensuring the health of the population beyond primary health care. The facilities are distributed broadly across the city.

- 31.9% of the population can walk to a hospital within 15 minutes.

The facilities are typically adjacent to major roads making them accessible via public transport, motorbike or private car.

Map: Walkable Catchments to Universities

0   1 km   2 km
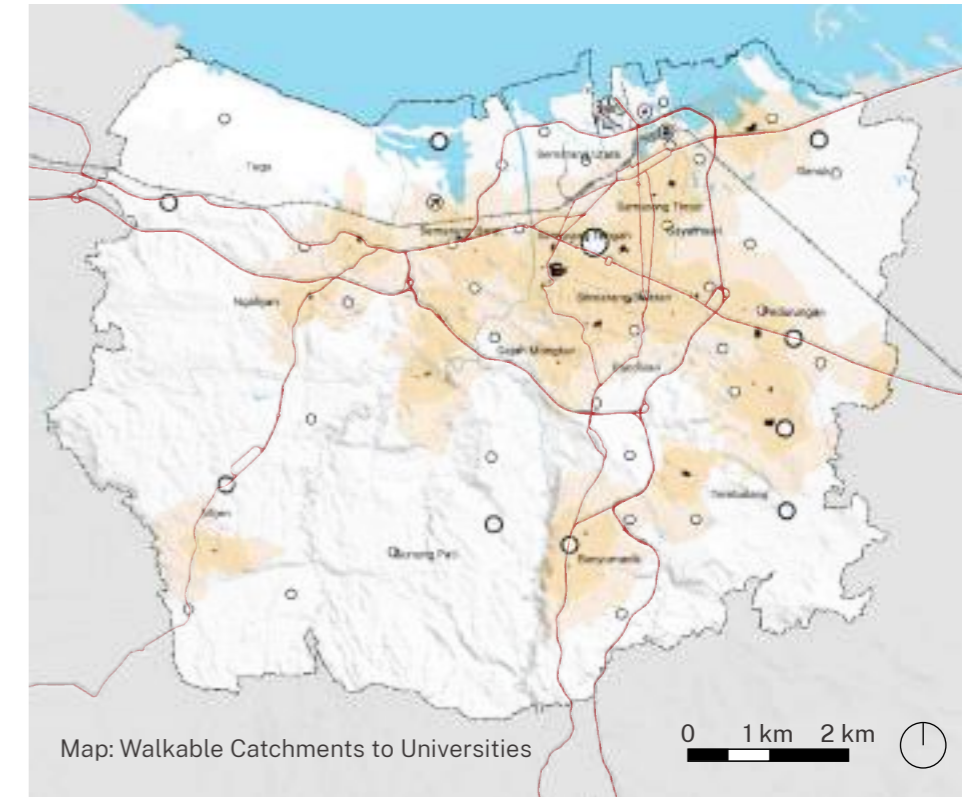
Legend

○ City Center   ▪ Hospitals

○ Secondary

Accessibility

▪ 15-minute walk

▪ 30-minute walk

Primary Health Access
Deficiency

Whilst Semarang is generally performing well in terms of access to the range of health facilities, there are substantial areas remaining outside a 15 minute walking access and a few isolated area where populations must walk more than 30 minutes.

This low access to health facilities occurs mostly in newer peripheral development outside the city core to the east and west of the city. There are also a few isolated clusters close to the coast where convenient access to healthcare remains an issue.

The two largest clusters with particularly large or highly populated areas outside a 15 minute walking distance are located on the eastern edge of the city in Genuk district and on the southern boundary in Banyumanik district.
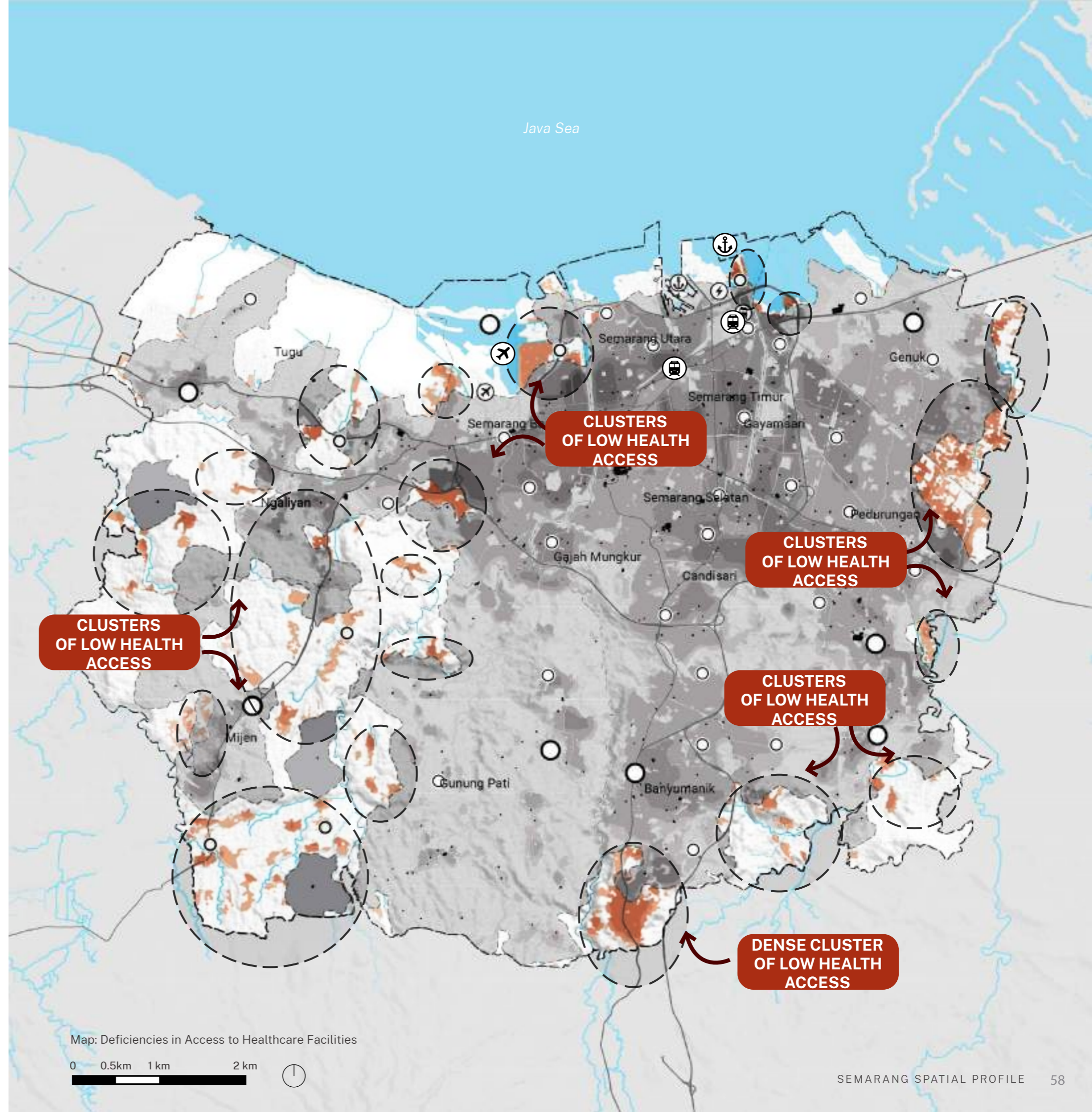
The clusters of low heath access in the west are very dispersed and in these cases, it may be more effective to invest in better transport links to ensure access to multi-purpose health facilities.

KEY CHALLENGE

Genuk and Banyumanik Districts contain the largest clusters of populations who remain excluded from accessing healthcare facilities within a reasonable walking distance

Legend

◯ City Center

◯ Secondary

Accessibility

▨ 15-minute walk

■ Health Facilities

Population Density
- 100 ppl/ha
- 150 ppl/ha
- 200 ppl/ha
- 268 ppl/ha

Java Sea

Tugu

Semarang Utara

Genuk

Semarang Timur

Gayamsari

Semarang B

CLUSTERS OF LOW HEALTH ACCESS

Ngaliyan

Semarang Selatan

Pedurungan

Gajah Mungkur

Candisari

CLUSTERS OF LOW HEALTH ACCESS

CLUSTERS OF LOW HEALTH ACCESS

CLUSTERS OF LOW HEALTH ACCESS

Mijen

Gunung Pati

Banyumanik

DENSE CLUSTER OF LOW HEALTH ACCESS

Map: Deficiencies in Access to Healthcare Facilities

0   0.5km   1 km   2 km

Vulnerable Group & Health Facility Access *Deficiency*

Those on low income and living in over-crowded conditions are often more exposed to health issues, making access to primary health care particularly important

The areas of vulnerable populations which are currently excluded from access to healthcare within a 15 minute tends to correlate broadly with the overall population. As such, the vulnerable groups in the peripheral areas are particularly affected.

As such, if the city identifies potential healthcare investments in the areas where the city as an overall sectoral deficiency, it is likely that these investments will also benefit the most vulnerable in the society.
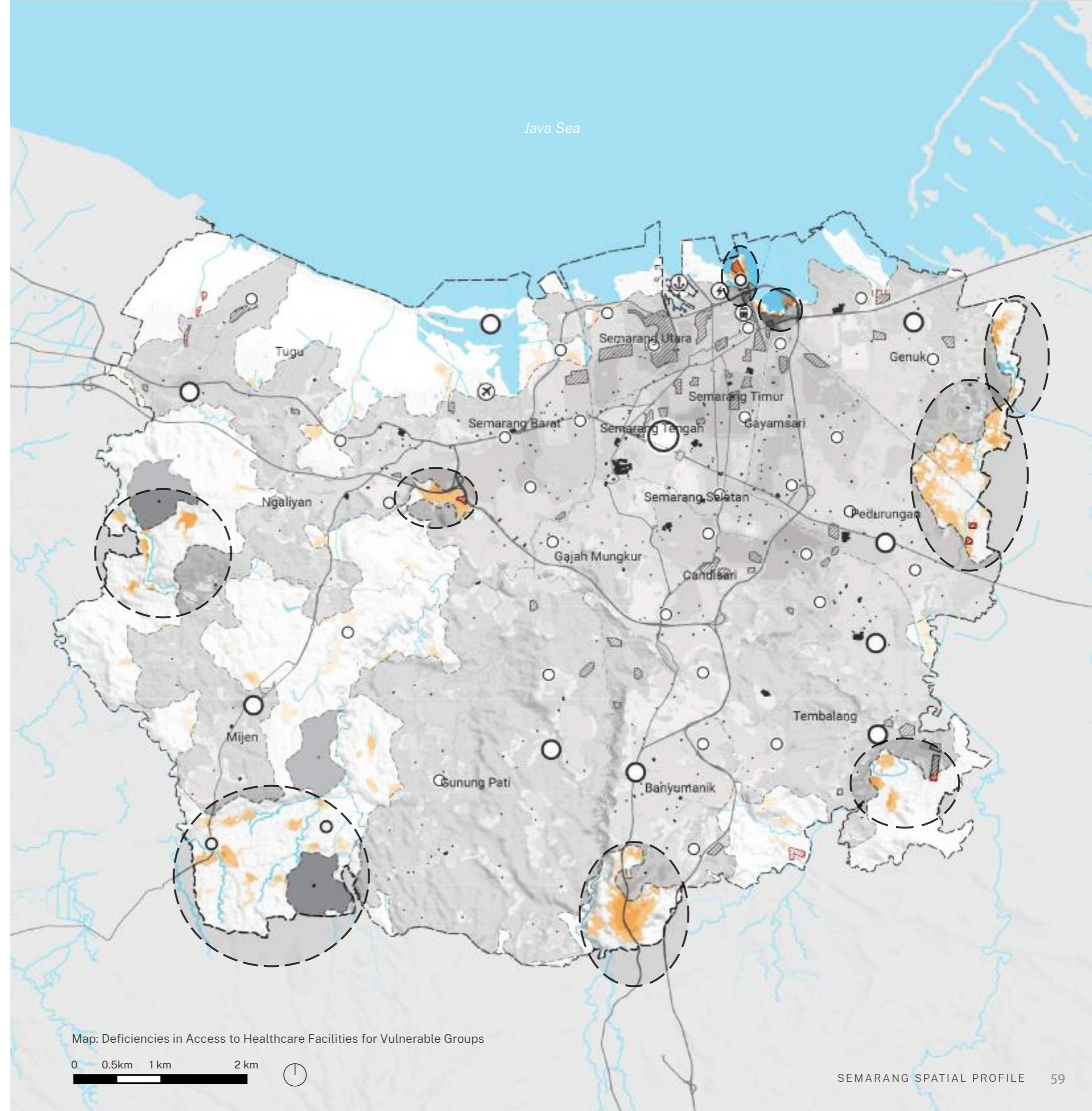
Legend

○ Secondary Centre

○ Tertiary Centre

— Existing Primary Motorways/Roads

◆ Existing Health Facilities

Poverty Density

- \> 90 p/ha
- 75 p/ha
- 25 p/ha
- 20 p/ha
- 5 p/h

Java Sea

Tugu
Semarang Utara
Genuk
Semarang Timur
Semarang Barat
Semarang Tengah
Gayamsari
Semarang Selatan
Pedurungan
Gajah Mungkur
Candisari
Ngaliyan
Mijen
Tembalang
Gunung Pati
Banyumanik

Map: Deficiencies in Access to Healthcare Facilities for Vulnerable Groups

0   0.5km   1 km   2 km
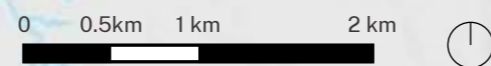
Health Facility Access
per capita

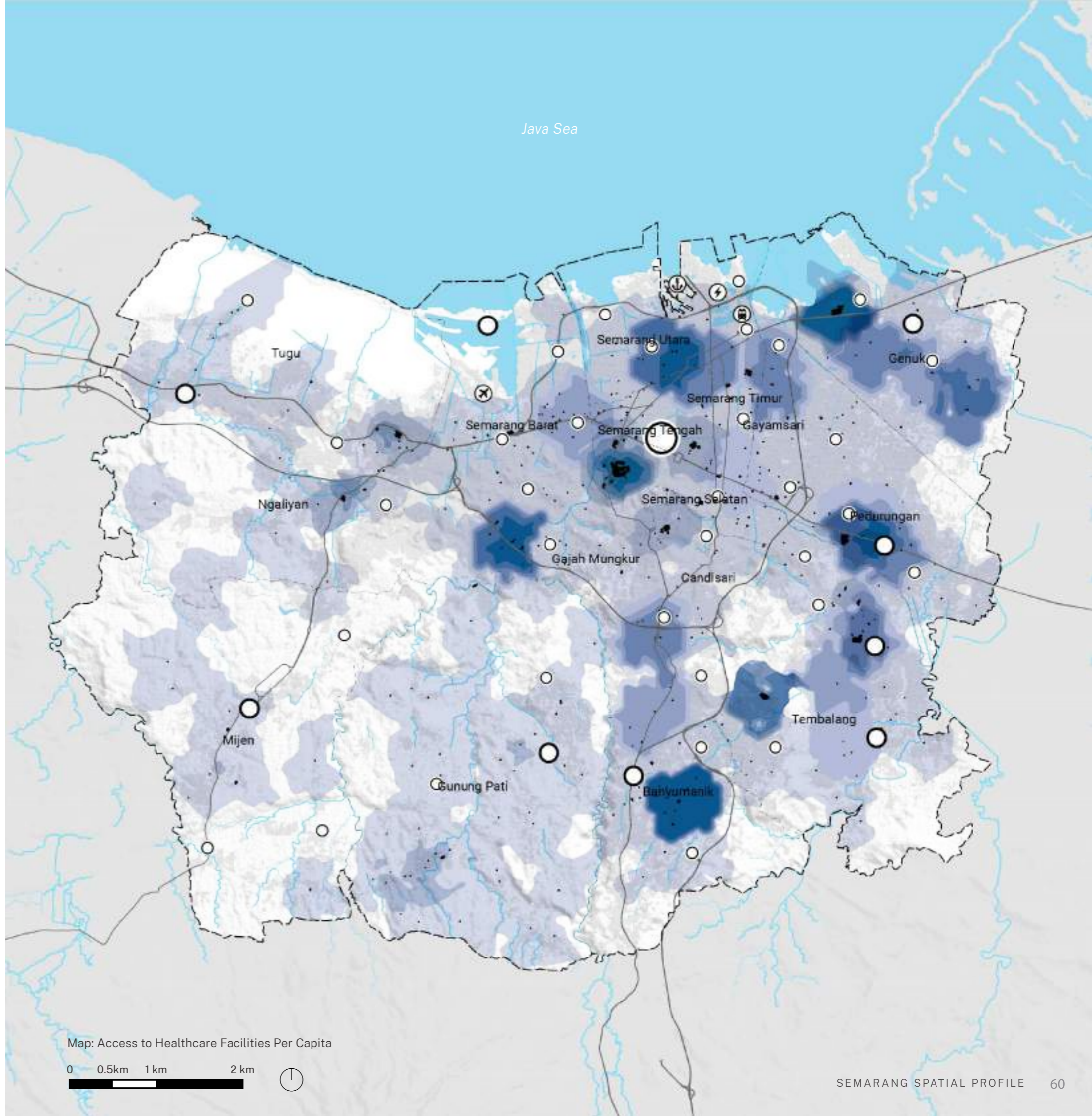—

The current data shows a substantial divergence of access per capita to health facilities across the city. To some extents this is logical given the fact that large hospital facilities are located at strategic locations which are typically accessed irregularly. However they are included in this analysis as they may also provide day to day access for primary healthcare purposes along with the Puskesmas, Poysyandu and local clinics.

Nearly 10% of the population have no per capita access within 15 minute walk. And 80% have access to very small provision. Further info is required in relation to the quality of service but this is likely to suggest severe oversubscription of health care service in the low provision areas.

The key finding is that the areas which have the lowest per capita access tend to be in the west of the city, in the Tugu and Ngaliyan districts. It is in these areas where health facilities are likely to at their most over-subscribed. Particularly given the major planned industrial developments and public housing projects in and around the Tugu area, focus on investing in healthcare facilities in these areas will be important to consider in future.

Map: Access to Healthcare Facilities Per Capita

0   0.5km   1 km   2 km

Legend

○ City Center

○ Secondary Centre

— Existing Primary Motorways/Roads

◆ Existing Health Facilities

Health Facility Area per capita
- 4 - 8 m2/p
- 2 - 4 m2/p
- 1 - 2 m2/p
- 0.5 - 1 m2/p
- 0.1 - 0.5 m2/p
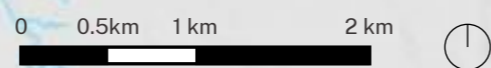
Key Findings

01 — **Severe public space access & provision deficit**

The current data shows that public space access across the city is very uneven with many central and peripheral areas suffering from poor access. Additionally, the provision of public space is particularly low, with 98% of the population having less than 5m2/per capita within a 15 minute walk.

The most vulnerable in Semarang are also particularly affected with large densities living in areas with very limited amounts of public space.

02 — **Public space datasets need improving**

Whilst there is a general view from the existing data and feedback from stakeholders that the city has far too few public spaces, substantial data discrepancies in the existing databases suggest that a full city-wide public space assessment is necessary.

03 — **Widespread access to education facilities**

Generally Semarang has widespread coverage of education facilities with very few areas living more than 15 mins walk from an education facility.

Data showing the number of facilities, students per facility and classrooms would be necessary to carry out a more full analysis on the provision of education facilities in Semarang.

04 — **Localized gaps in healthcare facility access**

The data suggests that substantial gaps in access to healthcare remain, particularly in Genuk and Banyumanik districts.

Given that there are substantial clusters of low income residents also living in these areas, investment in healthcare here should be considered to promote more inclusive access to healthcare.

Indicator 05
Environment

Natural ecological systems are key to the cities functionality. Blue and green grids can deliver an interconnecting network of open spaces and conservation areas that will keep the city cool, encourage healthy living, enhance biodiversity and ensure ecological resilience.

Existing Blue & Green Systems

Semarang historically had a very strong relationship with its natural environment, and particularly water its water systems. The settlement in the 1880's sat behind a natural defense of mangroves. Many of the 21 rivers in the city were used as water sources or for navigation as the city grew. However this relationship has been neglected, with rapid urbanisation, poor sanitation, pollution (94% of urban waste water is discharged into the canals, much of it untreated) and over-extraction of ground water (PDAM only provides 60% of the city with clean water).

The west and east flood canals which bisect through the city's urban core have become polluted struggle to contain the increasing extremes of weather caused by climate change. Insufficient water supply infrastructure which led to the proliferation of wells by the industry, for both commercial and domestic usage.

As the city has grown, there has also been encroachment into the surrounding natural environments, characterised by numerous ravines and forested lands, particularly in the hilly, undeveloped areas to the south and west. Without careful focus on the natural ecological systems, in addition to the constant growing pressure of urbanisation - the cities resilience (as elaborated under Indicator XX) is increasingly under threat.

Legend

- ◯ City Center
- ◯ Secondary
- ◯ Education Center
- ◯ Strategic Center

- Forest Lands
- Agriculture Lands
- Parks, Recreation Areas
- Water

Map: Existing Blue and Green Systems

Java Sea

EAST FLOOD CANAL

WEST FLOOD CANAL

CANALS FROM EARLY DUTCH SETTLEMENTS

EAST FLOOD CANAL TODAY
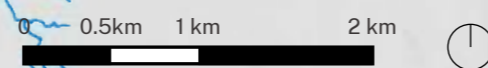
27.5%
of the land cover is green 'vegetation' or blue 'water'

2%
of the land is allocated to 'park' or 'sports & recreation'

0   0.5km   1 km   2 km

Conservation Corridors

Corridors to manage water and preserve green areas have been identified by multiple studies as key to help protects key destinations, existing forested lands, waterways and urban canals. These corridors form a backbone from which connected green and grids can arise and ensure are protected for improved biodiversity and recreation amenity.

Particularly in the case of Semarang, the integration of water management is key to create synergy between different urban systems and spaces. In fact, restoring green open space that has switched functions and particularly in the central area of the city is a key planning priority.

Dealing with gaps in the natural corridors could help to:

- Increase infiltration and water retention to improve quality of publics space e.g. Gubug Serut which is a popular recreation area in the city's south and is within a conservation corridor

- Create reservoirs along the river and streams to mitigate flooding and enhance ecological value

- Create natural recreation and tourist-friendly locations which support improved awareness of environmental protection. e.g the more rural south features many waterfalls at the base of Mt. Ungaran

Legend

◯ City Center	▨ Forest Lands
◯ Secondary	▨ Agriculture Lands
◯ Education Center	▨ Parks, Recreation Areas
◯ Strategic Center	▨ Water
	▨ Conservation Corridors
	⬌ Grid Gaps

Java Sea

GAPS IN THE GRID

GAPS IN THE GRID

GAPS IN THE GRID

GAPS IN THE GRID

GAPS IN THE GRID

Map: Gaps in Existing Blue and Green Networks

0   0.5km   1 km   2 km

Unprotected Forest & Agricultural Land

The south west of the city's administrative area has substantial tracts of forest land that is not within a conservation corridor yet remains highly vegetated. These present significant opportunities for protection and enhancing ecological resilience.

