FLOOD RISK MANAGEMENT IN MAKATI CITY

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City Government of Makati, Philippines

CITY GOVERNMENT OF MAKATI

Presentation Outline

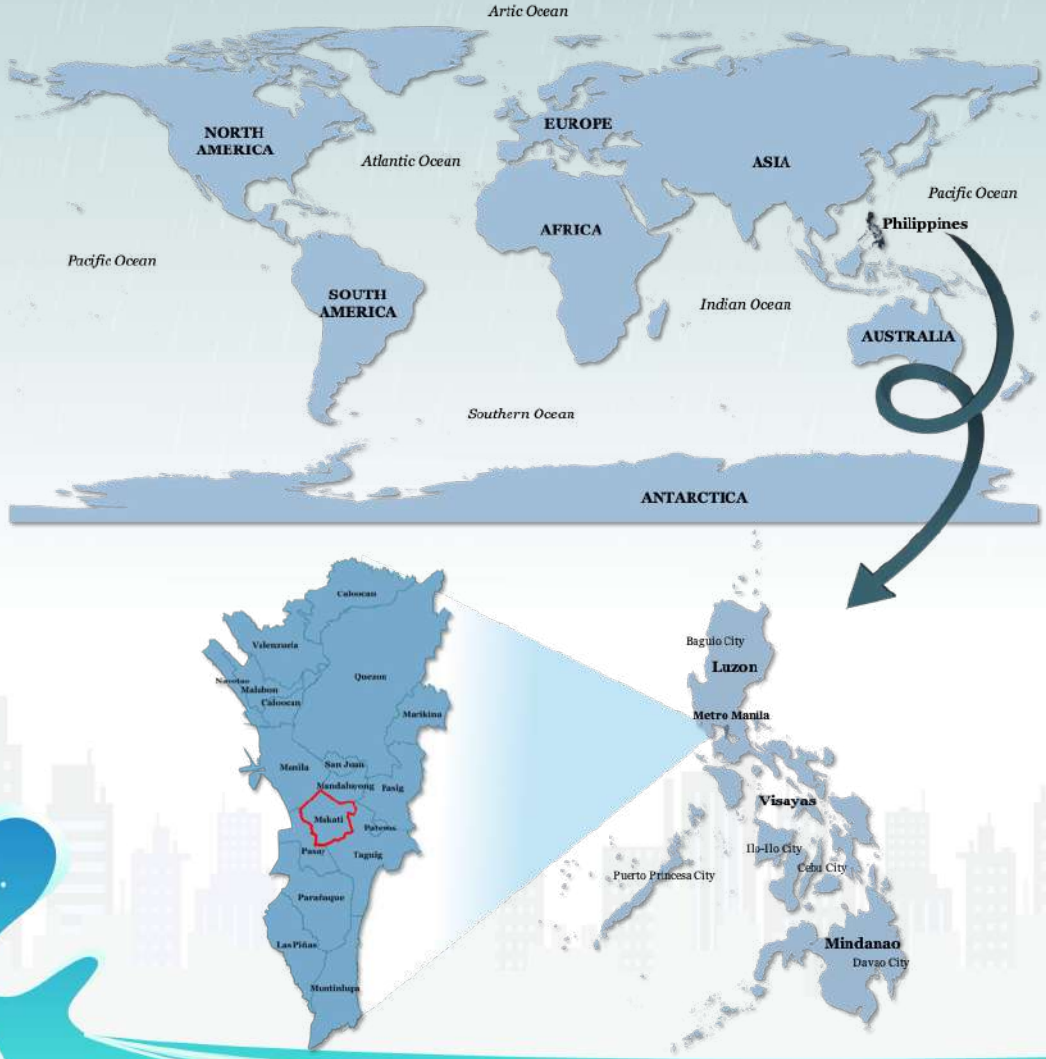
1. Makati City At a Glance
2. Makati City Natural and Physical Condition
3. Flood Hazard and Elements at Risk
4. Flood Hazard Management Initiatives