24.6% of the city is designated as 'vegetation'

Forest lands are likely a mix of public and private ownership and could prove difficult to claim for conservation and recreation purposes.

There remains a large amount of agricultural and fishery land that may be redeveloped into more intensive uses as urbanisation continues. These present opportunities for dedicating new green or grid links within any future development sites and can be planned for.

The city has designated the development of agroforestry activities in dry land agricultural areas owned by the community as a key planning priority

15.1% of the city is designated as 'agricultural'

5.9% of the city is designated as 'fishery'

5.9% of the city is designated as 'fisheries'

Forest Lands

Map: Unprotected Forest Land

0   1 km   2 km

Legend

○ City Center
○ Secondary
○ Education Center
○ Strategic Center

▬ Forest Lands
▬ Agriculture Lands
▬ Parks, Recreation Areas
▬ Water

Agriculture & Fisheries

Map: Unprotected Agricultural Land

0   1 km   2 km

Legend

○ City Center
○ Secondary
○ Education Center
○ Strategic Center

▬ Forest Lands
▬ Agriculture Lands
▬ Parks, Recreation Areas
▬ Fisheries
▬ Water
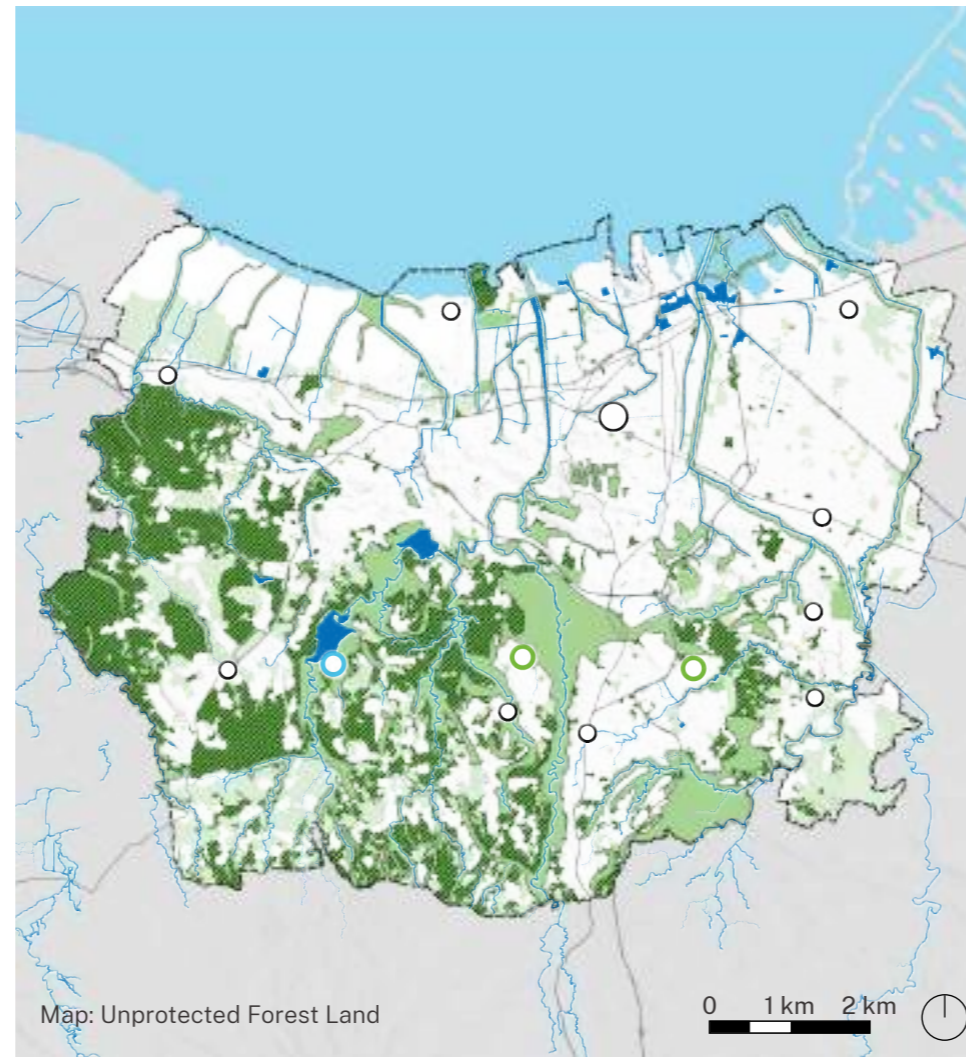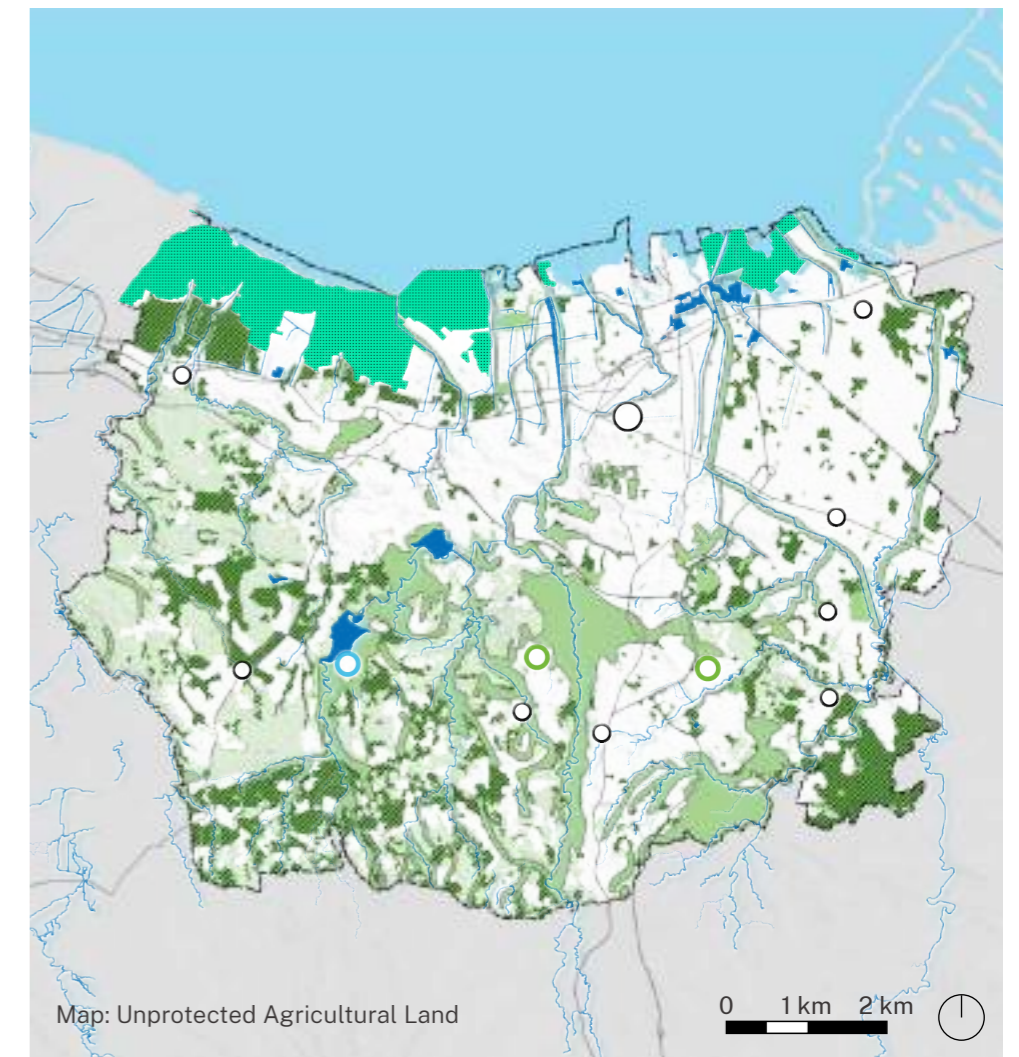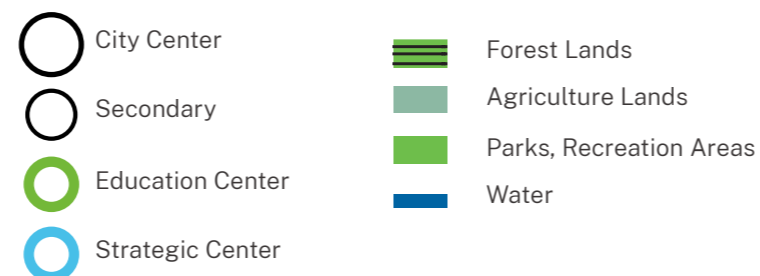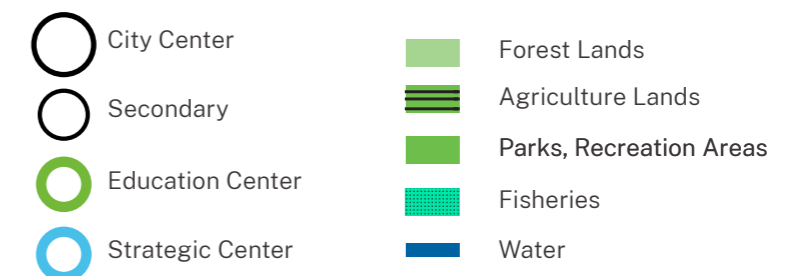
Hard Infrastructure & Ecological Projects

The coastline of Semarang is critical for the cities economic growth, but also its ecological systems. The proliferation of large infrastructure and associated urban development is increasingly compromising the environmental integrity of the area. Examples are outlined below.

The proposed new port and industrial area to the east will severely impact the mangroves in the area. It is understood however that this is a project of strategic importance mandated by the national government. Key to its implementation will be a rigorous environmental impact assessment and subsequent protection strategy to ensure sound ecological considerations are integrated wherever possible.

The proposed sea wall in the east of the city (with potential extension to the west) will help protect the areas from tidal inundation. Additionally, this area is particularly prone to subsidence, requiring further interventions beyond flood protection. In addition to the infrastructure, policy measures such as enforcing restrictions of ground water extraction is critical.

The new orbital roads planned on the outer reaches of the city will also cut through conservation and agricultural lands. Such roads can induce vehicular traffic and encourage sprawl into these areas.

Legend

◯	City Center	▦	Mangrove Restoration
◯	Secondary	▨	Key Port/Airport
○	Tertiary	▧	Planned Industrial
■	Conservation Zones	▦	Planned Land reclamation
■	Existing Vegetation	- - -	Planned Orbital Roads
■	Agricultural Use	+++	Existing Railway
■	Industrial Area	—	Existing Primary Roads
		▬	Existing Flood/Water Defences

PLANNED PORT & INDUSTRY

Java Sea

PROPOSED SEA WALL

"BUILDING WITH NATURE"

MANGROVE RESORATION

PORT EXPANSION

POLDER KALI SEMARANG

BANGER POLDER

PLANNED ORBITAL ROADS

Map: Hard Infrastructure and Ecologically Sensitive Areas

0   0.5km   1 km   2 km

Key Findings

01   Poor green and bluesystem management

Existing Blue and Green systems are coming under severe pressure due to encroachment, poor protection and conservation measures as well as poor sanitation mechanisms. Poor green and blue system connectivity is putting ecosystem services at risk and limiting the ability for local biodiversity to flourish.

02   Agricultural, forestry land loss

Agricultural and Forestry land as well as territory occupied by fisheries is key to the city and regions environment. They are also fundamental assets that are necessary to achieve key aspects of the city's planned objectives in relation to promotion of agro-forestry, and sustainable livelihoods.

03   Risky coastline infrastructure investments

Major investments in expanding industry and heavy transport infrastructure is planned along the coast line. This will place increased pressure on the fragile coastline which is also at increasing risk from sea level rise.

The design of these investments will need to carried out in a way that ensures protection of the environment e.g. mangroves and marine life as well considering measures that support adaptation to climate issues such as sea level rise.

Indicator 06
Hazard Affected Populations

When residents are exposed to increasingly severe natural hazards, their health, wellbeing and potential to engage in economic activity is severely curtained. In the context of Semarang, the city is particularly exposed to flooding, landslide, and public health issues such as dengue fever outbreak.

Existing Natural Hazards

Semarang is particularly exposed to natural hazards. In addition to climate induced sea level rise of up to 8mm per year, the city is prone to tidal inundation and flash flooding from upstream areas. The water supply system has not been able to keep up with urban growth, over extraction of ground water is resulting in compaction of alluvial soils and severe subsidence. Furthermore, the hilly terrain in the south of the city leaves large tracts of land susceptible to landslides. As a result, 60% of Semarang's population live in areas which are exposed to natural hazards of varying degrees of severity.

- 13.8% of Semarang's population are exposed to 2 forms of natural hazard (flood & subsidence)

- 0.4% of Semarang's population are exposed to 2 forms of natural hazard (flood & landslide)

- 64% of residents use ground water as a source of clean water, as well as a large proportion of industry

- The north east of the city is exposed to severe subsidence of between 4-8cm/year

KEY CHALLENGE

The majority of the populated area in the city is exposed to one, two or three forms of natural hazard; flood, subsidence or landslide.

Legend

Natural Hazards

- Subsidence Hazard
- Populated Area
- Flood Hazard
- Landslide Hazard
- 1985 Coastline

Map: Natural Hazards and Populated Areas

0   0.5km   1 km   2 km

High Density Areas Prone to Flooding

The areas with some of the highest population density in Semarang are also those affected by flood, particularly Semarang Utara, Semarang Timur, Semarang Barat and Gayamsari.

- 23% of the population of Semarang is exposed to flood.

The land uses in this area are also typically the most diverse, with substantial industrial and commercial activity. As such, the core economic centre of the city is at risk of flooding, meaning that both substantial clusters of people and their livelihoods are particularly affected.

In addition to the urban core and coastal areas, there are large clusters of populations living in Genuk to the east of the city as well as small-but-growing clusters living in low lying areas adjacent to transport infrastructure in the west who are exposed to flooding challenges.

KEY CHALLENGE

The majority of the economic and industrial heart of the city is exposed to flood, placing both residents and wider groups livelihoods at risk.

Legend

Flood Hazard Level

- Flood Hazard
- Tidal Inundation Project
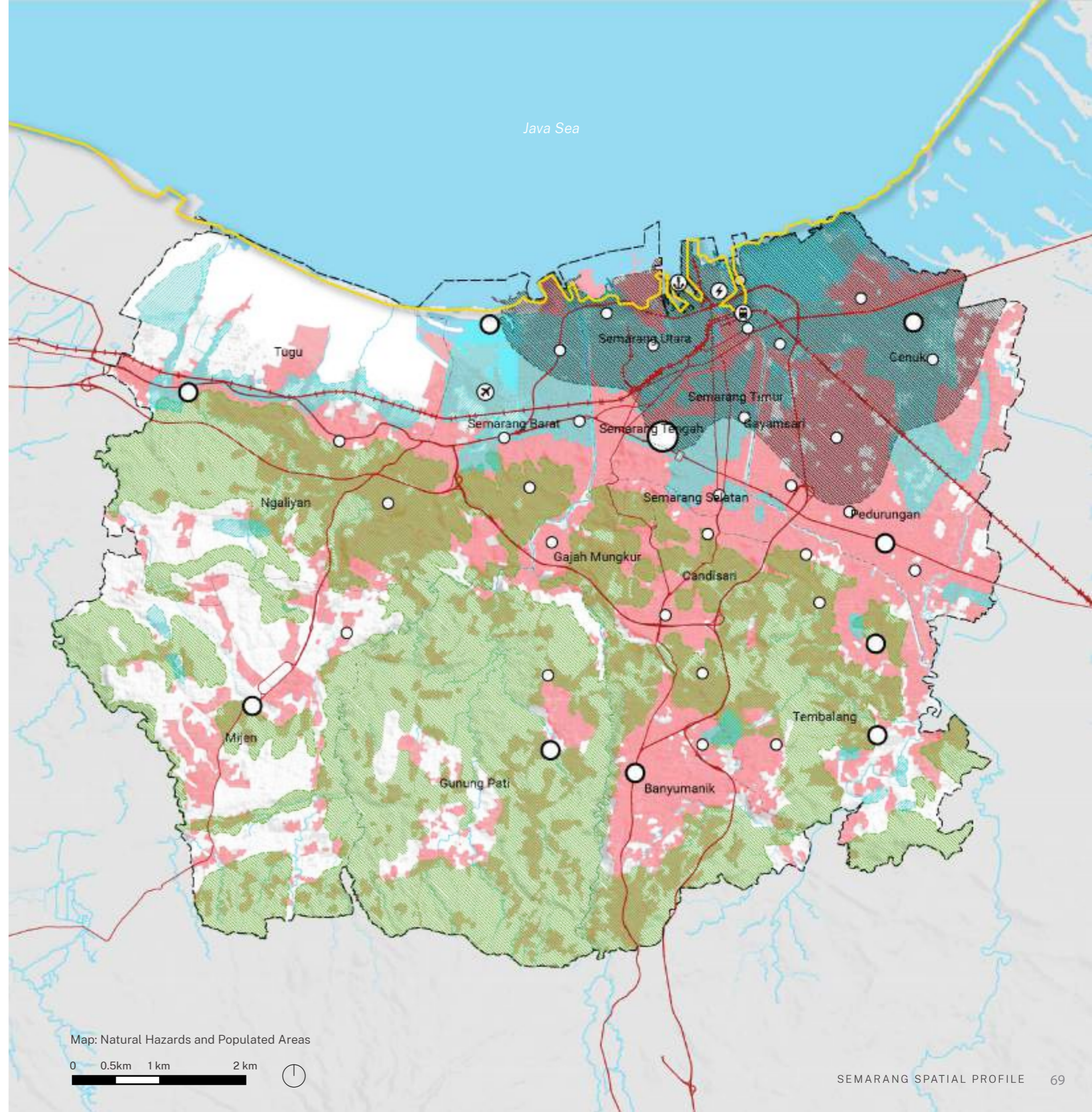- River Flood Project
- Surface Water Flood Project

Population Density

- 100 ppl/ha
- 150 ppl/ha
- 200 ppl/ha
- 268 ppl/ha

Map: Densely Populated Areas Prone to Flooding

SUBSTANTIAL EXPOSURE

TRANSPORT ADJACENT

UPSTREAM PROJECTS

LOWER DENSITY EXPOSURE

ISOLATED POCKETS

Java Sea

Tugu
Semarang Utara
Genuk
Semarang Barat
Semarang Timur
Semarang Tengah
Gayamsari
Ngaliyan
Semarang Selatan
Pedurungan
Gajah Mungkur
Candisari
Tembalang
Gunung Pati
Banyumanik

0   0.5km   1 km   2 km
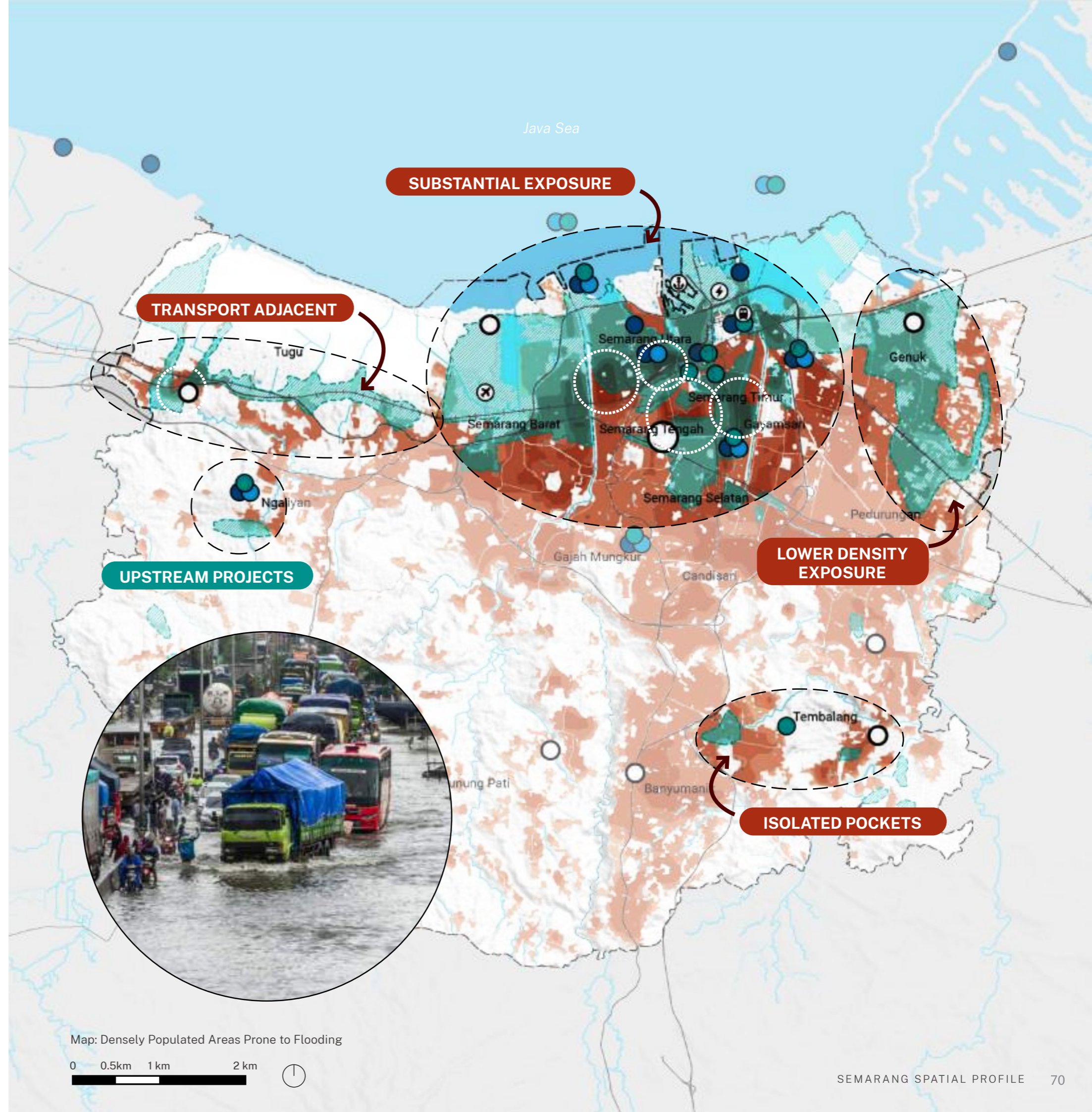
High Density Areas Prone **to** Subsidence

Semarang has a particularly significant challenge when it comes to subsidence. It is understood that only 62.4% of residents are connected to PDAM piped services. Furthemore, due to limited funds, only 20% of the system is in regular effect. The low lying areas with substantial industrial activity or poor water distribution are those most affected.