1. Makati City At a Glance

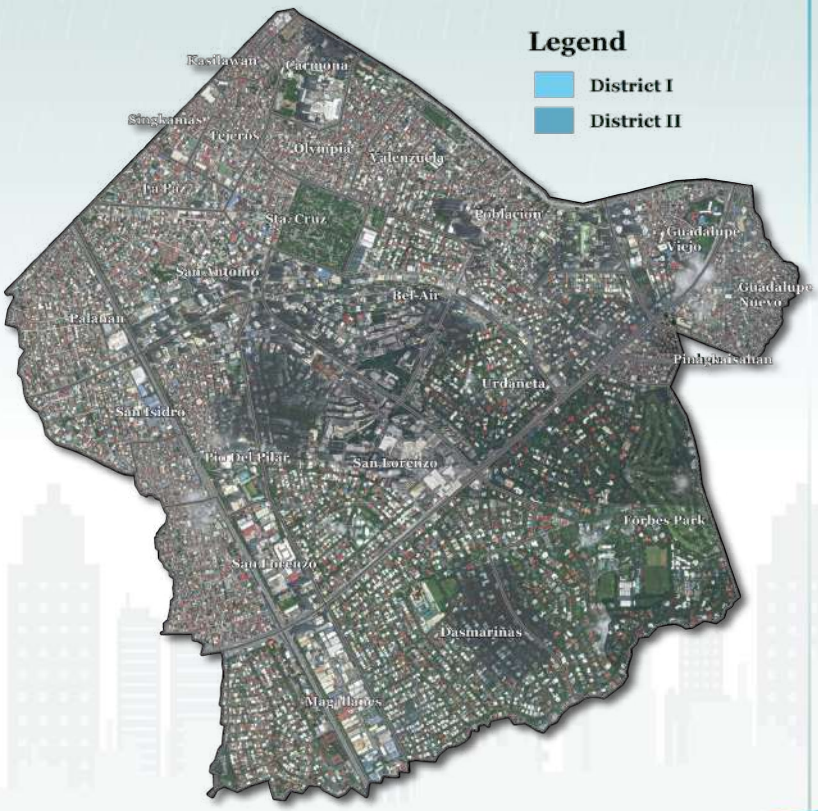
CITY GOVERNMENT OF MAKATI

Makati City At A Glance

Location and Land Area



- Located in Metro Manila (NCR)
- Land Area: 18.17 Km^2
- 23 Barangays; 2 Districts



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Makati City At A Glance

Population

Population Counts

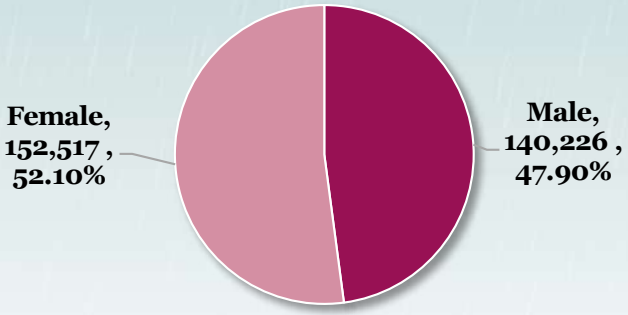
Nighttime: 309,770
PSA, 2024

Daytime: 2.4 Million

Sex Ratio: 90:100

Density: 17,048
Persons/km²

Percentage Share by Sex



Percentage Share by Age Group

11.04%
SENIOR (60 years old and Over)

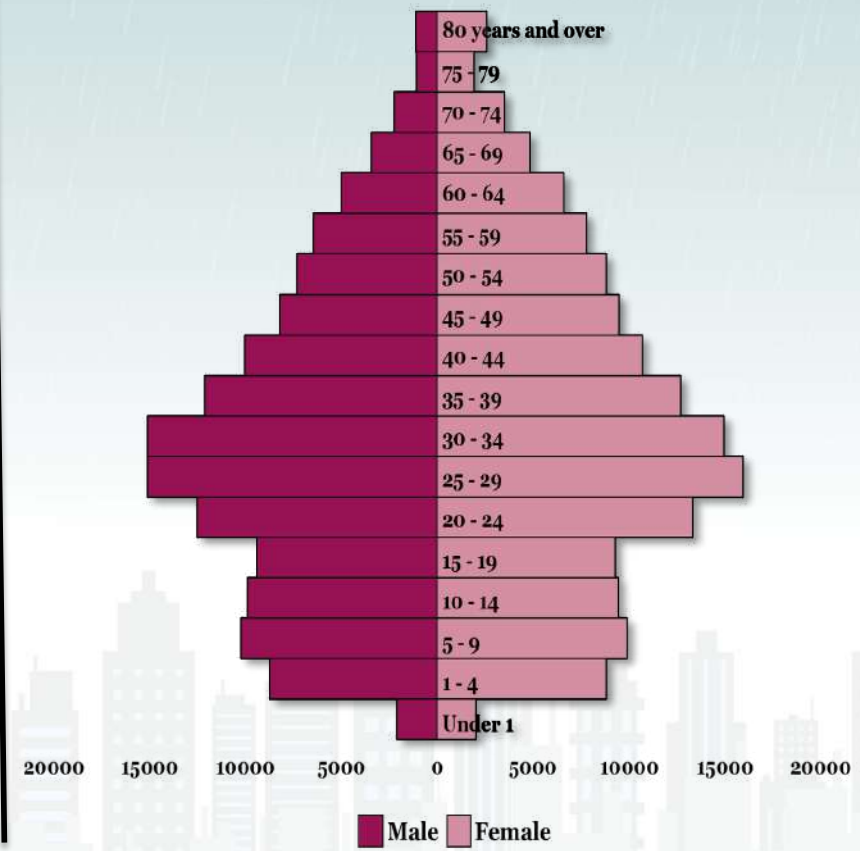
42.25%
ADULT (30-59 years old)

19.44%
YOUNG ADULT (20-29 years old)

12.98%
TEENAGER (10-19 years old)

14.28%
CHILDREN (9 years old and below)

Population Pyramid



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Makati City At A Glance

Hazard Profile

Flooding in low lying streets and along waterways

Urban Heat Island Effect – dense high-rise development

Seismic Risk – Strong **Ground Shaking,** West Valley Fault near Makati

Fire, specially in high dense areas

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2. Natural and Physical Condition

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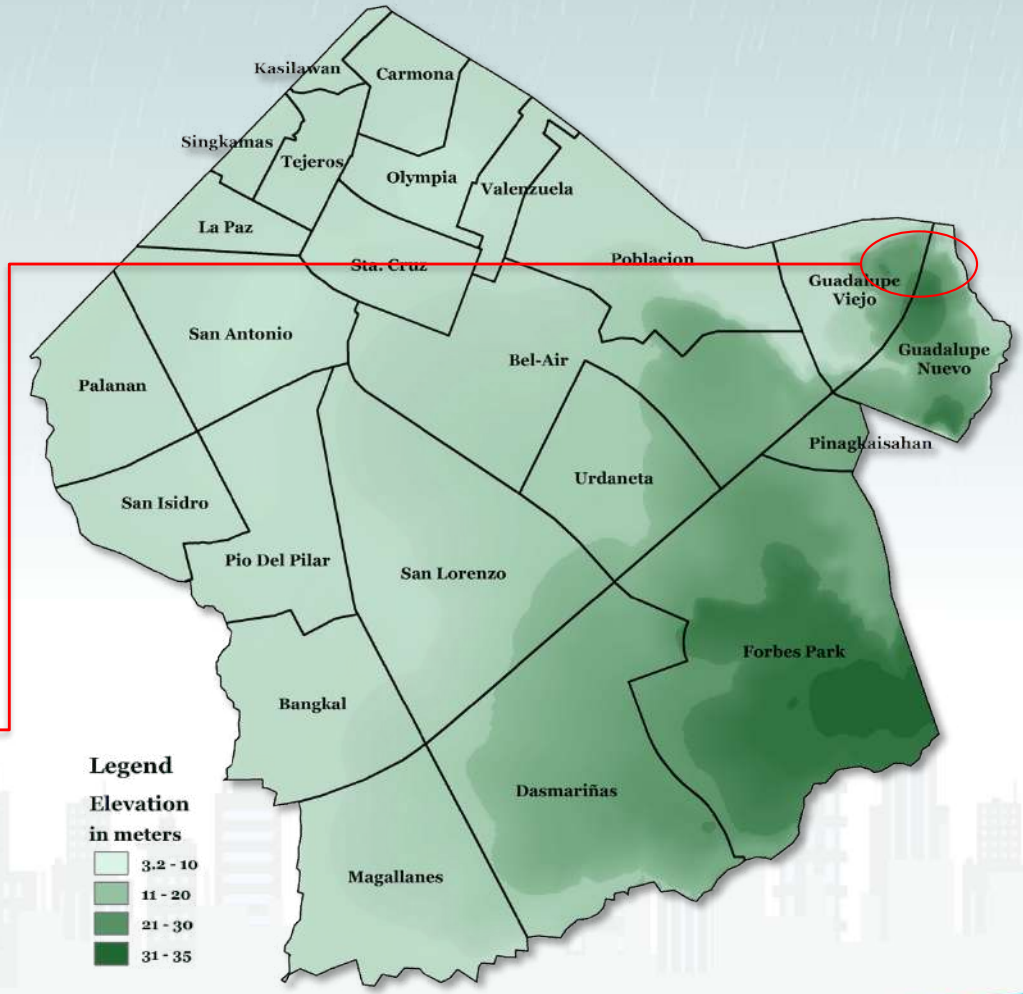
Natural and Physical Condition

Elevation

- Elevation: 3.2–30+ m ASL
- **67.26% (12.22 sq. km) – low-lying, flood-prone**
- 24.45% (4.44 sq. km) – moderate elevation
- 6.96% (1.27 sq. km) – 20.1–30 m range
- 1.33% (0.24 sq. km) – >30.1 m