- 26.3% of the population of Semarang is exposed to Subsidence

The majority of affected population are dwelling in areas exposed to between 0-6cm of subsidence, meaning that the there are only few incidences of extremely severe subsidence.

The worst affected areas are Semarang Utara, and west of Gayamsari. There is however a very large areas on the northern periphery of the urban core which is prone to widespread moderate subsidence.

KEY CHALLENGE

> The core industrial backbone of the city including the port are at severe risk of subsidence.
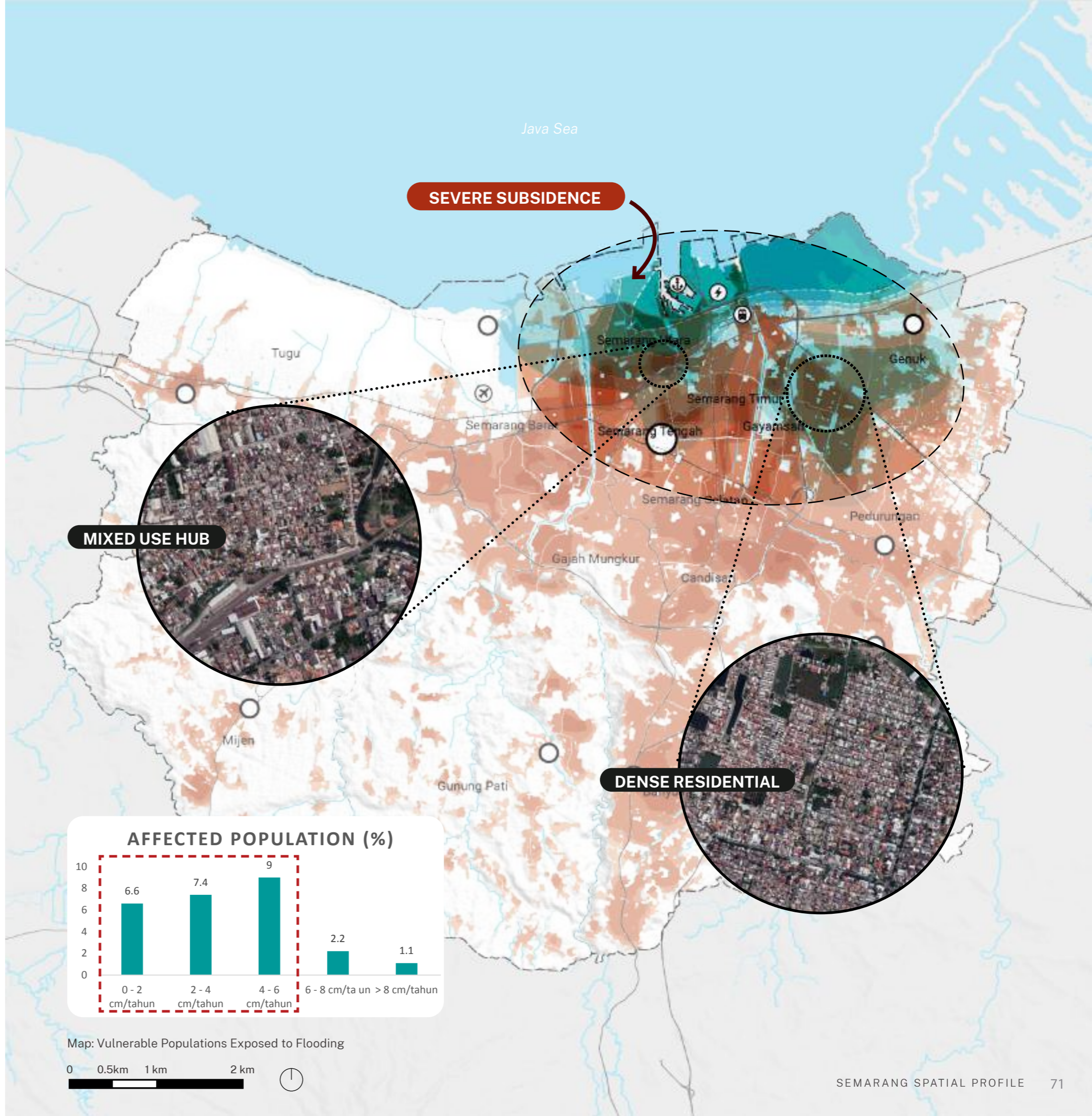
Legend

Subsidence Hazard Level

- > 8 cm
- 6-8 cm
- 4-6 cm
- 2-4 cm
- 0-2 cm

Population Density

- 100 ppl/ha
- 150 ppl/ha
- 200 ppl/ha
- 268 ppl/ha

SEVERE SUBSIDENCE

MIXED USE HUB

DENSE RESIDENTIAL

Java Sea

AFFECTED POPULATION (%)

Category	Value
0 - 2 cm/tahun	6.6
2 - 4 cm/tahun	7.4
4 - 6 cm/tahun	9
6 - 8 cm/ta un	2.2
> 8 cm/tahun	1.1

Map: Vulnerable Populations Exposed to Flooding

0   0.5km   1 km   2 km

High Density Areas Prone to Landslides

Whilst coastal semarang is low lying and flat, the terrain rapidly becomes hilly from the central belt to the south as the land elevates around the base of Mt Mt. Ungaran. This leaves large tracts of land inceasingly susceptible to landslides to around the central south and south west.

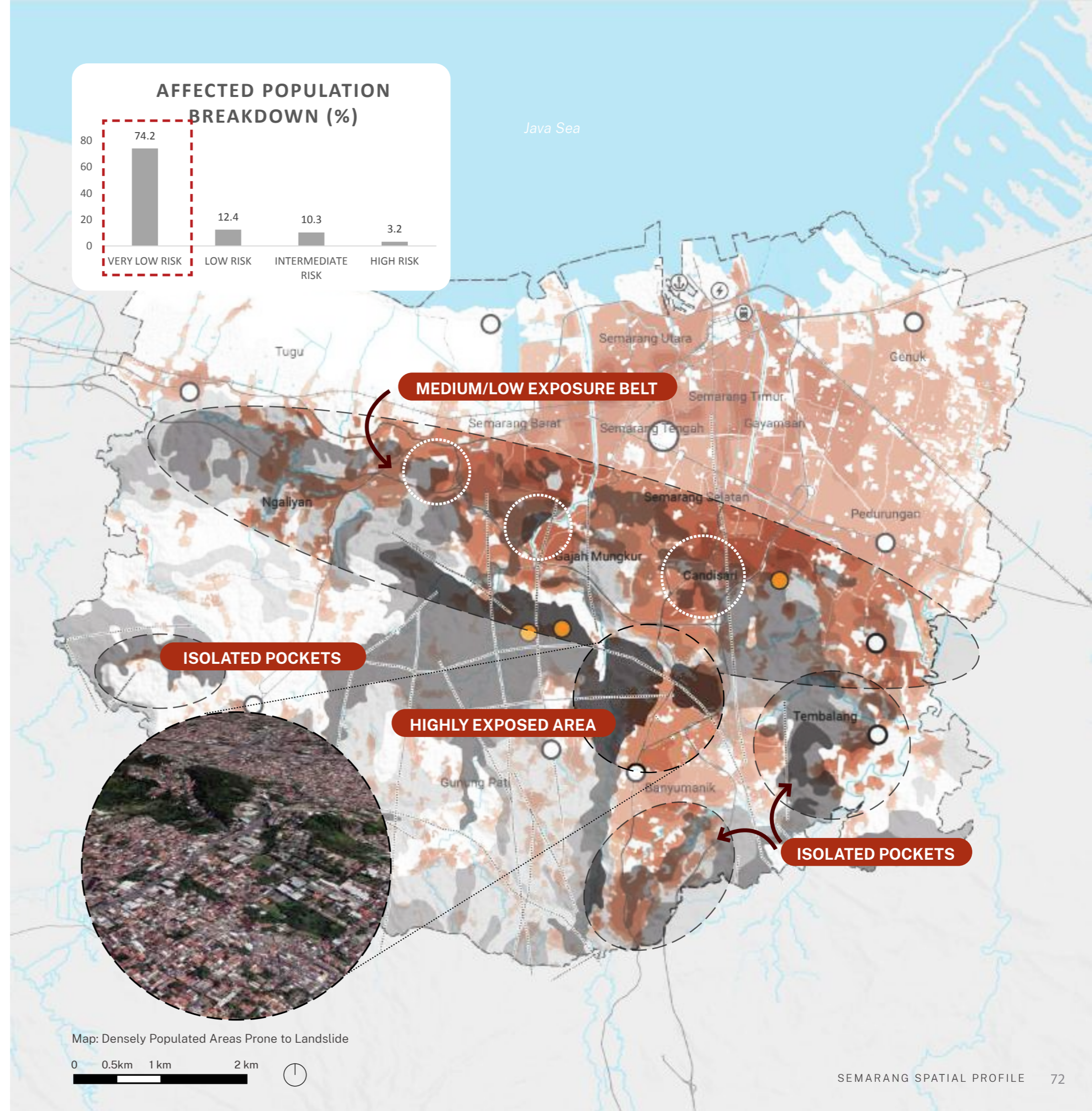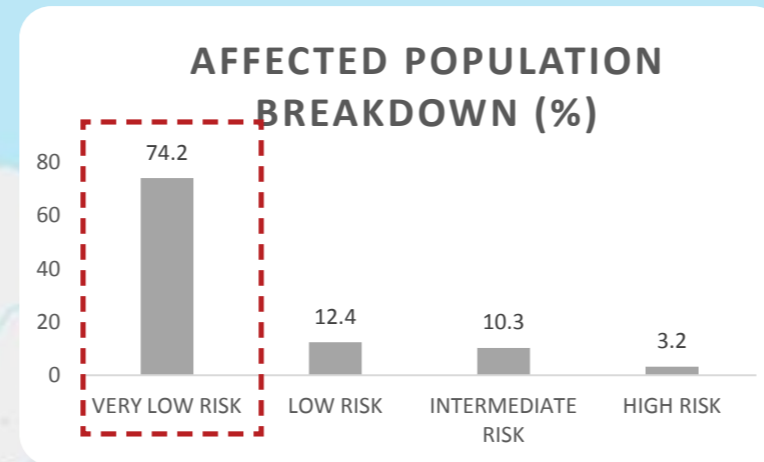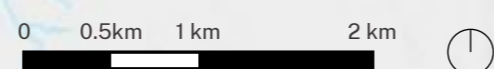Whilst approximately 25% of the population of Semarang is exposed to landslide, the fact that the land is naturally difficult build upon means only 3.2% of the population is shown to be exposed to high risk of landslide. The majority of the population affected are at very low risk of landslide

Substantial belt of low to medium exposure across the central belt of the city, with one highly exposed pockets in Temabalang, and small pockets on the periphery

There remains a strong need to support the control and enforcement of building codes in the upland areas where landslides are most susceptible. The future land use plan shows increased residential growth into these areas which would result in costly and likely haphazard/ sprawling development as well as placing more people at risk.

AFFECTED POPULATION BREAKDOWN (%)

Bar chart values:
- VERY LOW RISK: 74.2
- LOW RISK: 12.4
- INTERMEDIATE RISK: 10.3
- HIGH RISK: 3.2

Map labels: Java Sea, Tugu, Semarang Utara, Genuk, Semarang Barat, Semarang Timur, Gayamsari, Semarang Tengah, Ngaliyan, Semarang Selatan, Pedurungan, Gajah Mungkur, Candisari, Gunung Pati, Banyumanik, Tembalang

Map callouts: MEDIUM/LOW EXPOSURE BELT, ISOLATED POCKETS, HIGHLY EXPOSED AREA, ISOLATED POCKETS

Legend

Landslide Hazard Level
- High Hazard
- Intermediate Hazard
- Low Hazard
- Landslide prevention project

Population Density
- 100 ppl/ha
- 150 ppl/ha
- 200 ppl/ha
- 268 ppl/ha

Map: Densely Populated Areas Prone to Landslide

0   0.5km   1 km   2 km

Vulnerable Groups
## **Exposed to** Hazards

FLOODING

In addition to the generally highly populated areas and core economic centre being exposed to flooding - large proportions of vulernable/low income residents live in these areas and therefore are also are particularly exposed.

- 24.7% of low income residents live in flood prone areas

Low lying areas along the transport infrastructure to the west and more generally on the east area have clusters of low income residents who live in areas prone to flooding.
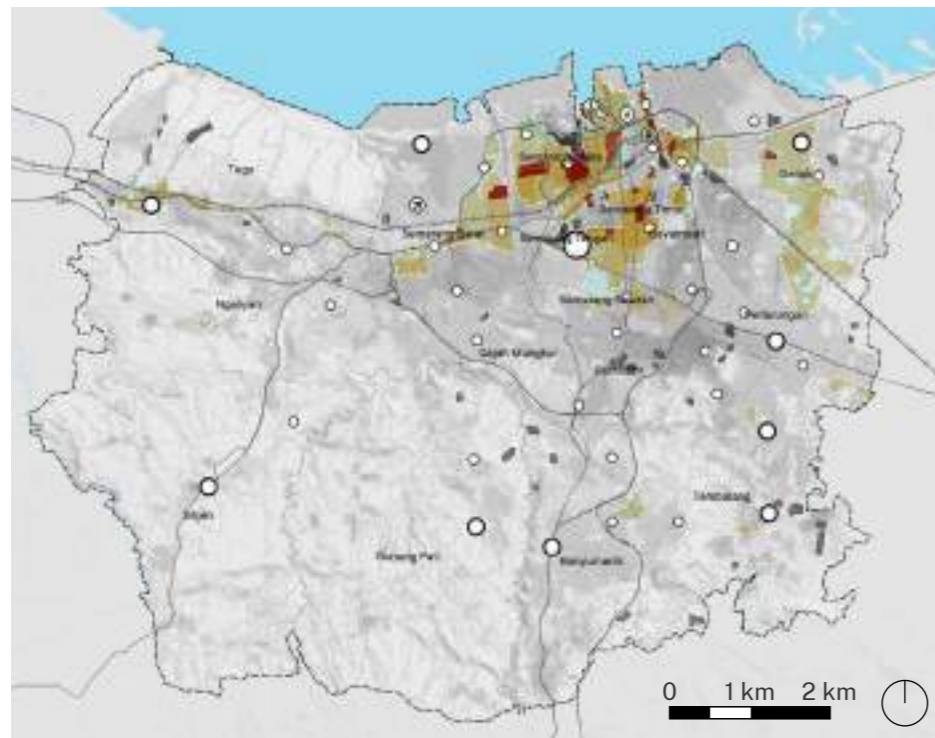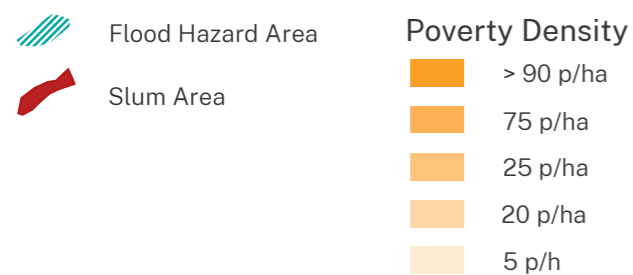
SUBSIDENCE

The areas most affected are also those with the highest density of low income residents, and areas which have developed on alluvial surface deposit closest to the waterfront are most at risk. Major adaptation infrastructure already being considered for this area, can be linked to wider upgrading strategies

- 30% of low income residents live in subsidence prone areas

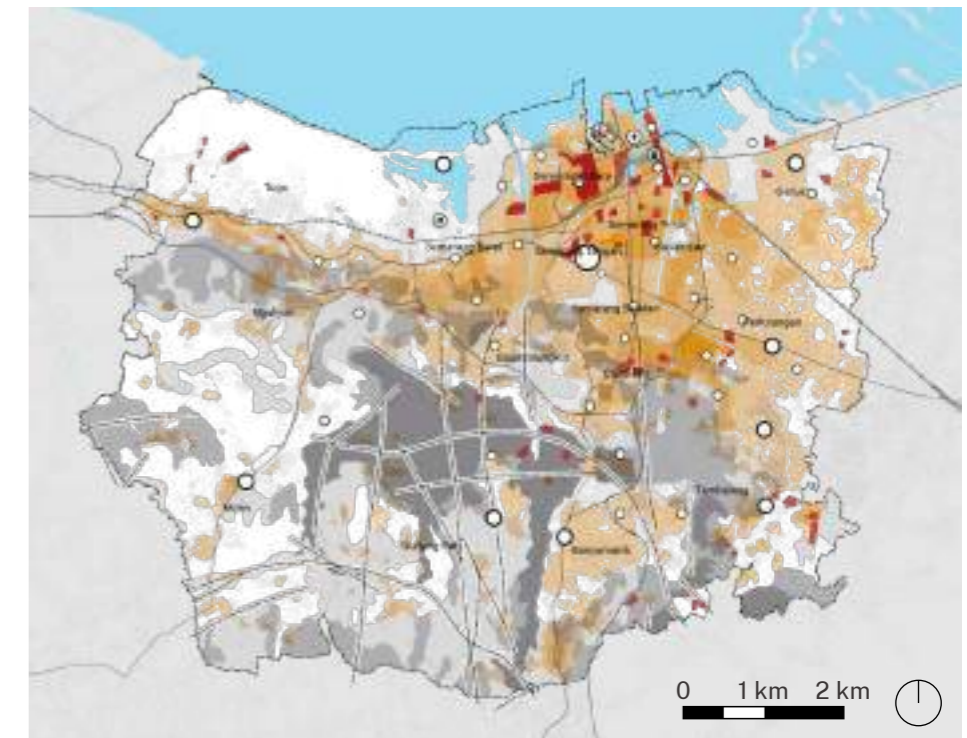Northern areas of the urban core where high levels of poverty occur are highly prone to subsidence
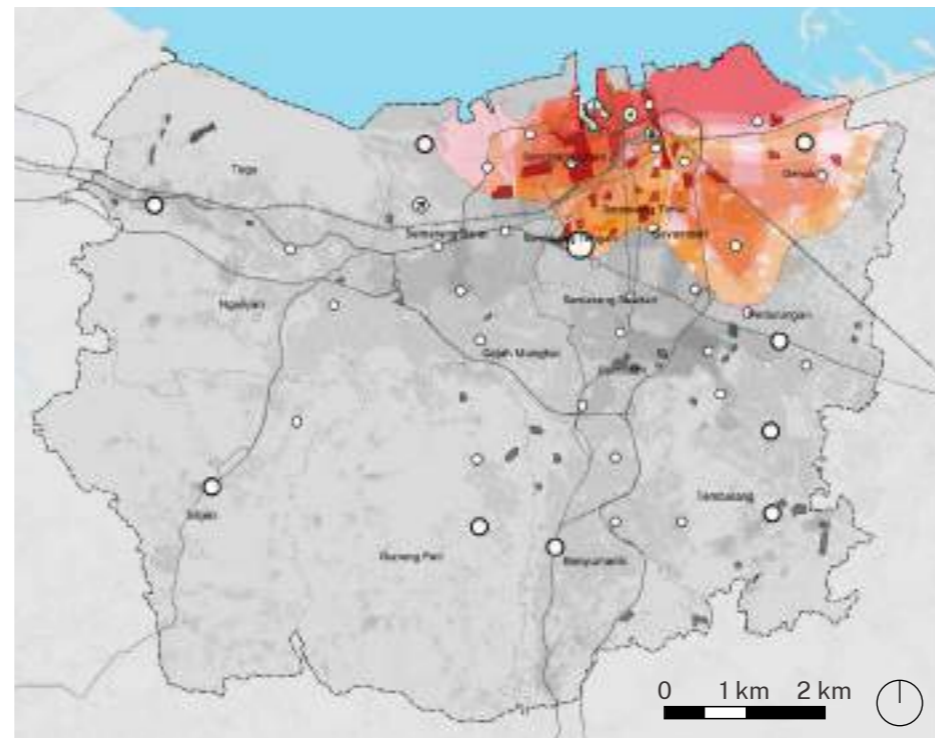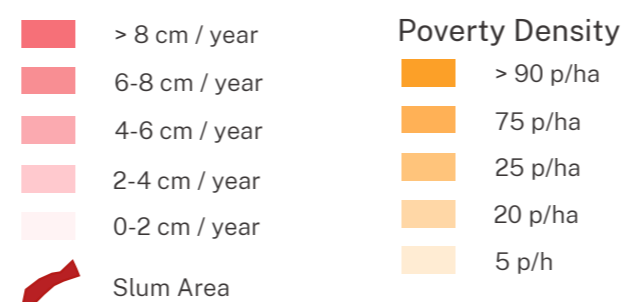
LANDSLIDES

The majority of low income residents who live in landslide prosne areas tend to be in small pockets of slums dwelling within the very high risk areas in Gunung Pati. Peripheral areas with moderate levels of low income residents area encroaching onto medium risk areas are also found in Ngaliyan and Gajah Mungkur districts.

- 24.9% of low income residents live in landslide prone areas

Legend

▨ Flood Hazard Area	**Poverty Density**	
	▨ > 90 p/ha	
◥ Slum Area	▨ 75 p/ha	
	▨ 25 p/ha	
	▨ 20 p/ha	
	▨ 5 p/h	

Legend

▨ > 8 cm / year	**Poverty Density**	
▨ 6-8 cm / year	▨ > 90 p/ha	
▨ 4-6 cm / year	▨ 75 p/ha	
▨ 2-4 cm / year	▨ 25 p/ha	
▨ 0-2 cm / year	▨ 20 p/ha	
◥ Slum Area	▨ 5 p/h	

Legend

▨ High Risk of L'slide	**Poverty Density**	
▨ Medium Risk of L'slide	▨ > 90 p/ha	
▨ Low Risk of L'slide	▨ 75 p/ha	
	▨ 25 p/ha	
◥ Slum Area	▨ 20 p/ha	
	▨ 5 p/h	
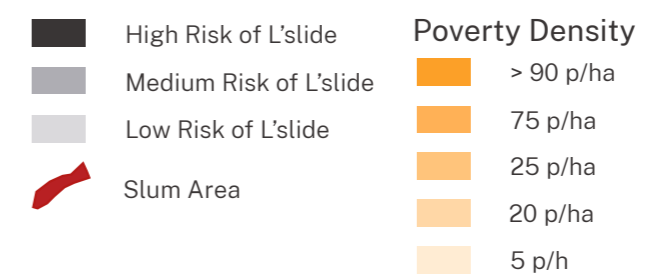
Existing Resilience Initiatives

Given the severity of the resilience challenges in Semarang, there are many related ongoing and planned projects. The majority of the initiatives are focused on the most affected northern core of the city, with projects responding to tidal, river or surface water flooding

However there are no identified projects in the administrative boundary relating to subsidence, although the proposed sea wall, in addition to policy measures (supported with improved enforcement) to prevent ground water extraction may have an impact to reduce severity.