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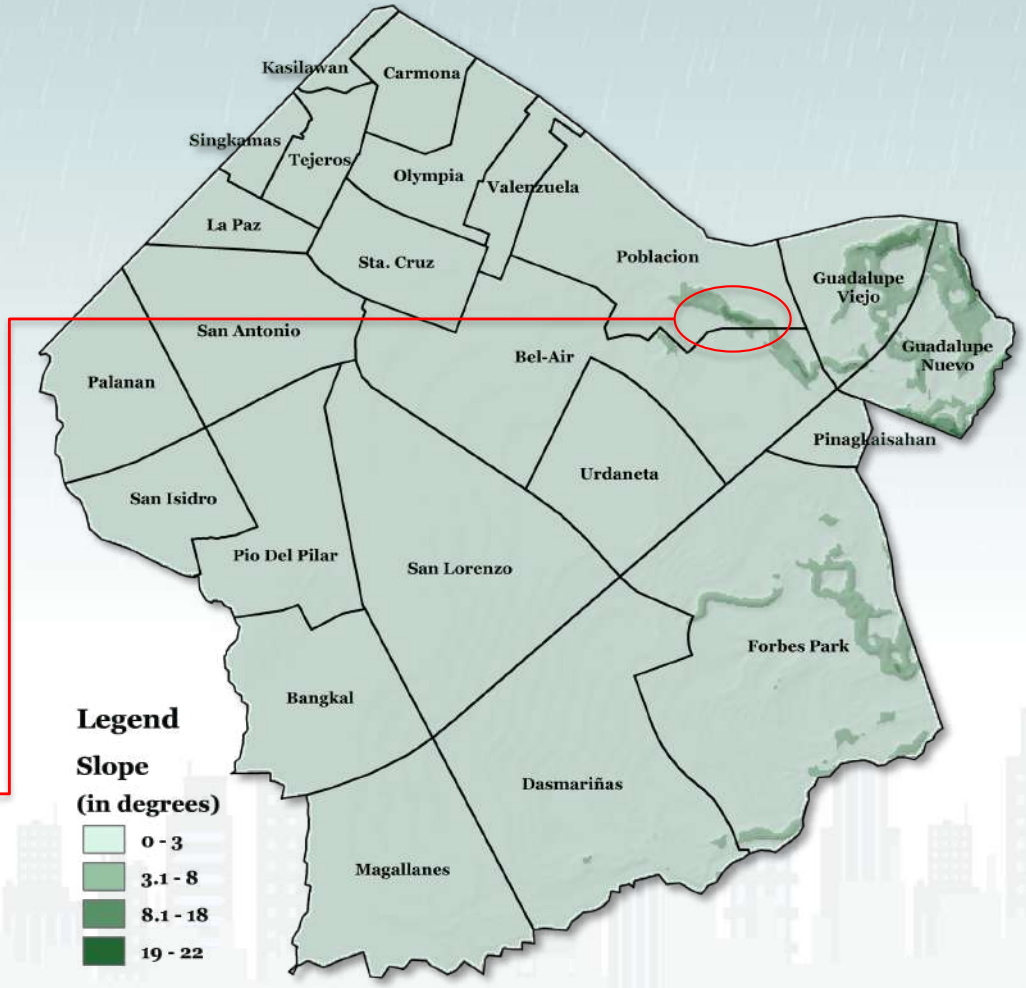
Natural and Physical Condition

Slope Map

- **0–3°: 95.93% (17.43 sq. km) – flat/gently sloping, flood-prone**
- 3.1–8°: 3.68% (0.67 sq. km) – moderate slope, good drainage
- 8.1–18°: 0.37% (0.07 sq. km) – slope stabilization needed
- **18–22°: 0.01% (0.002 sq. km) – steep, risk of erosion/landslide**
- Steeper areas: Forbes Park, Poblacion, Guadalupe

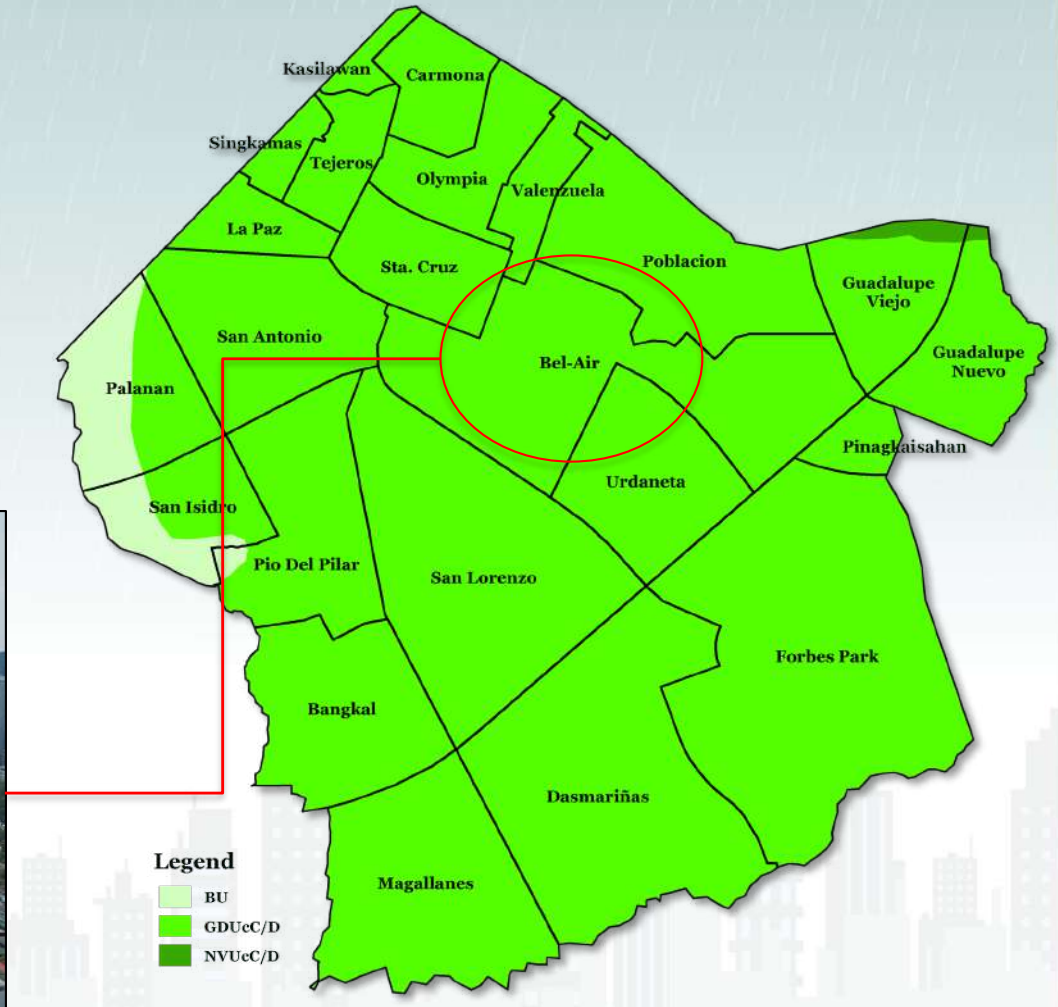


Natural and Physical Condition

Soil Map

- **GDUcC/D (Guadalupe Series):** 96.42% (17.52 sq. km) – fertile, low permeability, flood-prone. **High clay content, poor water absorption**

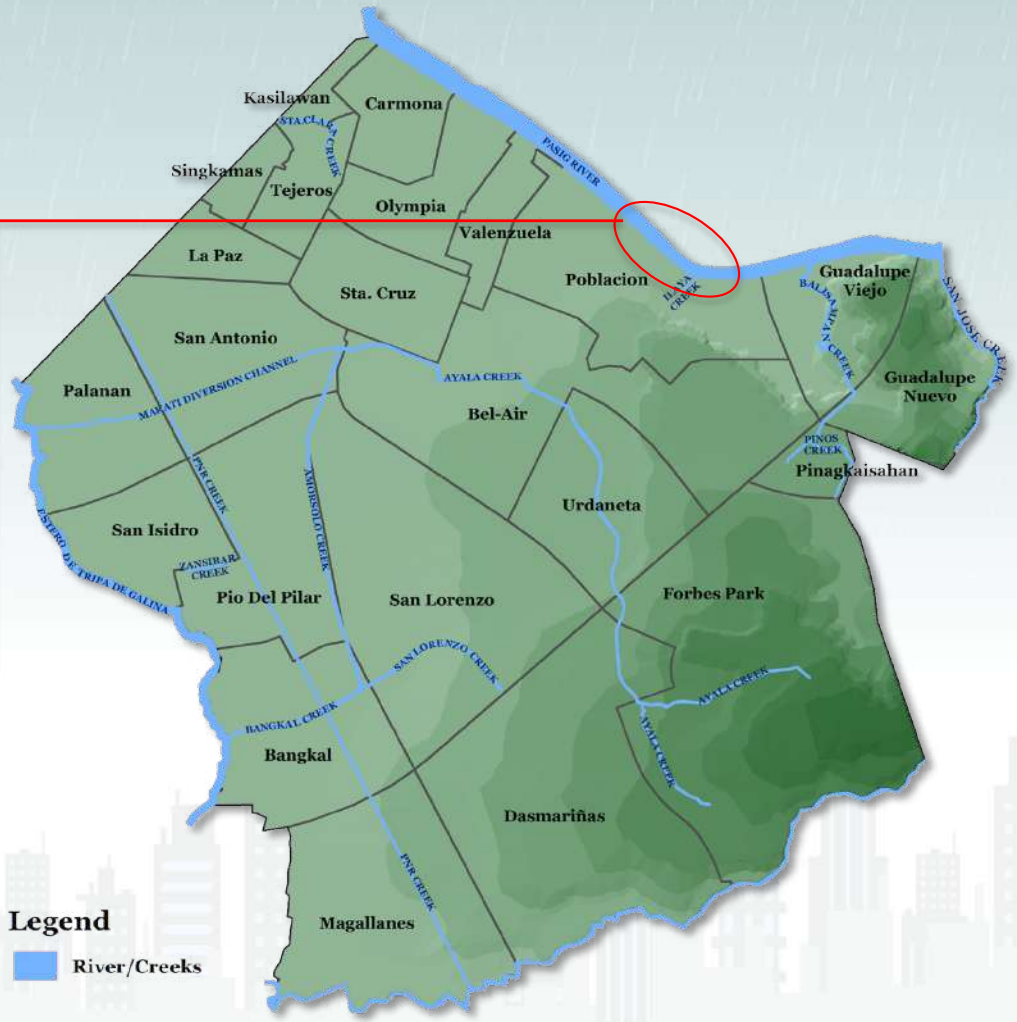
- Planning concern: drainage, flood risk, and soil suitability for construction



Natural and Physical Condition

Waterways Map

- **Total Waterways:** 15 rivers & creeks
- **Major River:** Pasig River (northern boundary)
- **Longest:** Ayala Creek – 5,059.69 m