There are several isolated landslide protection projects in Gunung Pati and Tembalang, generally in the most severe landslide prone areas.
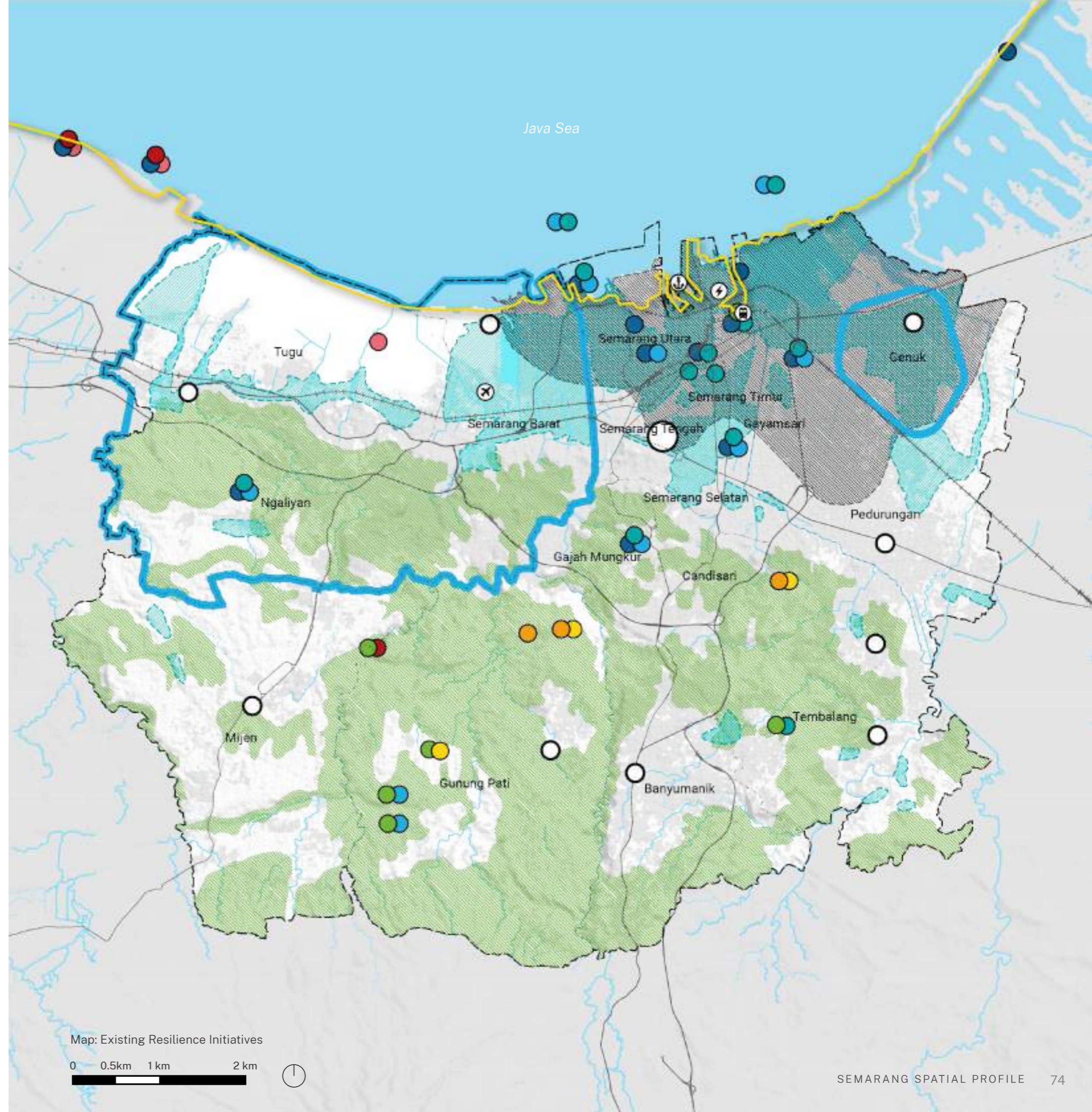
There are a large water supply expansion projects in the Tugu and Ngaliyan areas of the city to the west (fed from improved Jatibarang Reservoir) and in the Genuk area to the east of the city.

KEY CHALLENGE

A systematic approach to implementation and monitoring of the large number of ongoing/planned initiatives is needed to ensure impact

Legend

- ⬤ City Centre
- ⬤ Secondary Centre
- ⬤ Tertiary Centre
- 🔴 Coastal Erosion Project
- 🔵 Tidal Inundation Project
- 🔵 River Flood Project
- 🟢 Surface Water Flood Project
- 🟢 Water Supply Project
- 🔴 Land Subsidence Project
- 🟠 Landslide Project
- 🟡 Drought Relief Project
- 🟦 Water Supply Network Expansion Zone

Java Sea

Tugu

Semarang Utara

Semarang Barat

Semarang Tengah

Semarang Timur

Gayamsari

Genuk

Semarang Selatan

Pedurungan

Ngaliyan

Gajah Mungkur

Candisari

Mijen

Gunung Pati

Tembalang

Banyumanik

Map: Existing Resilience Initiatives

0   0.5km   1 km   2 km

Key Findings

---

01 **Populations most exposed to flood and subsidence risk**

The majority of the populated area in the city is exposed to one, two or three forms of natural hazard; flood, subsidence or landslide.

The most severe risks to people in the city are flood and subsidence with 13.8% of the population exposed to both flood & subsidence hazards.

02 **Core economic and industrial hub at risk**

The majority of the economic and industrial heart of the city is exposed to flood, placing both residents and wider groups livelihoods at risk.

The core industrial backbone of the city including the port are also at severe risk of subsidence, requiring both adaptation infrastructure with supporting policy measures.

03 **Vulnerable groups are exposed to flood and subsidence**

Vulnerable groups are predominantly exposed to flood and subsidence hazards as many of the most dense clusters of slum and low income populations live in affected areas.

Whilst substantial numbers are exposed to landslide risk, the majority are exposed to low and medium risk.

04 **A coherent resilience strategy is needed**

Given the widespread understanding of the resilience issues facing Semarang, a systematic approach to planning, implementation and monitoring of the large number of ongoing/ planned initiatives is needed. To ensure that the sustainable outcomes are achieved and that the projects fully support a more resilient city, considering this as part of a full resilience strategy (i.e. Water as Leverage) is necessary.

Indicator 07
Hazard Affected Assets

The assets of the
city are critical to its
effective delivery of
public service. They are
also key components in
ensuring resilience in
the event of a natural
disasters or emergency
event. Interventions
to protect the assets
an ensure resilience
are key for long term
sustainability.

Highly Exposed Critical Assets

In addition to the populations living in the hazard affected areas, the public assets and infrastructure providing critical servics are potentially at risk. As shown in the previous section, in addition to populations, the public facilities in Semarang Utara, Semarang Tenga and Semarang Timur are those most typically affected by both flood and subsidence.

The public facilities in the area around Semarang Barat and the north of Semarang Selatan are hospitals are those most affected by flood (only).

The universities in Tembalang, Gunung Pati, Nagliyan and Gajah Mungkur are the facilities most to exposed landslide.

KEY CHALLENGE

A very large number of public facilities /assets are exposed to flood and/or subsidence hazards in the main urban core and on the northern districts of the city.

Legend

Natural Hazards

- ▨ Subsidence Hazard
- ▨ Flood Hazard
- ▨ Landslide Hazard
- — 1985 Coastline

Public Facility Types

- Schools
- Universities
- Healthcare
- Public Spaces
- Primary Motorways/Roads

UN@HABITAT
FOR A BETTER URBAN FUTURE

Java Sea

CONCENTRATION OF EXPOSED ASSETS

ISOLATED CLUSTERS

ISOLATED CLUSTERS

50.5%	76.4%	48.9%	71.6%	60%
[of schools exposed]	[of universities exposed]	[of healthcare facilities exposed]	[of public spaces exposed]	[of buildings exposed]
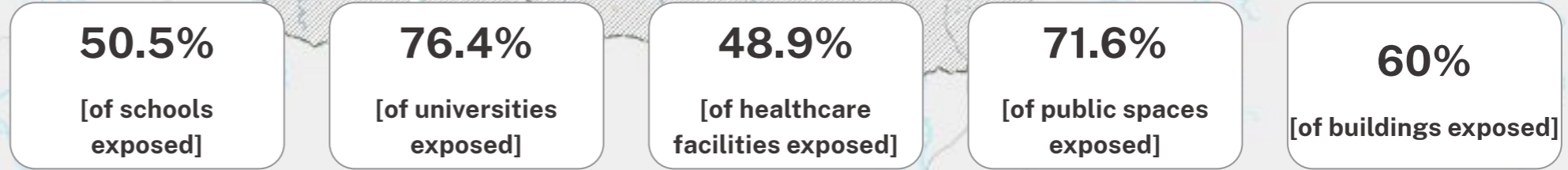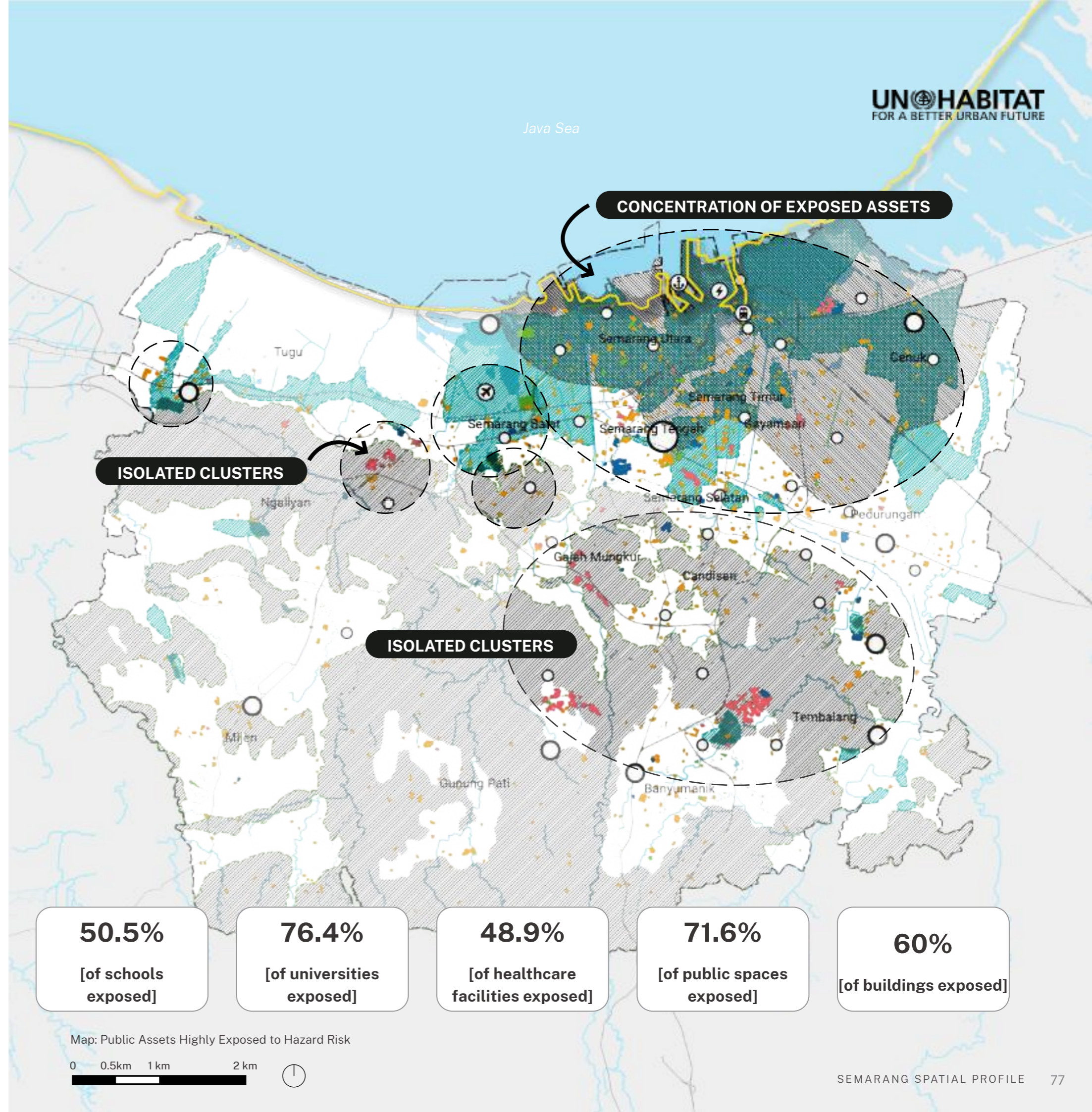
Map: Public Assets Highly Exposed to Hazard Risk

0   0.5km   1 km   2 km
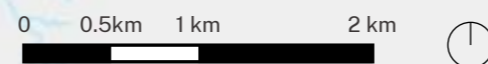
Water Network Exposure

The topographical characteristics of the city mean that there is no part of the water network that is exposed to both landslide and subsidence. However, the majority of the main water supply network is in areas that are exposed to natural hazards, with a substantial proportion exposed to both flood and subsidence.

- 61 % of the water network is exposed to natural hazards in Semarang.

- 14.2 % of the water network is exposed to a combination of flood and subsidence

Given that water supply is already a key challenge in th city, with initiatives to expand the network to resolve the lack of water supply as a driving factor in subsidence, there is a need to consider how key hazard areas will require additional maintenance as an ongoing capital expense.

KEY CHALLENGE

A network which is already struggling to supply sufficient water is also highly at risk of damage from flood, subsidence, and to some extent landslide.

Legend

Natural Hazards

⬛ Subsidence Hazard		▬ Water Trunk Line (WTL)	
⬛ Flood Hazard		▬ WTL - Land Slide Zone	
⬛ Landslide Hazard		▬ WTL - Flood Zone	
⬛ Flood & Subsidence		▬ WTL - Subsidence Zone	
⬛ Flood & Landslide		▬ WTL - Flood & Landslide	
		▬ WTL - Flood & Subsidence	
		▬ Primary Motorways/Roads	

Java Sea

Map: Water Trunk Lines Exposed to Hazard Risk

0   0.5km   1 km   2 km
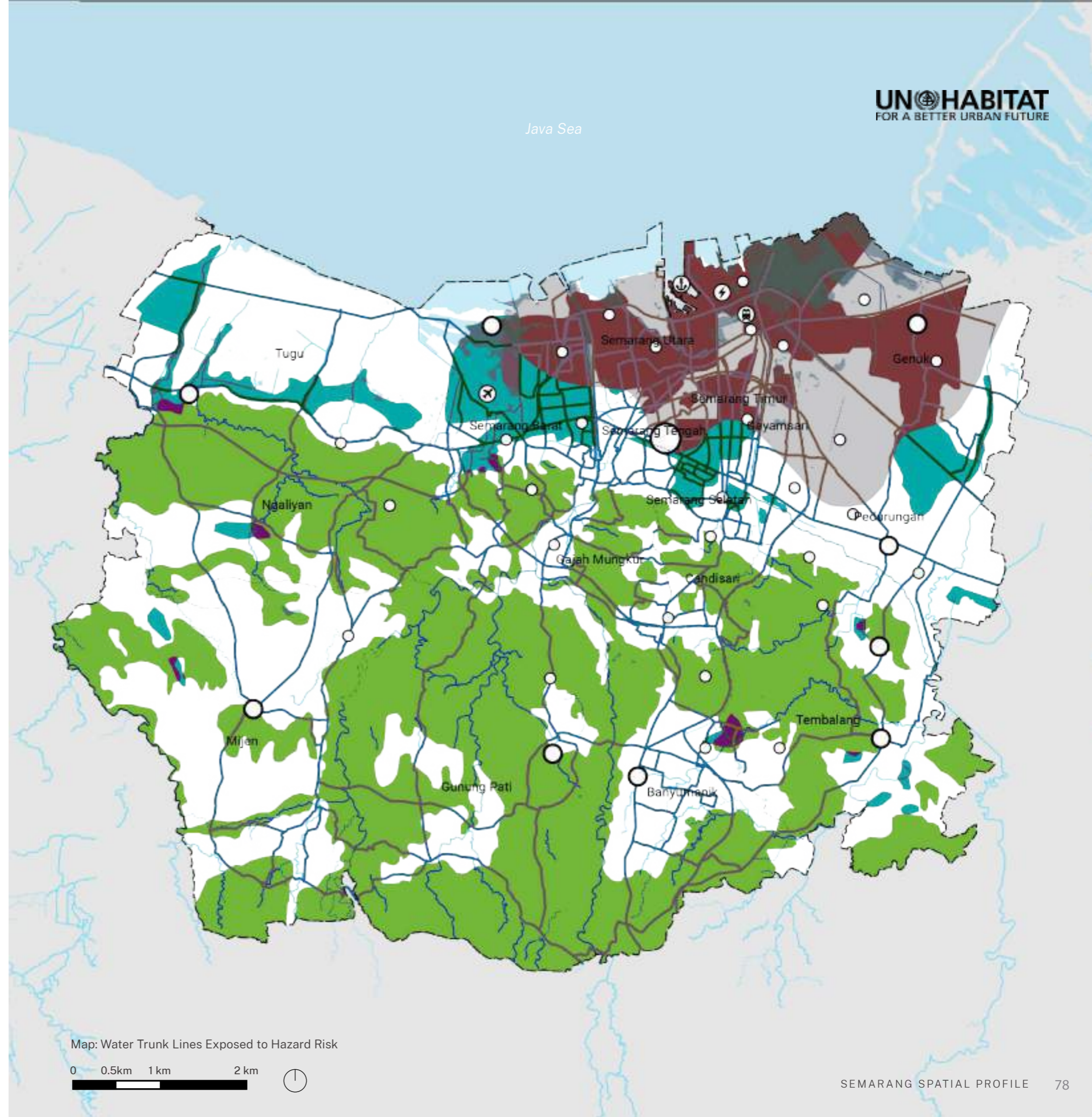
Water Network Exposure

FLOODING

- 25% OR 124.6 km the network is exposed to flood

- Much of the affected area in the north is also affected by subsidence.
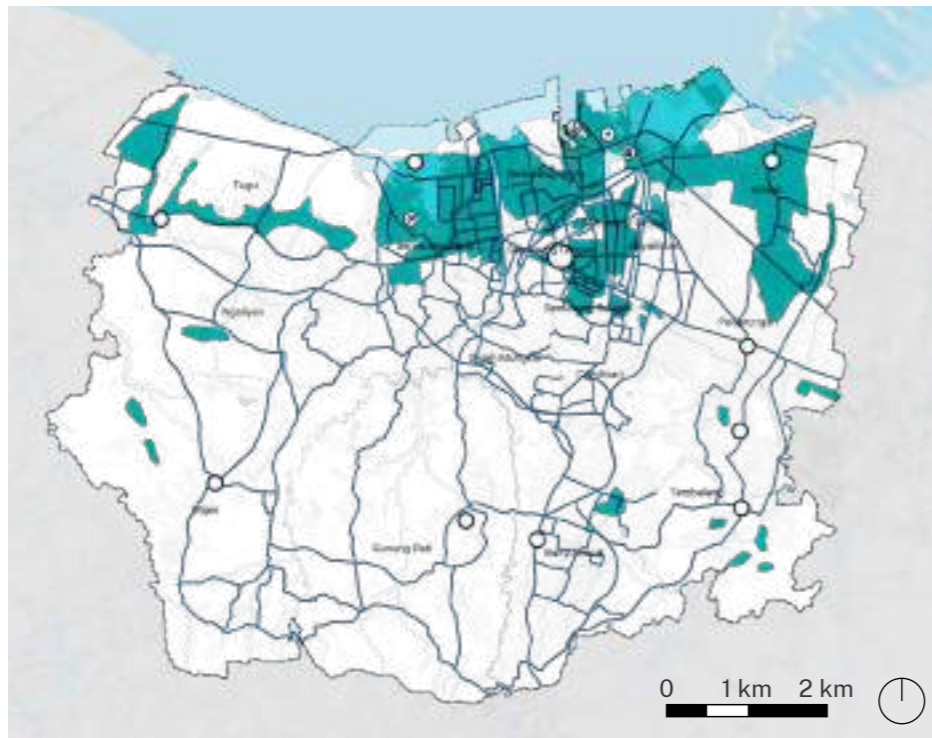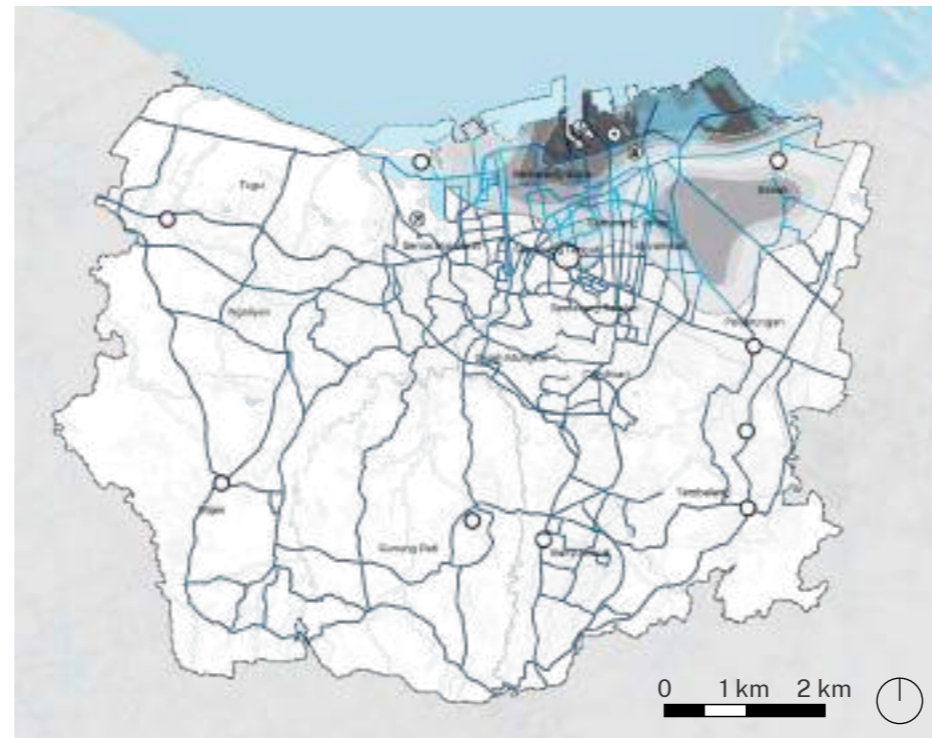

Legend

■ Flood Hazard   — Water Trunk Line (WTL)
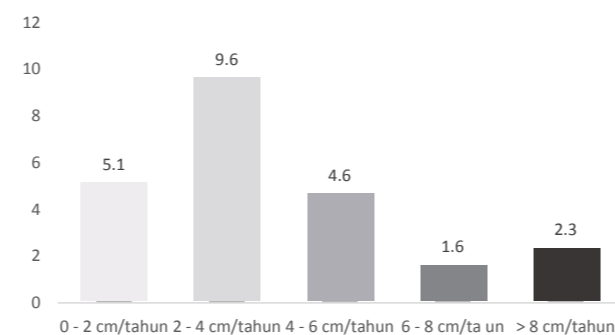

SUBSIDENCE

- 23% OR 115.9 km of the water network is exposed to subsidence

- 8.6% OR 42.7 km of the water network is exposed to severe subsidence of between 4-8cm

Legend

■ > 8 cm / year   ■ 2-4 cm / year
■ 6-8 cm / year   ■ 0-2 cm / year
■ 4-6 cm / year   — Water Trunk Line (WTL)

SUBSIDENCE EXPOSURE (%)

0 - 2 cm/tahun	2 - 4 cm/tahun	4 - 6 cm/tahun	6 - 8 cm/ta un	> 8 cm/tahun
5.1	9.6	4.6	1.6	2.3

LANDSLIDES

- 27.4% OR 136.5km of the water network is exposed to landslide

- The areas most affected are in the central belt of the city, two main zones in the centre and two clusters to the south.