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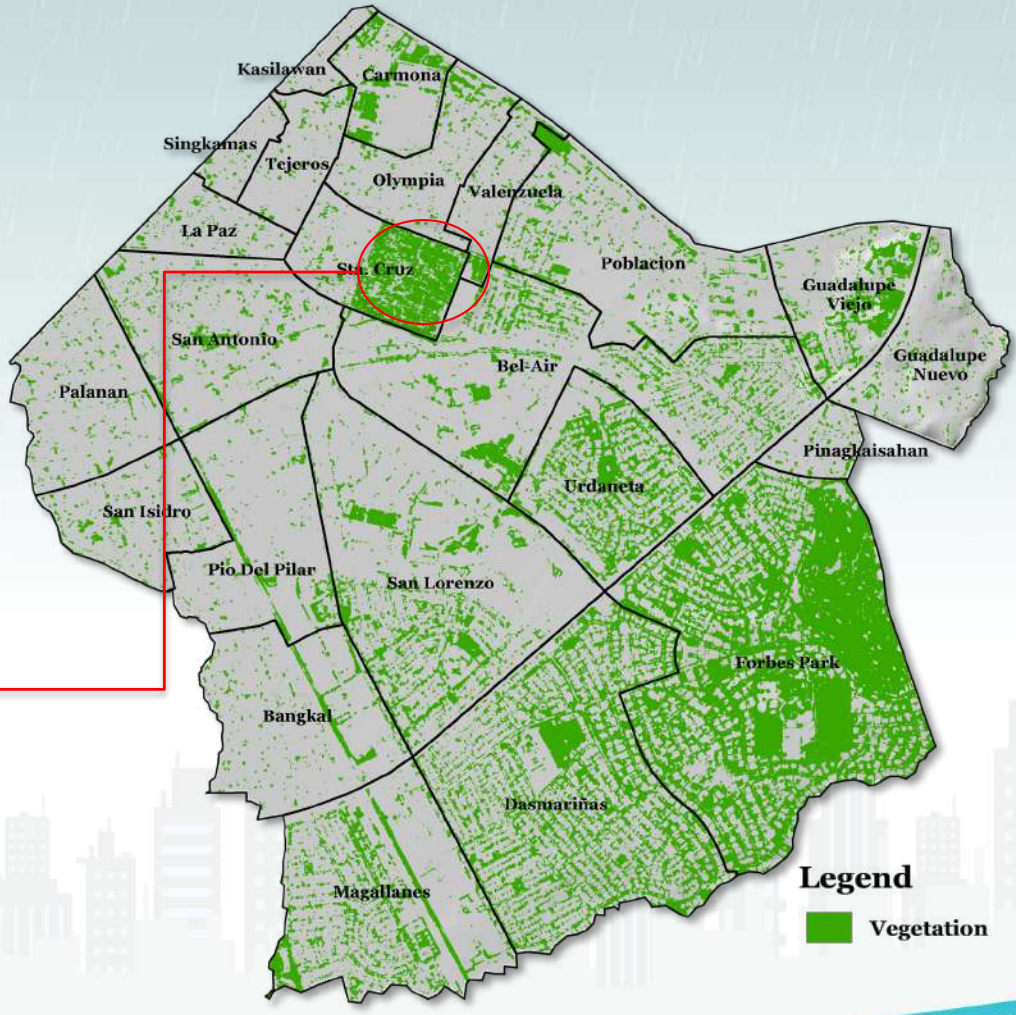
Natural and Physical Condition

Vegetation Cover

- **Vegetated area (2024):** 4.55 sq. km (25.05% of city)
- **Functions:** Air quality, cooling, stormwater absorption, biodiversity
- **Major green zones:** Forbes Park, Dasmariñas, Urdaneta, Manila South Cemetery



Natural and Physical Condition

Building Stock

Building Density: 15.07 structures/hectare

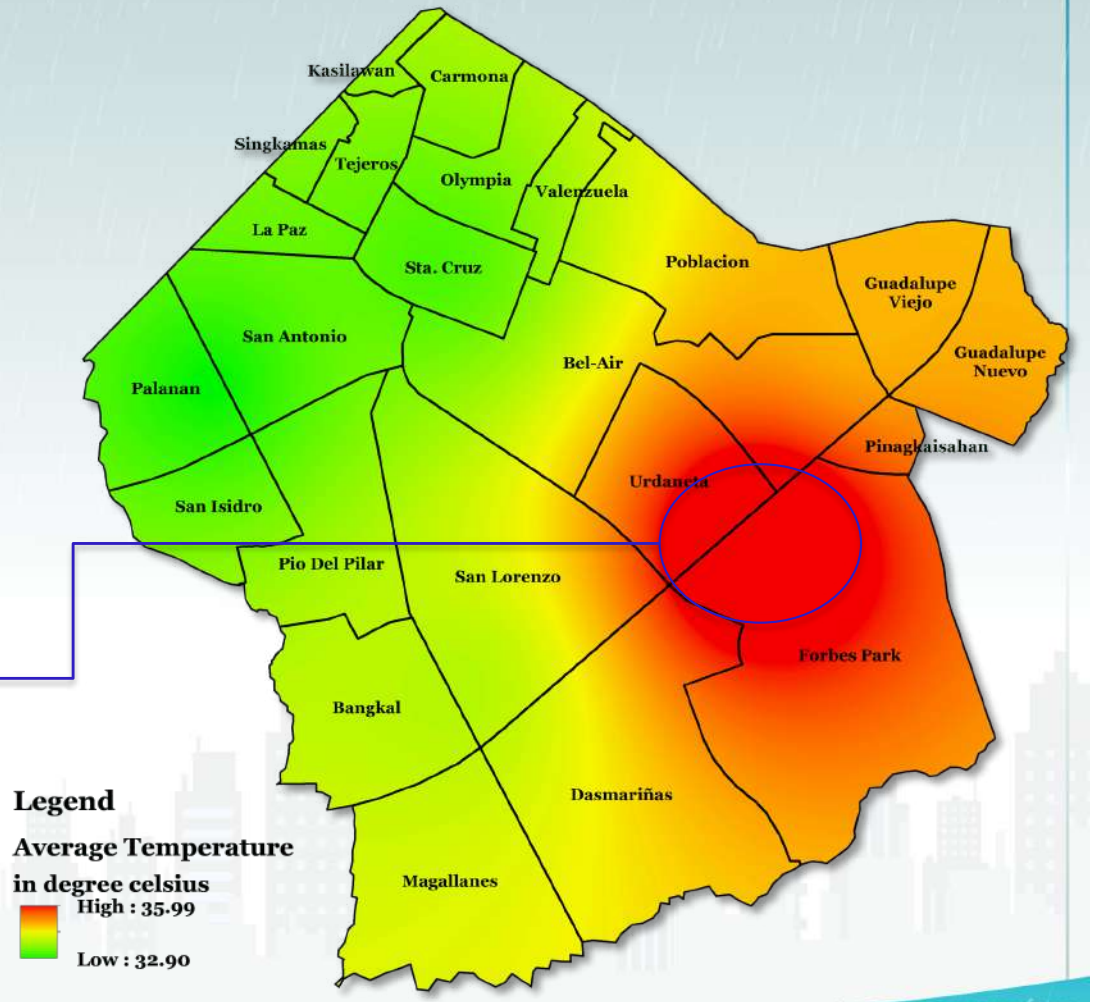
No. of Buildings: 27,376

- Low: 25,727 (93.9%)
- Medium : 1,312 (4.8%)
- High : 321 (1.2%)

Natural and Physical Condition

Temperature

- **Citywide Average:** 34.1°C
- **Highest:** Forbes Park – 36.0°C
- **Hot zones:** Northern & central areas – dense, commercial, high-traffic zones



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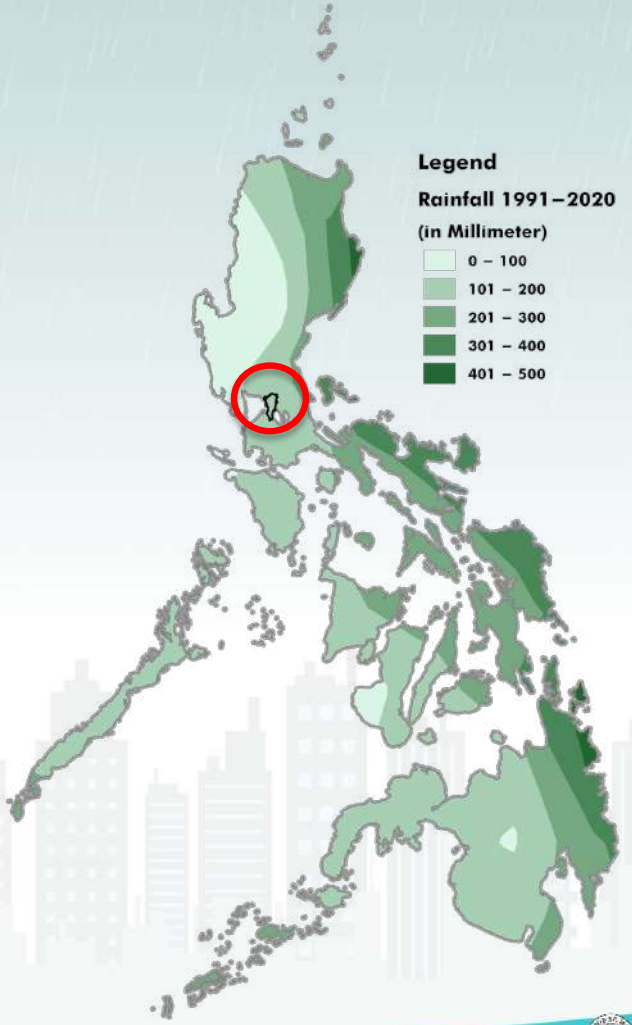
Natural and Physical Condition

Rainfall

- **Avg rainfall:** 101–200 mm/month (Makati)
- **Metro Manila range:** 100–500 mm/month (PAGASA, 1991–2020)
- **Peak season:** June–September (Habagat)
- **Extreme event:** Ondoy (2009) – 455 mm in few hours



Natural and Physical Condition

Drainage System

- **Total length:** 509 km (23 barangays)
- **Type breakdown:** 78.90% box culvert, 16.98% RCCP, 4.13% combined
- **Avg width:** 1.21 m
- **Maintenance:** 100% improved/maintained (as of 2023)
- **Flood control:** Pumping stations & flood gates (Poblacion, MMDA-operated)