Legend
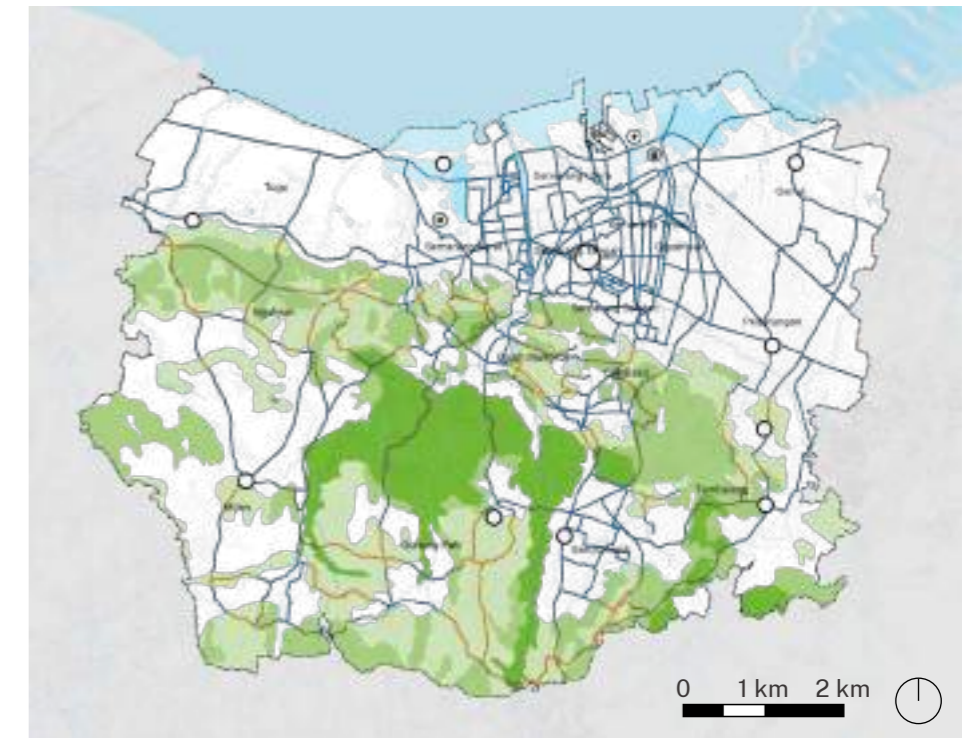
■ High Risk of L'slide   — Water Trunk Line (WTL)
■ Medium Risk of L'slide
■ Low Risk of L'slide

LANDSLIDE EXPOSURE (%)

Low	Intermediate	High
14	9.9	3.6

Roads & Rail Exposure

The Road and Rail infrastructure is fundamental to the cities smooth operation, and is also critical in times of emergency. The importance of the resilience of this infrastructure is paramount.

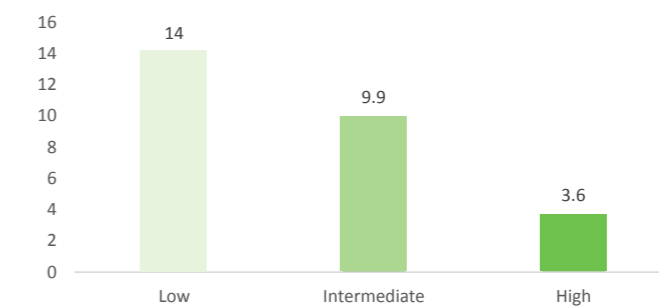- 57.7% of the road network is exposed to natural hazards in Semarang.

- 15.8% of the road network is exposed to flood and subsidence

- 81.5% of the rail network is exposed to natural hazards in Semarang.

- 20% of the rail network is exposed to flood and subsidence

Landslide hazards play less of a factor in relation to road and rail infrastructure with the rails not affected at all, and the road infrastructure only affected by intermediate risk.
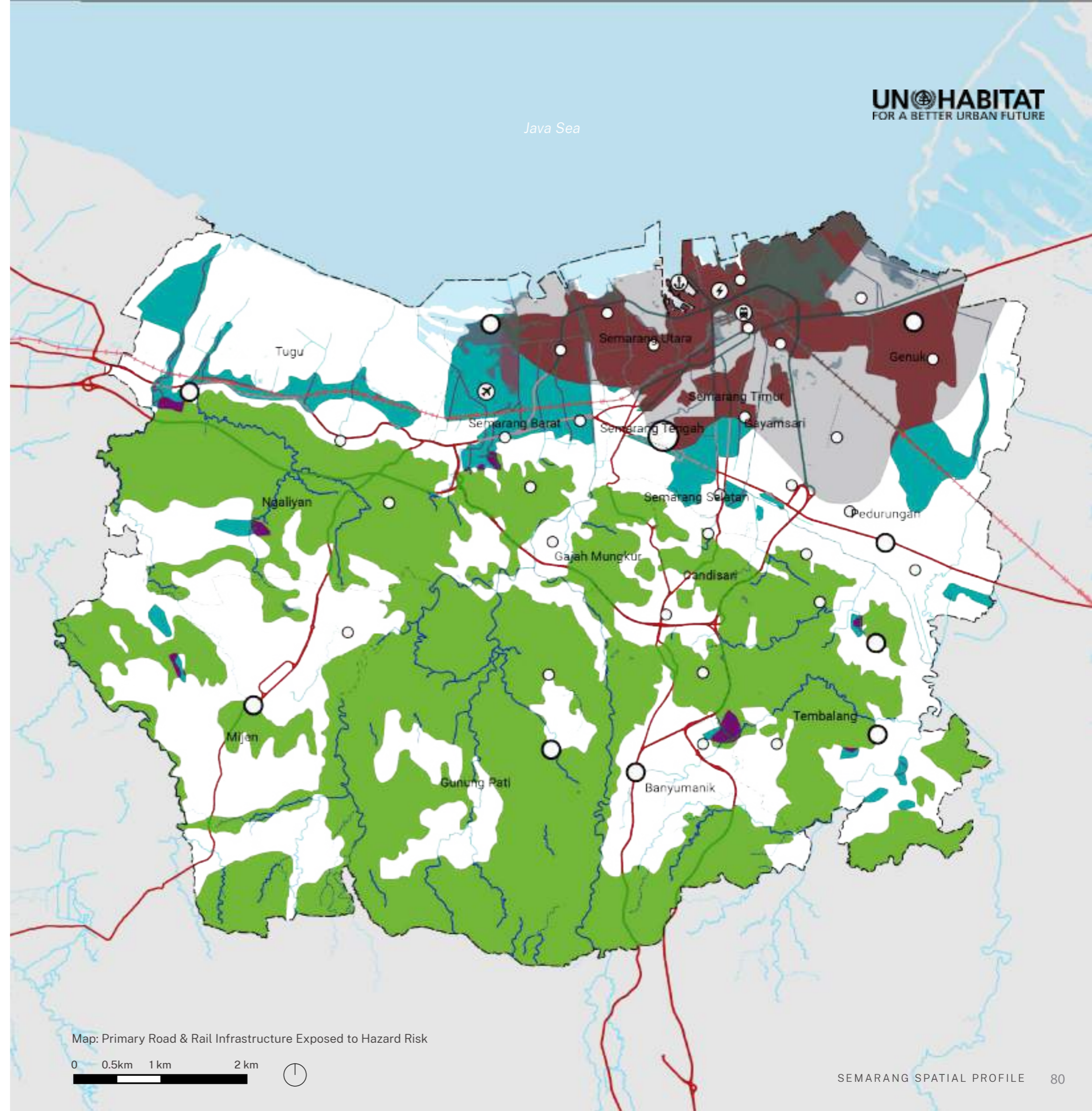
KEY CHALLENGE

The majority of the rail network and arterial road network in the north is exposed to flood and/or subsidence hazards.

Legend

Natural Hazards

⬛ Subsidence Hazard		▬	Primary Roads (PR
⬛ Flood Hazard		▬	PR - Land Slide Zone
⬛ Landslide Hazard		▬	PR - Flood Zone
⬛ Flood & Subsidence		▬	PR - Subsidence Zone
⬛ Flood & Landslide		╫╫	Railway
		╫╫	Rail - Flood Zone
		╫╫	Rail - Subsidence Zone

Java Sea

UN@HABITAT
FOR A BETTER URBAN FUTURE

Tugu

Semarang Utara

Genuk

Semarang Timur

Semarang Barat

Semarang Tengah

Gayamsari

Ngaliyan

Semarang Selatan

Pedurungan

Gajah Mungkur

Candisari

Mijen

Tembalang

Gunung Pati

Banyumanik

Map: Primary Road & Rail Infrastructure Exposed to Hazard Risk
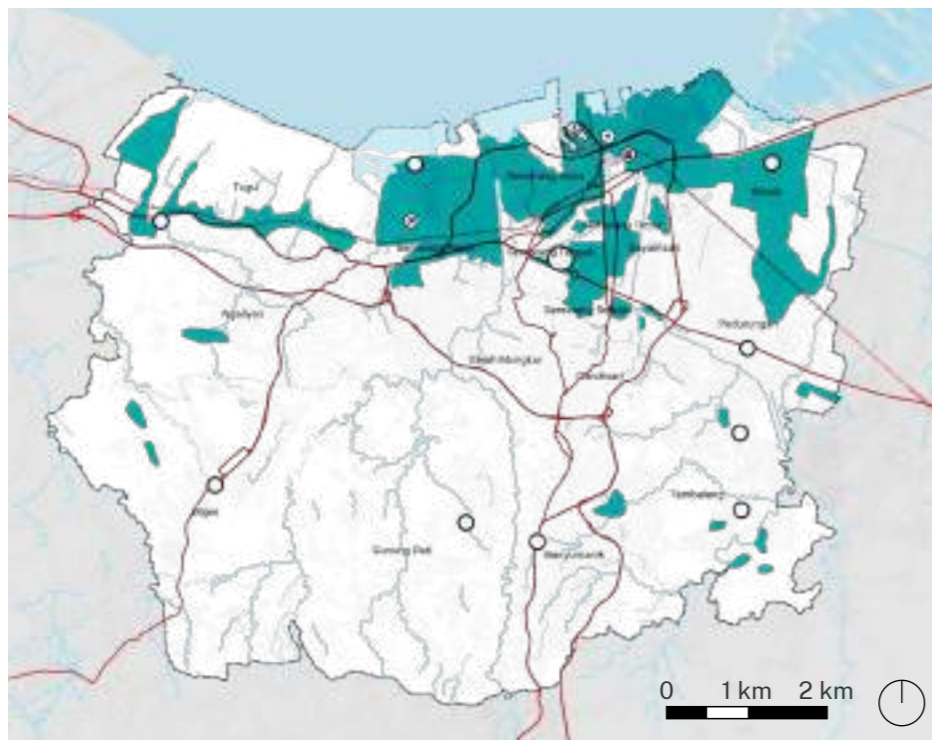
0   0.5km   1 km   2 km

Roads & Rail Exposure

FLOODING

- 26.5% or 71.9 km of the road network is exposed

- 66.4% or 17.6 km of the rail network is exposed

- Typically main water supply network runs under arteries, offering options to link initiatives.
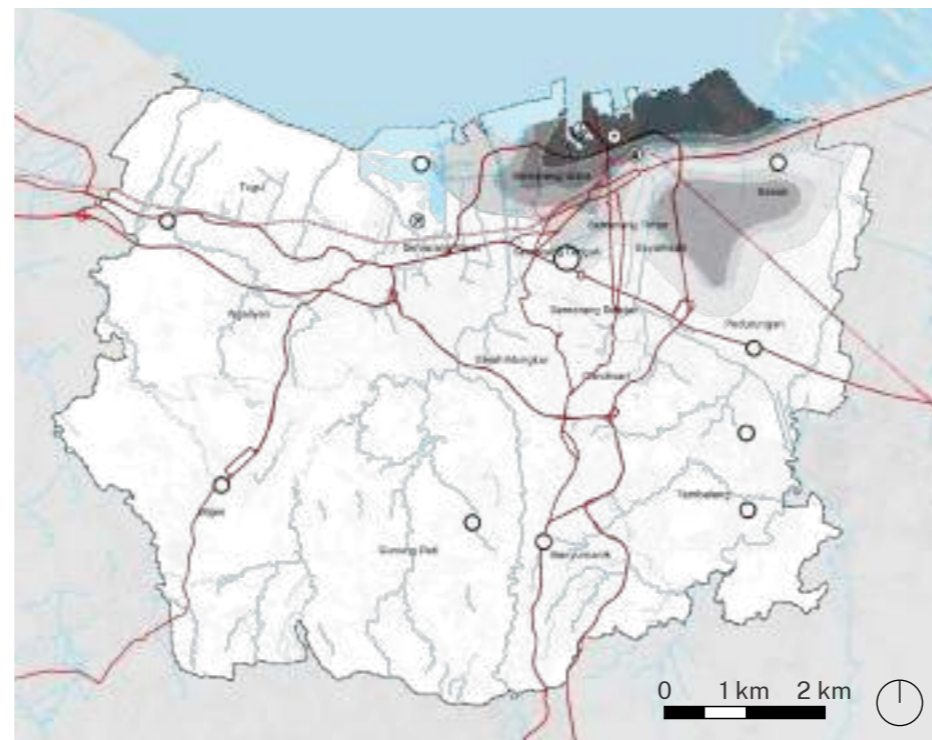

Legend

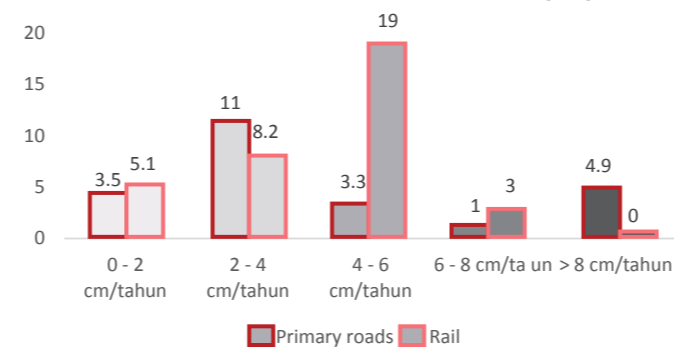|			
▮ Flood Hazard		▬ Primary Roads	
▰ Railway			

SUBSIDENCE

- 23% OR 64.5 km of the road network is exposed

- 9.2% OR 24.9 km is exposed to subsidence between 4-8cm

- 35.2% OR 7.9 km of the rail network is exposed

- 21.9% OR 5.8 km is exposed to subsidence between 4-8cm

Legend

▮ > 8 cm / year	▯ 0-4 cm / year	
▮ 6-8 cm / year	▬ Primary Roads	
▮ 4-6 cm / year	▰ Railway	

SUBSIDENCE EXPOSURE (%)

Primary roads / Rail

Values: 0 - 2 cm/tahun: 3.5, 5.1; 2 - 4 cm/tahun: 11, 8.2; 4 - 6 cm/tahun: 3.3, 19; 6 - 8 cm/tahun: 1, 3; > 8 cm/tahun: 4.9, 0

LANDSLIDES

- 11.5% of the road network is exposed to intermediate landslide risk

- 31.3 km of the road network is exposed to intermediate landslide risk

- The rail network is not exposed
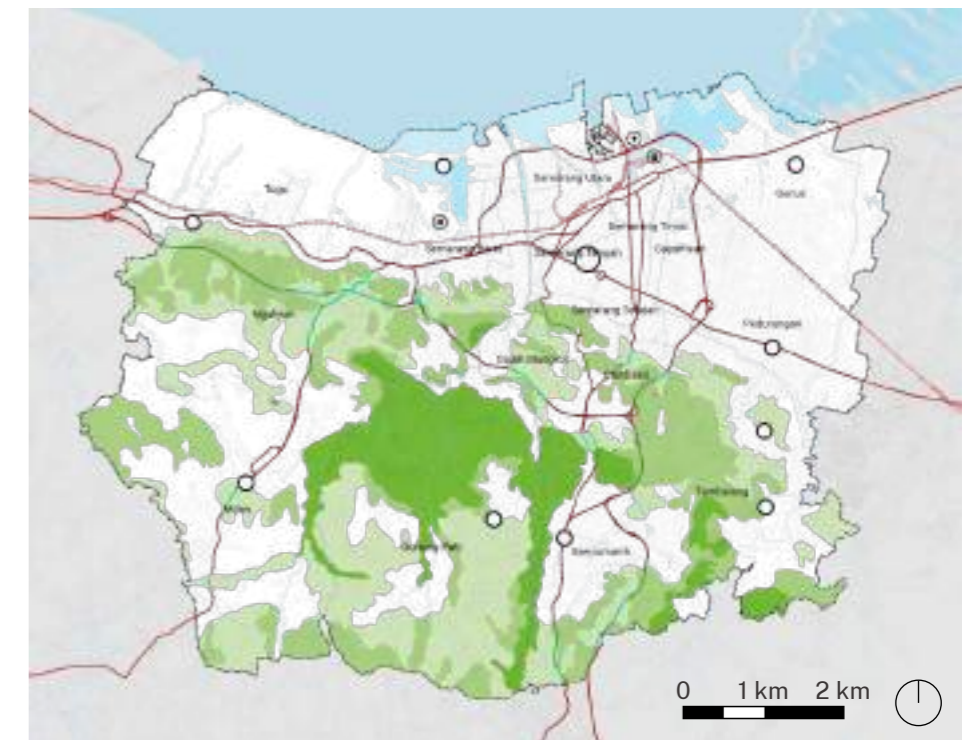
Legend

▮ High Risk of L'slide	▬ Primary Roads	
▮ Medium Risk of L'slide	▰ Railway	
▯ Low Risk of L'slide		

LANDSLIDE EXPOSURE (%)

Primary roads / Rail

Values: Low: 11.3, 0; Intermediate: 11.5, 0; High: 0.3, 0
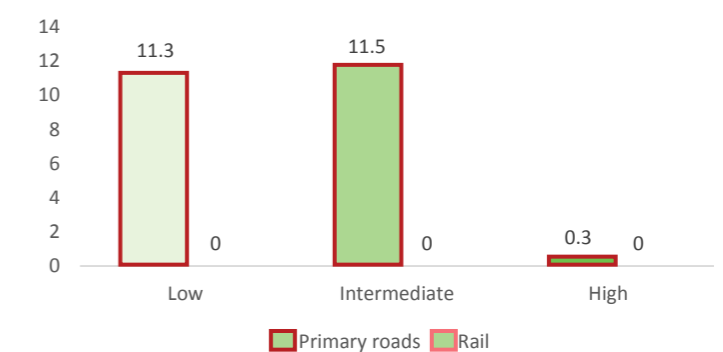
Key Findings

01 Public facilities exposed to hazard

A very large number of public facilities /assets are exposed to flood and/or subsidence hazards in the main urban core and on the northern districts of the city.

Education and health facilities are particularly affected with almost half of all the assets at risk.

02 Water networks exposed to hazard

A network which is already struggling to supply sufficient water is also highly at risk of damage from flood, subsidence, and to some extent landslide.

Given the nature of the water system both as a critical basic service and an element key to resolving the subsidence issue, investment in both expanding and protecting the network is vital.

03 Rail network particularly exposed to flood

The majority of the rail network is exposed to flood hazards, with a substantial proportion of it also exposed to subsidence.

As the rail network is key to the functioning of the city's industry and the wider economy, interventions to support its protection from flood particularly is recommended.

04 Primary road network exposed to hazards

Similarly to the rail network, a substantial proportion of the primary arterial road network is exposed to flood and subsidence in the noth of the city.

In the south of the city, key routes connecting the city to the south and Central Java are exposed to landslides.

Indicator 08
Land Use

A diversity of different functions and land uses within a neighbourhood that encourage residents to interact with a wide range of activities and walk to diverse destinations will enable a more vibrant and dynamic urban environment. A flow of different users creates vibrant and safe places.

Distribution of Diverse Land Use Activities

The urban core presents a significant diversity of land use, parcels and plots which promotes a greater level of mixed-used and a better permeability of the urban fabric. This is key to create a vibrant streetscape. Overall, there is a diverse offering of opportunities is located in the city centre and along main access lines.

- 0.11 average diversity index across the city's urbanised areas

- 0.33 average index in the city's urban core / mixed use corridor nodes

EXISTING LAND USE
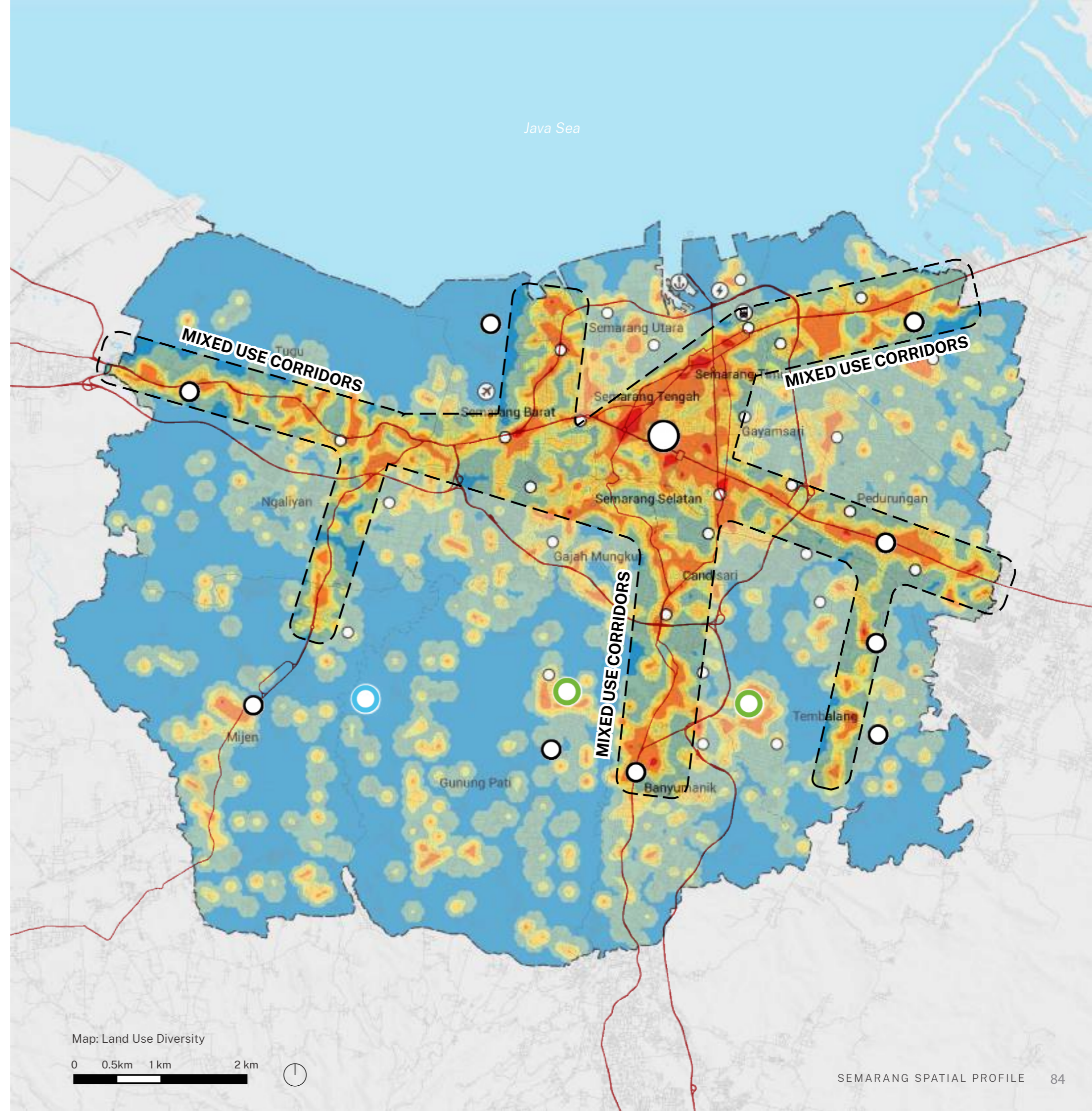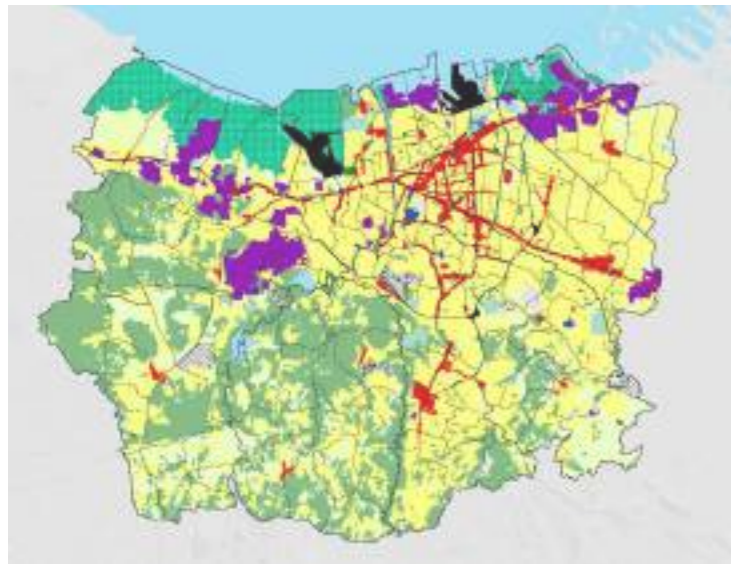
Legend

⬤	City Center
◯	Secondary
○	Tertiary
🟢	Education Center
🔵	Strategic Center

Functional Diversity Index

🟥	0.6-0.7 (most diverse)
🟧	0.4-0.6
🟨	0.2-0.4
🟩	0.1-0.2
🟩	0-0.1
🟦	0 (least diverse)

Java Sea

MIXED USE CORRIDORS

MIXED USE CORRIDORS

MIXED USE CORRIDORS

Map: Land Use Diversity
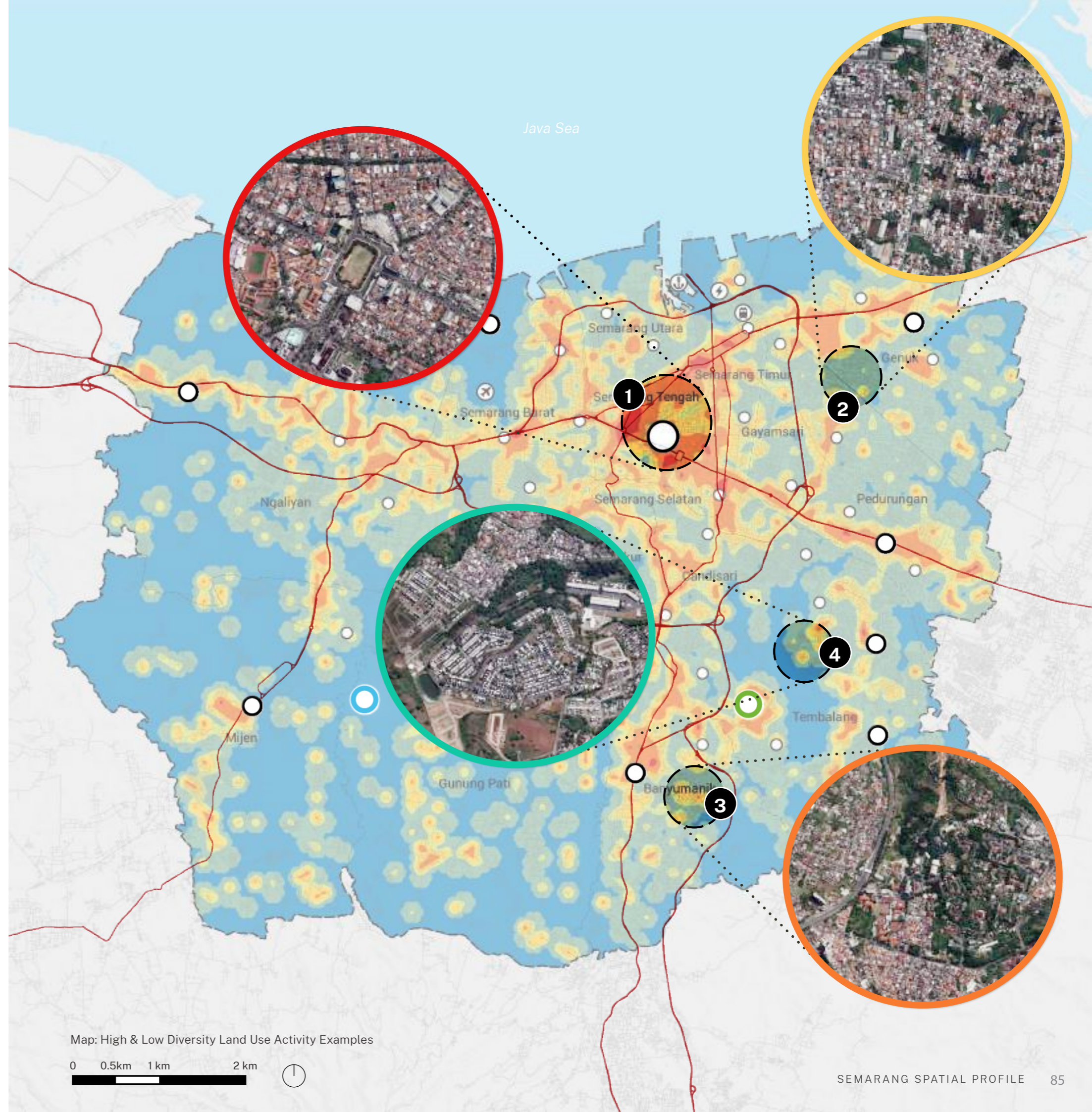
0   0.5km   1 km   2 km

High & Low Diversity Examples

The configuration of the existing urban fabric in different areas of the city can hinder a balanced mix of functional activities.

1. Area with high functional diversity

2. Area with medium functional diversity

3. Area with medium functional diversity

4. Area with low functional diversity

Map: High & Low Diversity Land Use Activity Examples

Legend

- City Center
- Secondary
- Tertiary
- Education Center
- Strategic Center

Functional Diversity Index

	0.6-0.7
	0.4-0.6
	0.2-0.4
	0.1-0.2
	0-0.1
	0

0   0.5km   1 km   2 km

Distribution of Cultural Assets

- 3,995 religious institutions

- 126 community centres

- 8 major cultural institutions

- 50 markets

Legend

○ City Center

○ Secondary

○ Tertiary

○ Education Center

○ Strategic Center

Cultural Assets

● Religious

● Markets

● Community Centres

● Cultural

● Attractions

Key (Tourist) Destinations

1 Simpang Lima Lapangan

2 Lawang Sewu

3 Sam Poo Kong Temple

4 Gran Mosque

5 Saint Joseph's Church

6 Kota Lama Heritage

7 Semawis Market

8 Ronggowarsito Museum

9 Old City Digital Museum

10 Kampung Pelangi

11 Gran Maerakaca

Public Transport

—— Bus Light Transit (BLT)

--- BLT Feeder lines

○ BLT stop

○ Feeder Stop

Java Sea

Pearl of Jave

URBAN CORE
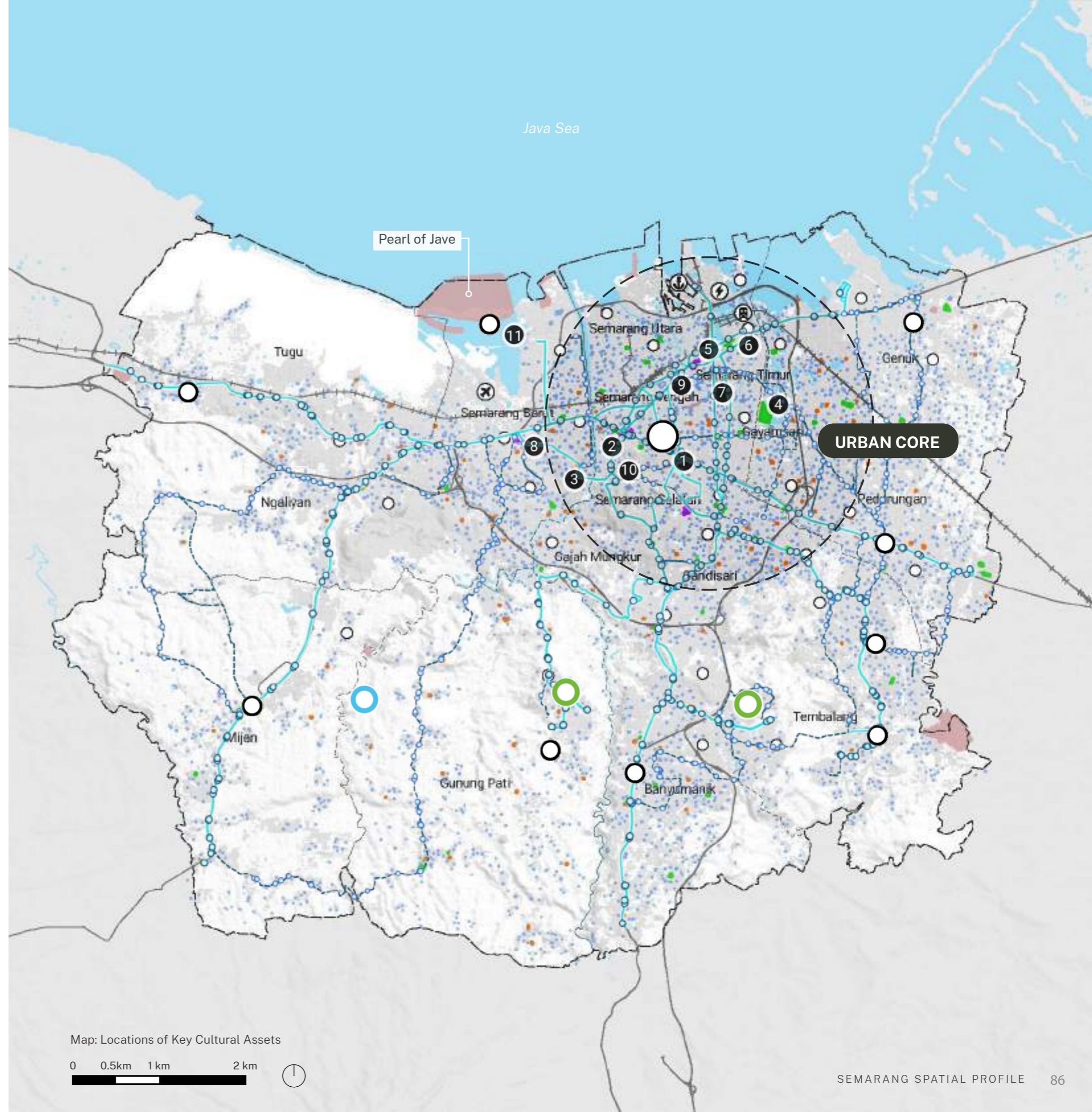
Map: Locations of Key Cultural Assets
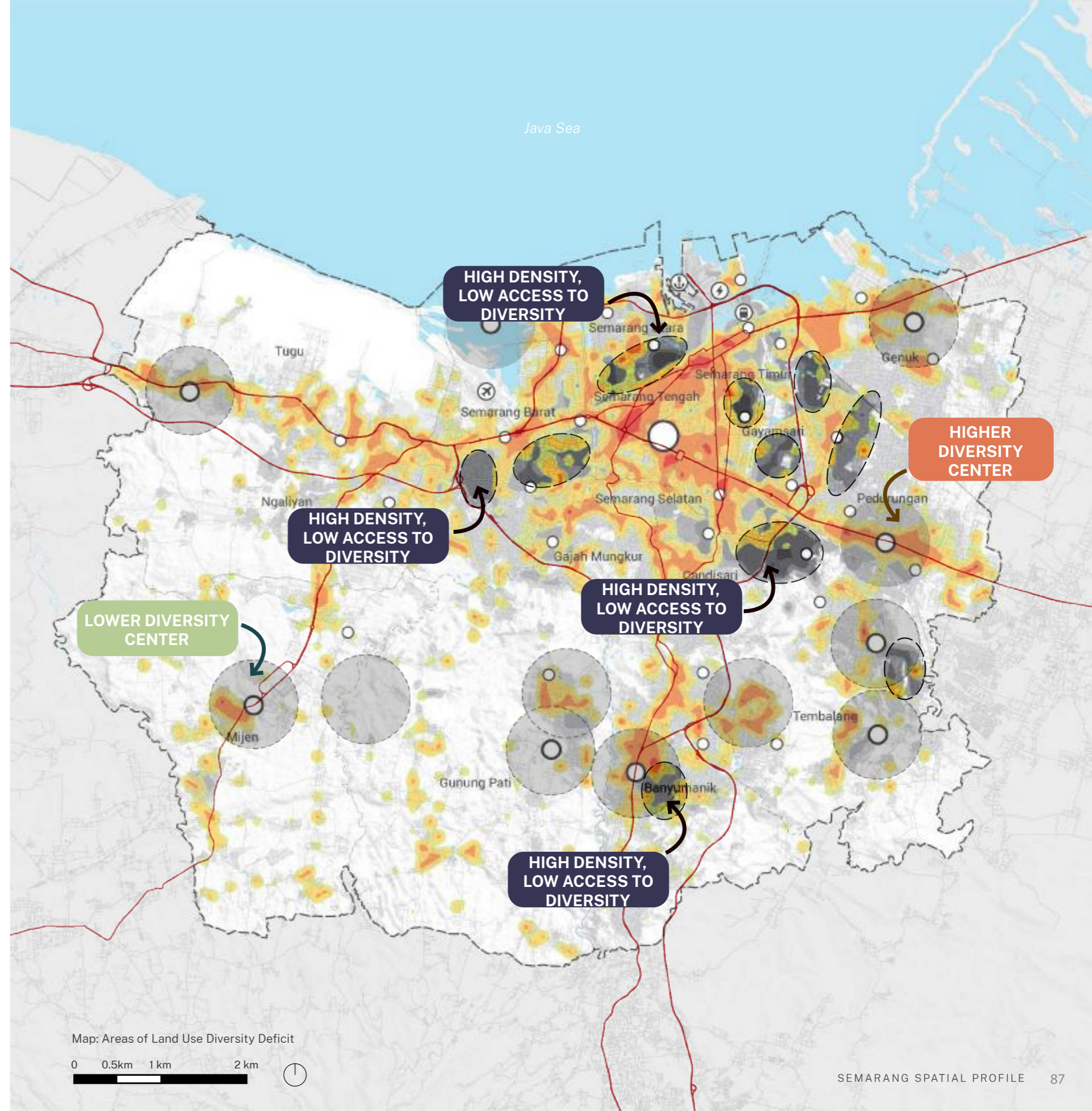
0   0.5km   1 km   2 km
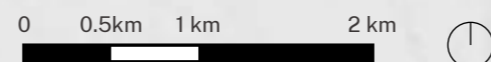
Diverse Activity Deficiency

The configuration of the existing urban fabric in different areas of the city can hinder a balanced mix of functional activities.

1. Area with high functional diversity

2. Area with medium functional diversity

3. Area with medium functional diversity

4. Area with low functional diversity
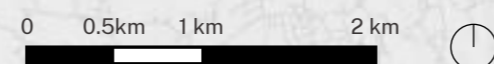
Legend

City Center

Secondary

Tertiary

Functional Diversity Index

■ (red)	0.6-0.7
■ (orange)	0.4-0.6
■ (yellow)	0.2-0.4
■ (green)	0.1-0.2

Population Density

■	268 ppl/ha
■	200 ppl/ha
■	150 ppl/ha
■	100 ppl/ha

Java Sea

HIGH DENSITY, LOW ACCESS TO DIVERSITY

HIGHER DIVERSITY CENTER

HIGH DENSITY, LOW ACCESS TO DIVERSITY

HIGH DENSITY, LOW ACCESS TO DIVERSITY

LOWER DIVERSITY CENTER

HIGH DENSITY, LOW ACCESS TO DIVERSITY

Map: Areas of Land Use Diversity Deficit

0   0.5km   1 km   2 km

Key Findings

01 Land use diversity peaks in the city core and key corridors

The urban core presents more diversity of land uses than the periphery. Mixed use land use patterns emanate out along key transport routes in all directions from the urban core. Where there is high population density areas, a greater mix of land uses and cultural uses should to support daily life. This can be relevant for the City's planned Activity Centers.

02 Newer sprawl development is less diverse

Newer development on the city's periphery tends to be focussed on residential uses. The configuration of the urban fabric as connected and accessible alongside the promotion of mixed use areas creates an enabling environment for vibrant development and something to encourage in future development on the periphery.

03 Cultural use diversity is only concentrated in the city core

Most residents are within walking distance of multiple religious institutions, but other cultural uses are further away. 37.3% of residents do not have access (within 15 minutes' walk) to more than 1 type of cultural use. 25% of residents do not have access (within 15 minutes' walk) to diverse services
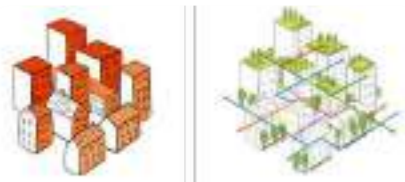
Findings Summary

Challenge 1: **Rapid and Low Density Sprawl**
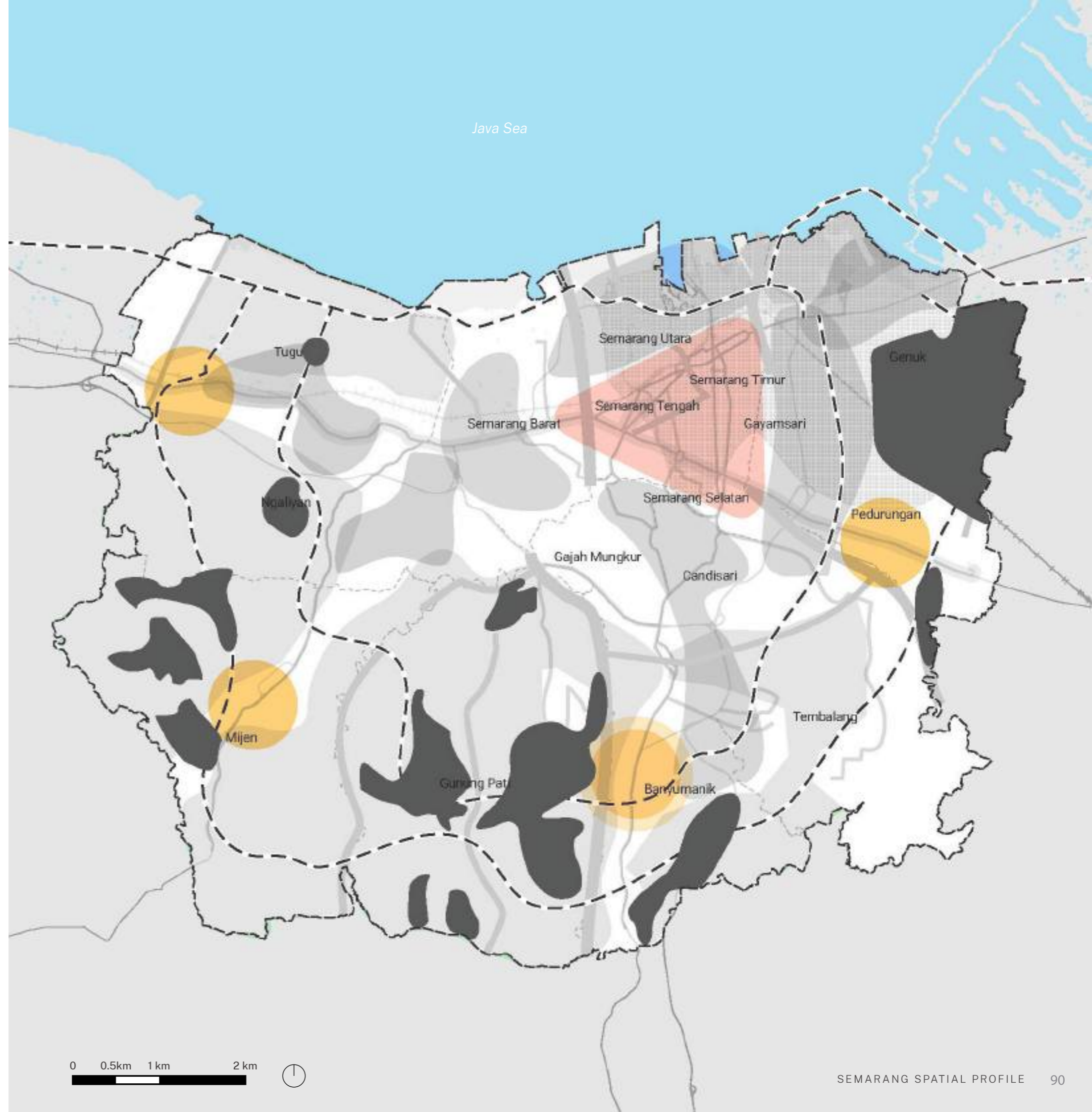

Identified Challenges:

- Isolated, Low Service, Sprawl Pattern

- Under Developed Sub Centres

- ⬤ Strategic Node

- Central Economic Hub

- Recommended Sprawl Containment

Sustainability Principles to apply

Compact & Connected

Java Sea

Tugu

Semarang Utara

Genuk

Semarang Timur

Semarang Tengah

Semarang Barat

Gayamsari

Ngaliyan

Semarang Selatan

Pedurungan

Gajah Mungkur

Candisari

Mijen

Tembalang

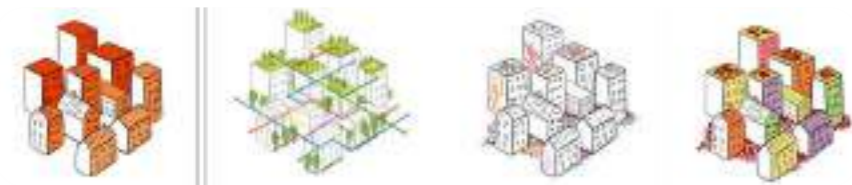Gunung Pati

Banyumanik

0   0.5km   1 km   2 km

Challenge 2:. Transport and Connectivity
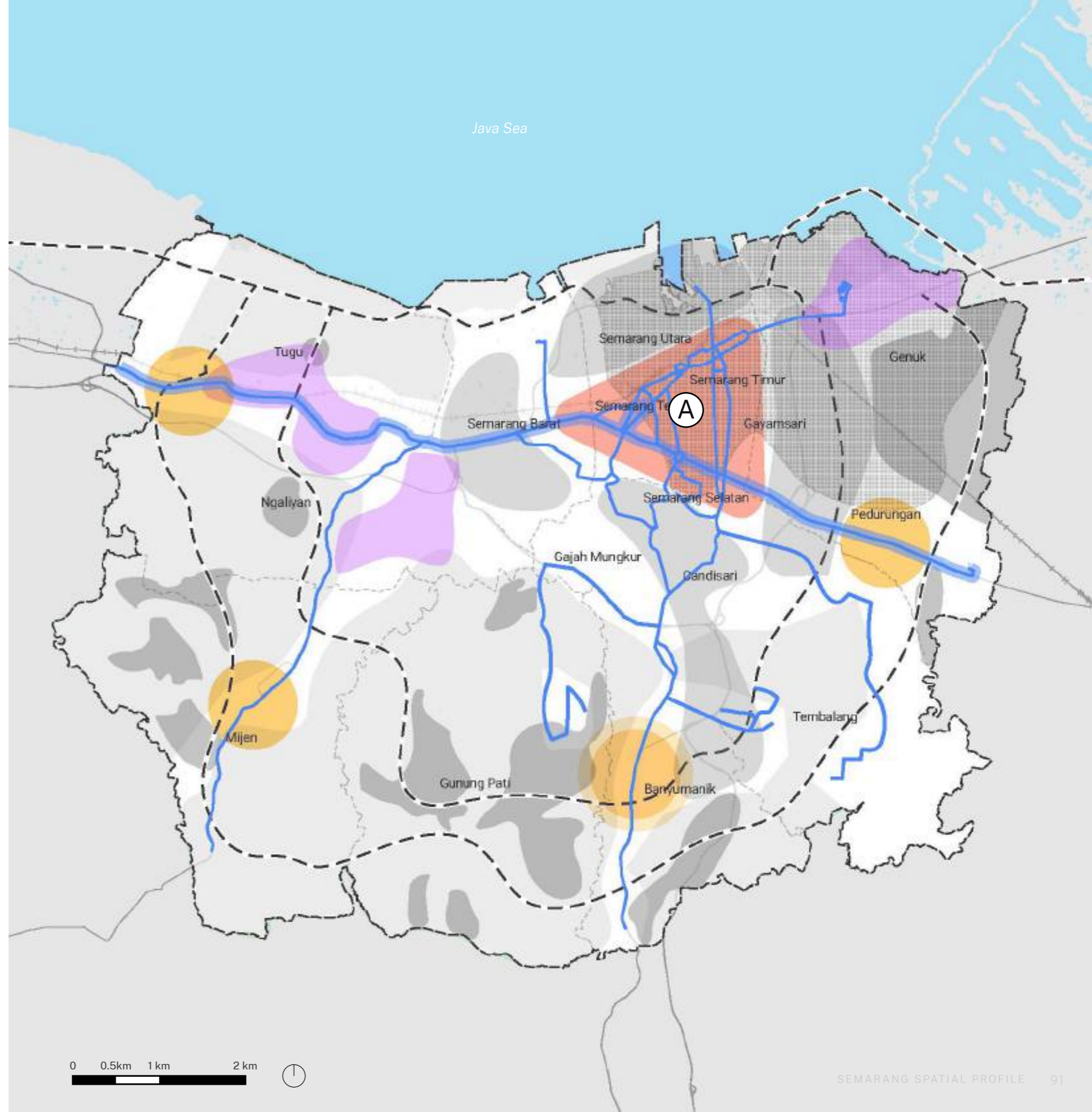
Identified Challenges:

- Underutilised East-West transport Corridor

- Under developed centres with poor internal street connectivity

Legend

- 🟠 Strategic Node
- 🟧 Central Economic Hub
- ⬛ Recommended Sprawl Containment
- 🟪 Key Industrial Areas
- —— Key Transport Lines

Sustainability Principles to apply

Compact, Connected, Inclusive & Vibrant

Java Sea

Tugu

Semarang Utara

Genuk

Semarang Timur

Semarang Barat

Gayamsari

(A)

Ngaliyan

Semarang Selatan

Pedurungan

Gajah Mungkur

Candisari

Mijen

Tembalang

Gunung Pati

Banyumanik

0   0.5km   1 km   2 km

Challenge 3: Inequitable Service Provision

Identified Challenges:

- Pockets of High Density Population Clusters with Lower than average Access to Key Services

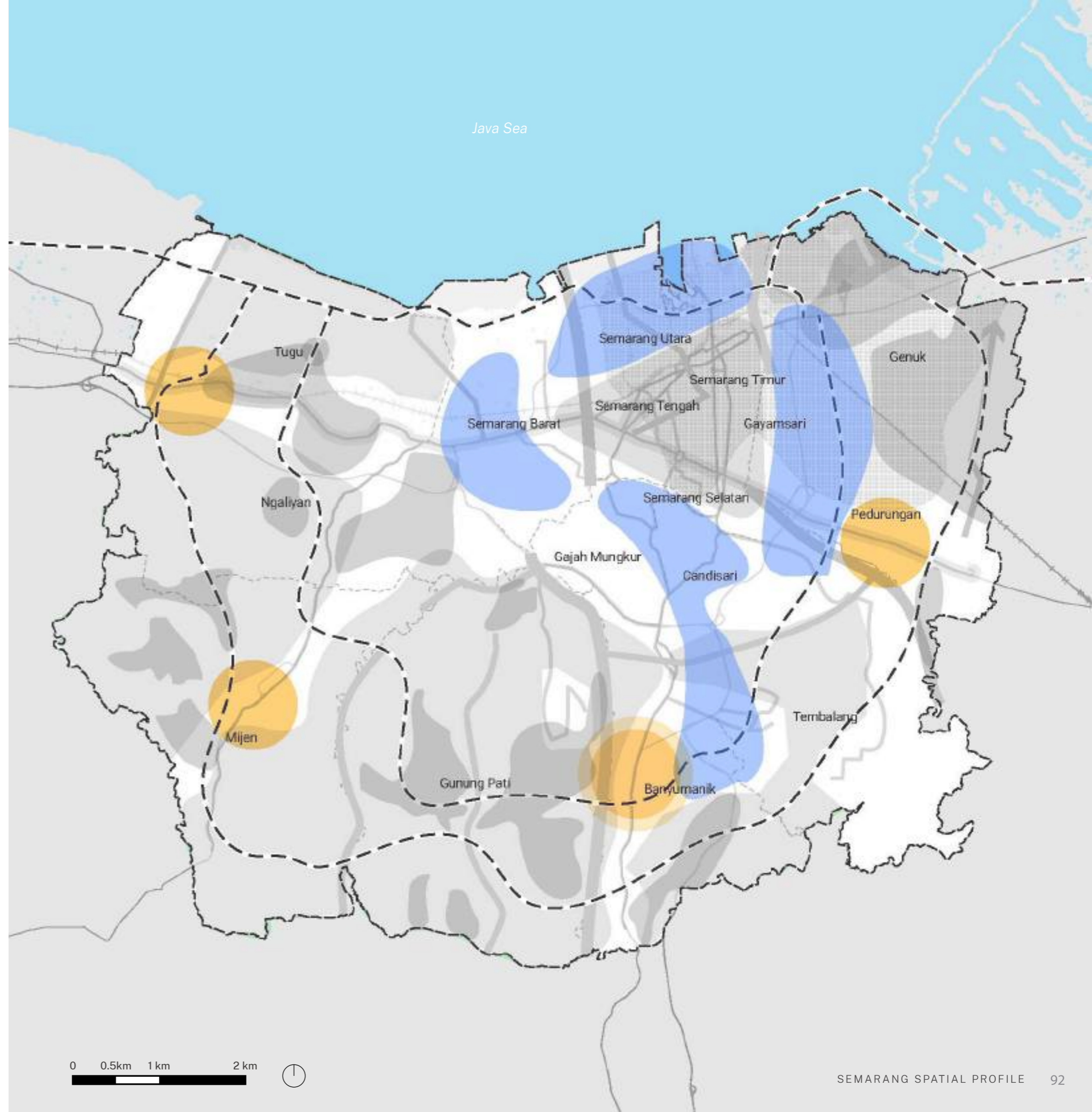- Clusters of Vulnerable Populations with particularly lower than average access to key servicess

🟠 Strategic Node

🟦 Generalised Social Facilities Deficit Areas

Sustainability Principles to apply

Compact, Inclusive, Connected

Java Sea

Tugu
Semarang Utara
Genuk
Semarang Timur
Semarang Tengah
Semarang Barat
Gayamsari
Ngaliyan
Semarang Selatan
Pedurungan
Gajah Mungkur
Candisari
Mijen
Tembalang
Gunung Pati
Banyumanik

0   0.5km   1 km   2 km

Challenge 4: **Exposure to Natural Hazards**
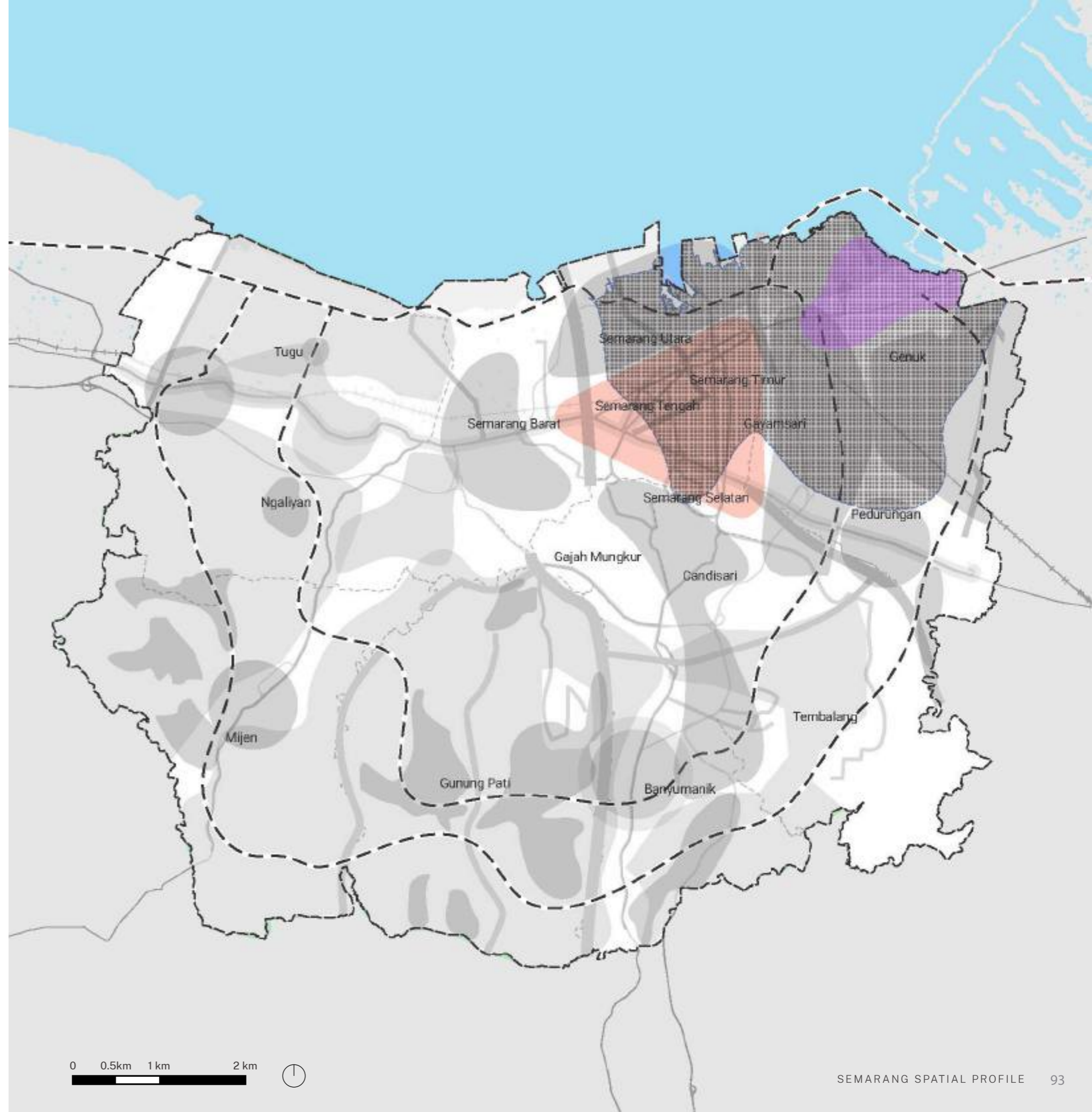
Identified Challenges:

- Highly exposed well serviced City Centre (assets & population)

- Highly exposed economic core

- Major Planned Infrastructure investments in highly exposed Areas

● Strategic Node

▮ Central Economic Hub

▮ Key Industrial Areas

▦ Multiple Hazard Risk Areas

Sustainability Principles to apply

Resilient, Compact & Inclusive

0 0.5km 1 km 2 km

Challenge 5:
Environmental Impact

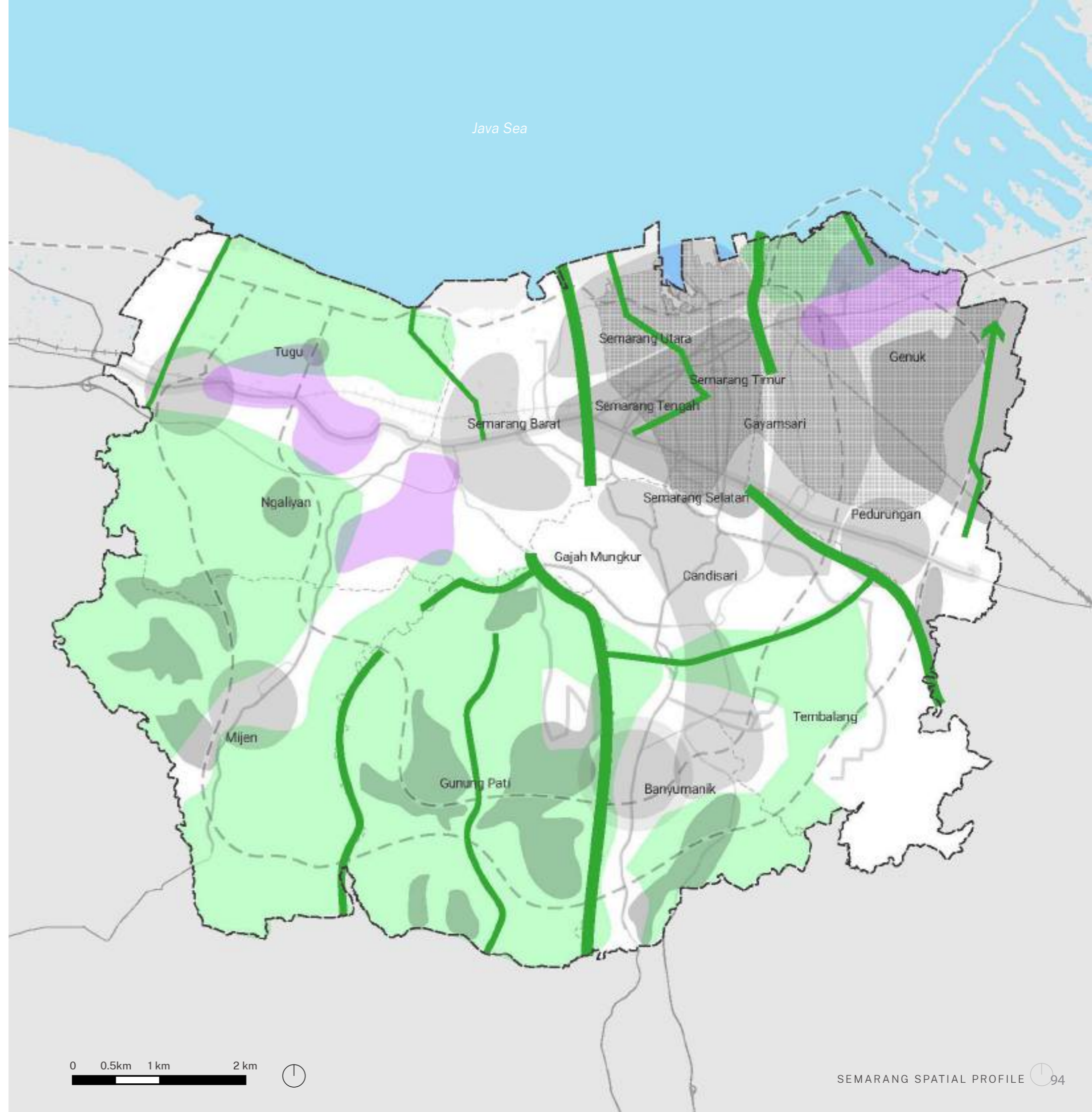___

Identified Challenges:

- Unclear restrictions for development in sensitive green and forested areas

- Disconnected riverines and canal corridors

___

- Key Industrial Areas
- Unprotected Green and forested areas
- Disconnected canal and riverine corridors

___

Sustainability Principles to apply

Compact, Connected, Inclusive

Java Sea

Tugu

Ngaliyan

Semarang Utara

Semarang Timur

Genuk

Semarang Tengah

Semarang Barat

Gayamsari

Semarang Selatan

Pedurungan

Gajah Mungkur

Candisari

Mijen

Tembalang

Gunung Pati

Banyumanik

0   0.5km   1 km   2 km

Combined Challenges
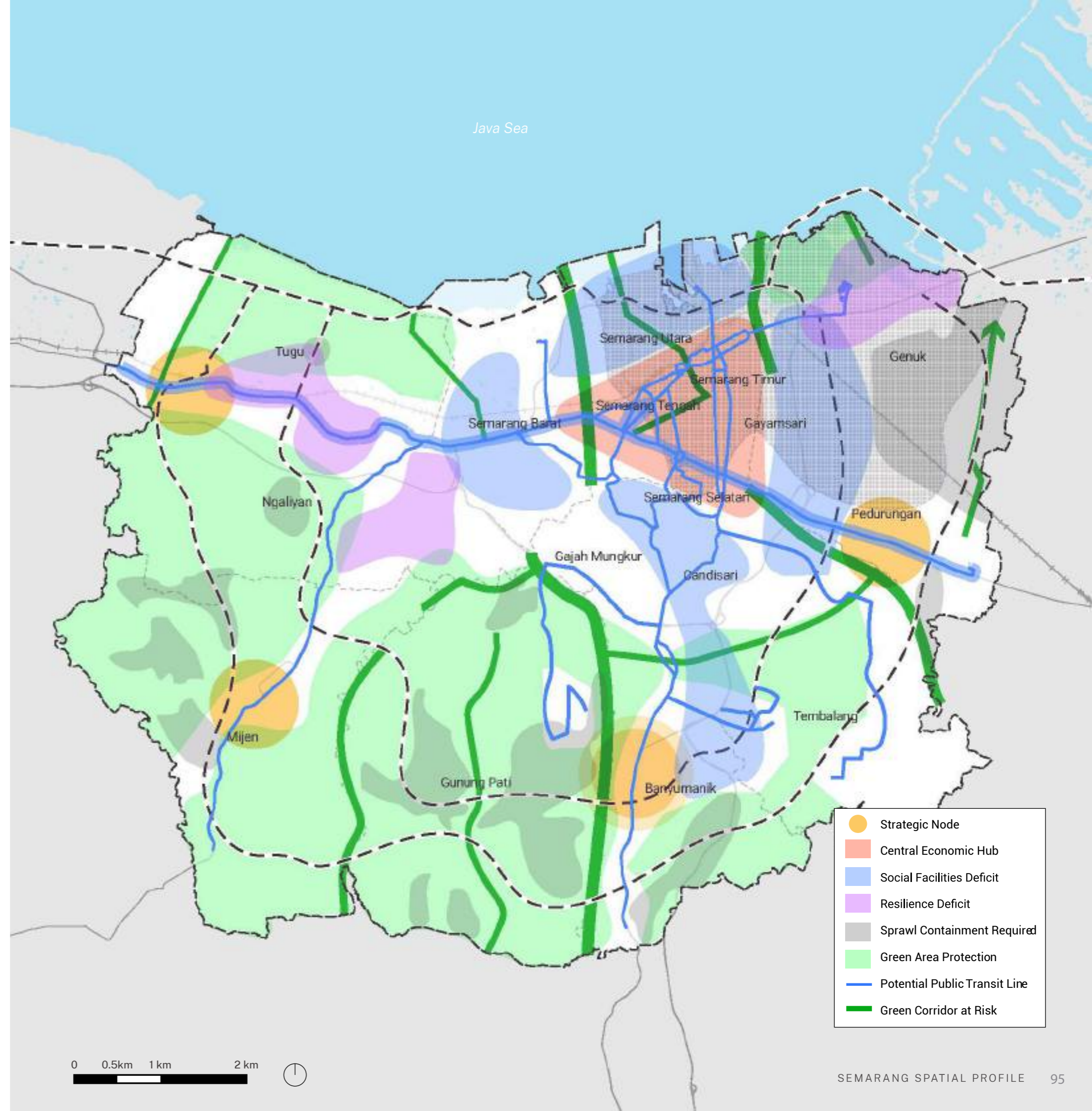

Compact, Connected, Inclusive, Vibrant, Resilient

1 Rapid & Low Density Sprawl

Sprawl, informal areas without services, underutilised centres

2 Transport & Connectivity

Low transport take-up, over-investment in highways

3 Inequitable Service Provision

Lack of public open space or recreation within built-up areas

4 Exposure to Natural Hazards

Environmental degradation, flooding, sea rise, subsidence

5 Environmental Impacts

Blue and green grids, rivers, ravines and canal health, recreation amenity

Java Sea

Tugu

Ngaliyan

Semarang Utara

Semarang Timur

Semarang Tengah

Genuk

Semarang Barat

Gayamsari

Gajah Mungkur

Semarang Selatan

Pedurungan

Candisari

Mijen

Gunung Pati

Banyumanik

Tembalang

Legend

- Strategic Node
- Central Economic Hub
- Social Facilities Deficit
- Resilience Deficit
- Sprawl Containment Required
- Green Area Protection
- Potential Public Transit Line
- Green Corridor at Risk

0   0.5km   1 km   2 km

Planning Semarang

Turning 'Plan' to 'Transformation'

Scope of this Profile
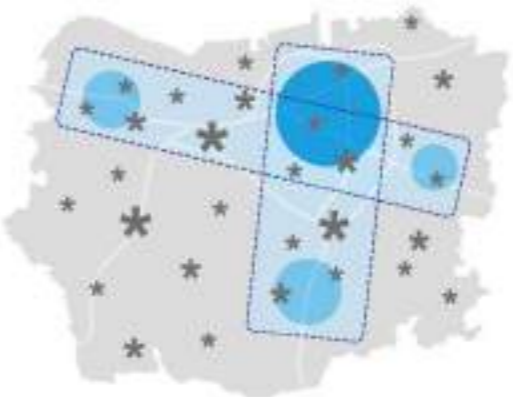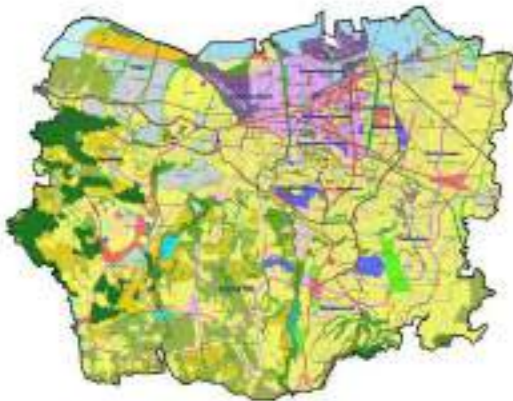
Not in the scope of this Profile

Step 1
Assessing the City

Step 2
Identifying the Needs

Step 3
Developing Sustainable Responses

Step 4
Identification of Projects

Step 5
Prioritising Projects

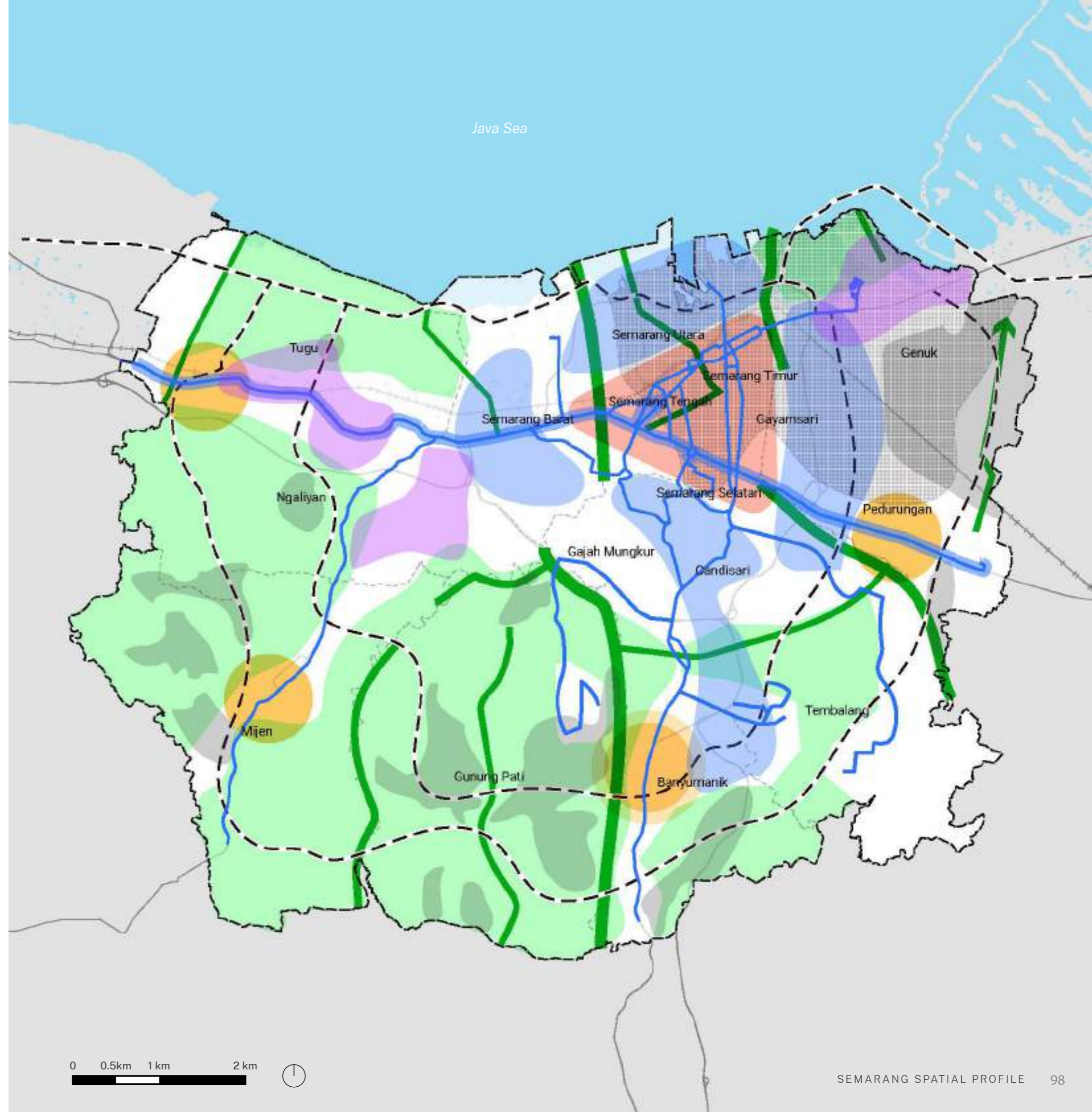**UNDERSTANDING** THE CITY

PLANNING THE CITY

TRANSFORMING THE CITY

Step 2: Identifying the Needs (Recap)

- A composite picture of challenges and needs to be addressed

- Comparing the various spatial areas of need

- Identifying commonalities and linking to priorities

- Creating foundations for developing a spatial strategy

Legend

- 🟠 Strategic Node
- 🟧 Central Economic Hub
- 🟦 Social Facilities Deficit
- 🟪 Resilience Deficit
- ⬛ Sprawl Containment Required
- 🟩 Green Area Protection
- ── Potential Public Transit Line
- ── Green Corridor at Risk

Java Sea

Tugu
Semarang Utara
Genuk
Semarang Timur
Semarang Tengah
Semarang Barat
Gayamsari
Ngaliyan
Semarang Selatan
Pedurungan
Gajah Mungkur
Candisari
Mijen
Gunung Pati
Tembalang
Banyumanik

0   0.5km   1 km   2 km

Step 3:
Developing Sustainable Responses

- Which areas of need can be aligned with the SDGs to more sustainably implement the city's existing plan and achieve the desired objectives?
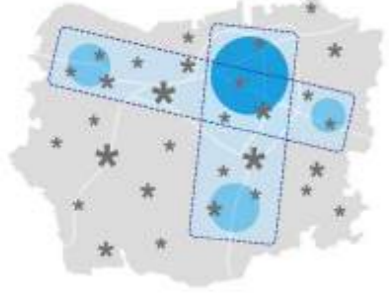
Java Sea

Legend

🟠 Strategic Development Node

🟥 Strategic Development Area

🟧 Industrial Development Zone

🟩 Green Area Protection Zone

▰▰ New Public Transport Connection

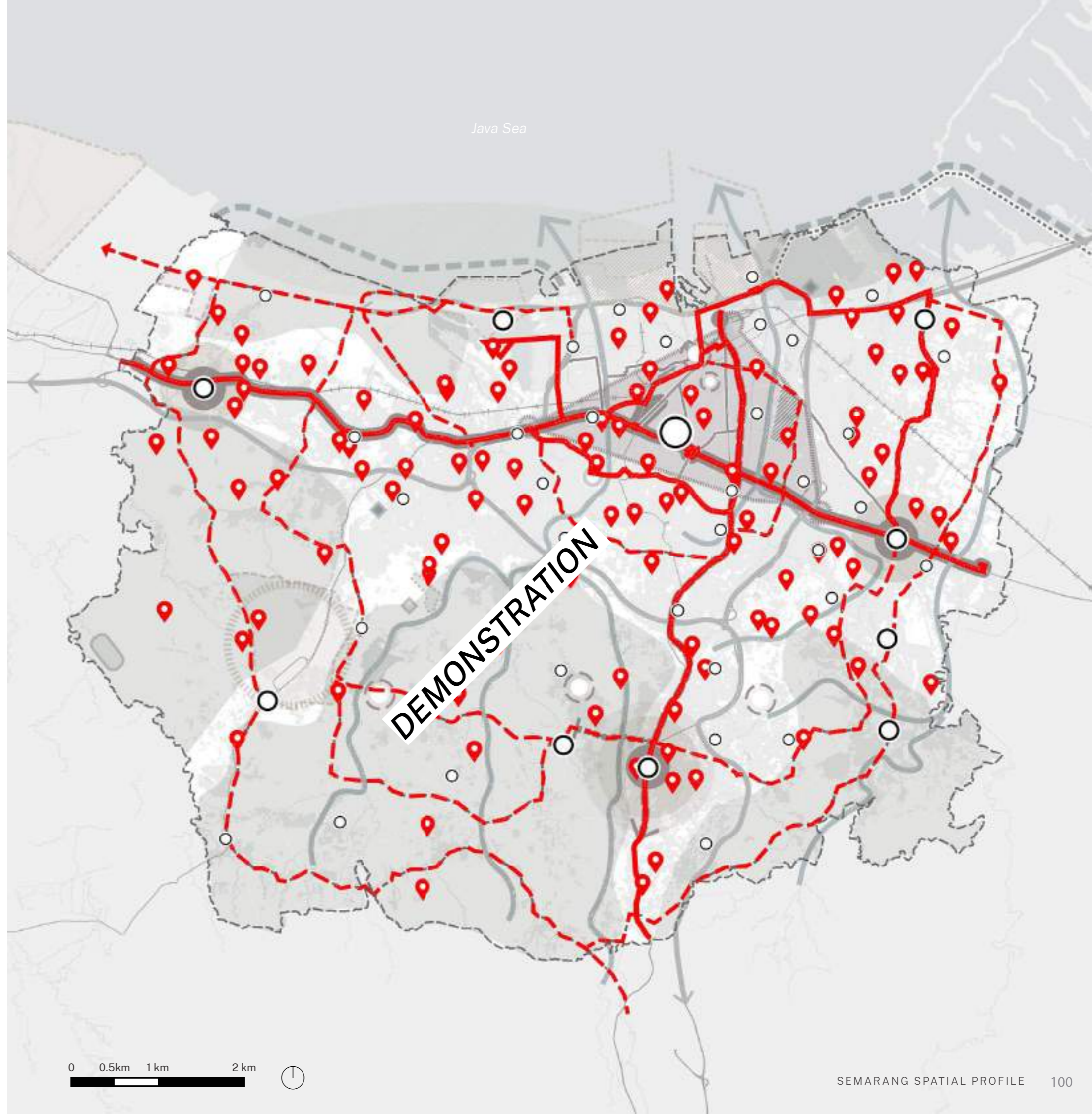━━ Blue / Green Corridor
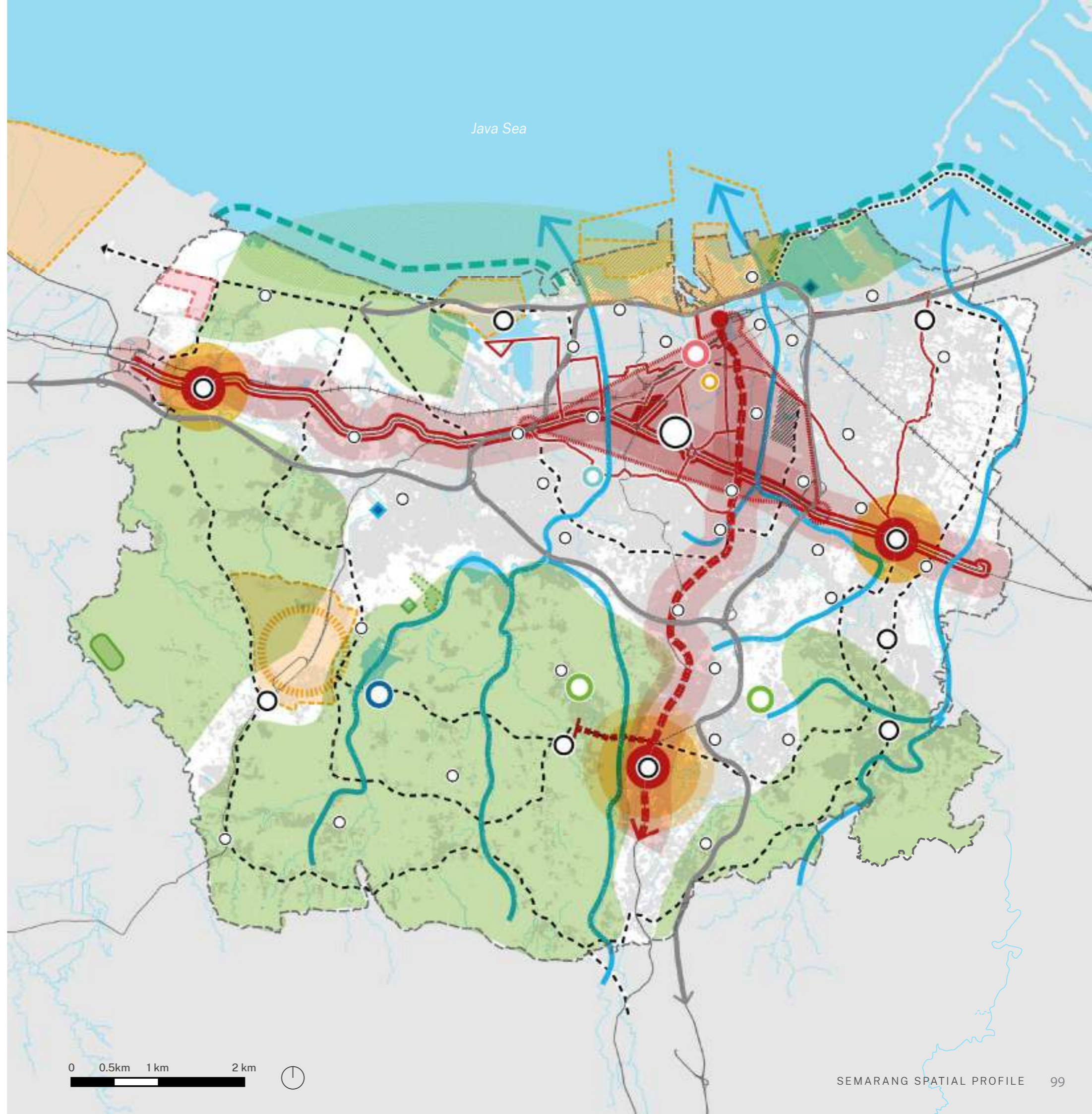
0   0.5km   1 km   2 km

Step 4:
Identification of Projects

- Identification of all urban projects across the city, regardless of where.

Legend

 Proposed ProjectS ite

▪▪▪▪ Proposed Ring Road

━━━ Proposed BRTL ine
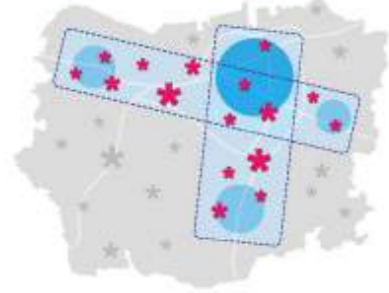

Java Sea

DEMONSTRATION

0   0.5km   1 km   2 km

Step 5:
Prioritising Projects

- Clarifying the priority projects that can effectively achieve the strategy, create spinoff value for residents and achieve the desired objectives given funding limits

Legend

🟠	StrategicD evelopment Node
🟥	StrategicD evelopment Area
🟧	Industrial DevelopmentZ one
🟩	Green Area Protection Zone
▬▬	NewP ublic Transport Connection
▬▬	Blue /G reen Corridor
📍	Proposed ProjectS ite
▪▪▪	Proposed Ring Road
▬▬	Proposed BRTL ine

Java Sea

DEMONSTRATION
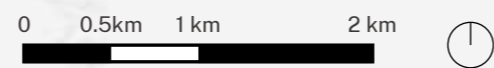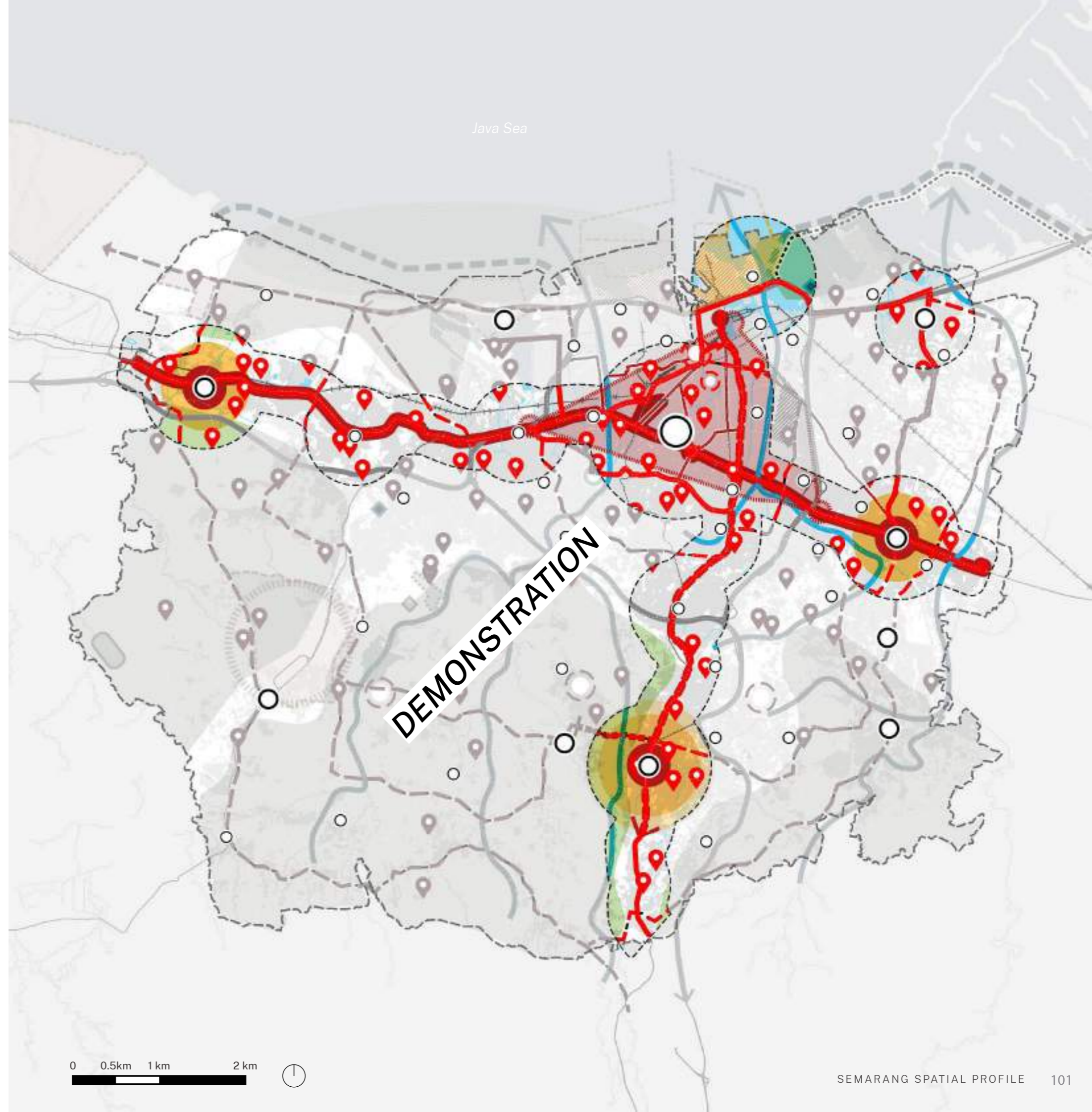
Step 5:
Prioritising Projects through a CIP Prioritisation Matrix

A Spatially Informed CIP Prioritisation Matrix can include:

- Financial Sustainability and Governance

- Community Impact

- Spatial Development Priorities

- Infrastructure Deficit Areas

- High Level Strategic Objectives

The prioritisation matrix has not been holistically set up as part of this profile.

SEMARANG SPATIAL PROFILE

DECEMBER 2022

UN❀HABITAT
FOR A BETTER URBAN FUTURE