3. Flood Hazard and Elements at Risk

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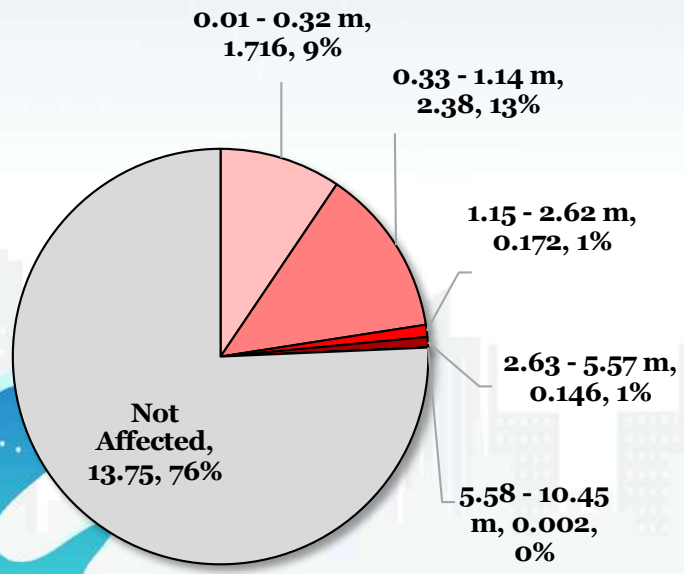
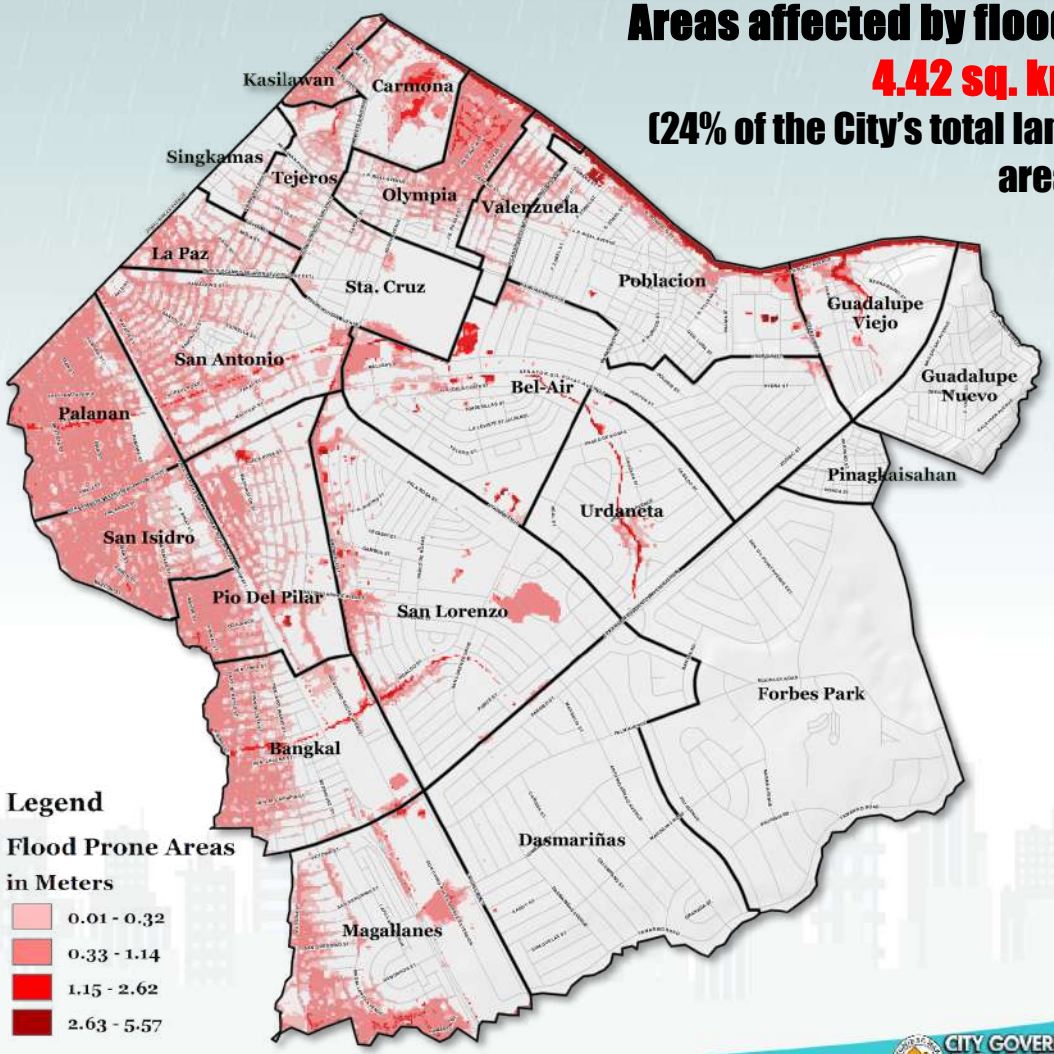
FLOOD HAZARD

200-Year Return Period

- Based on the Risk Analysis Project (RAP) conducted by PAGASA, MGB, and NAMRIA.
- Makati flood levels were categorized into 8 as shown in the map legend



Areas affected by flood:
4.42 sq. km
(24% of the City's total land area)



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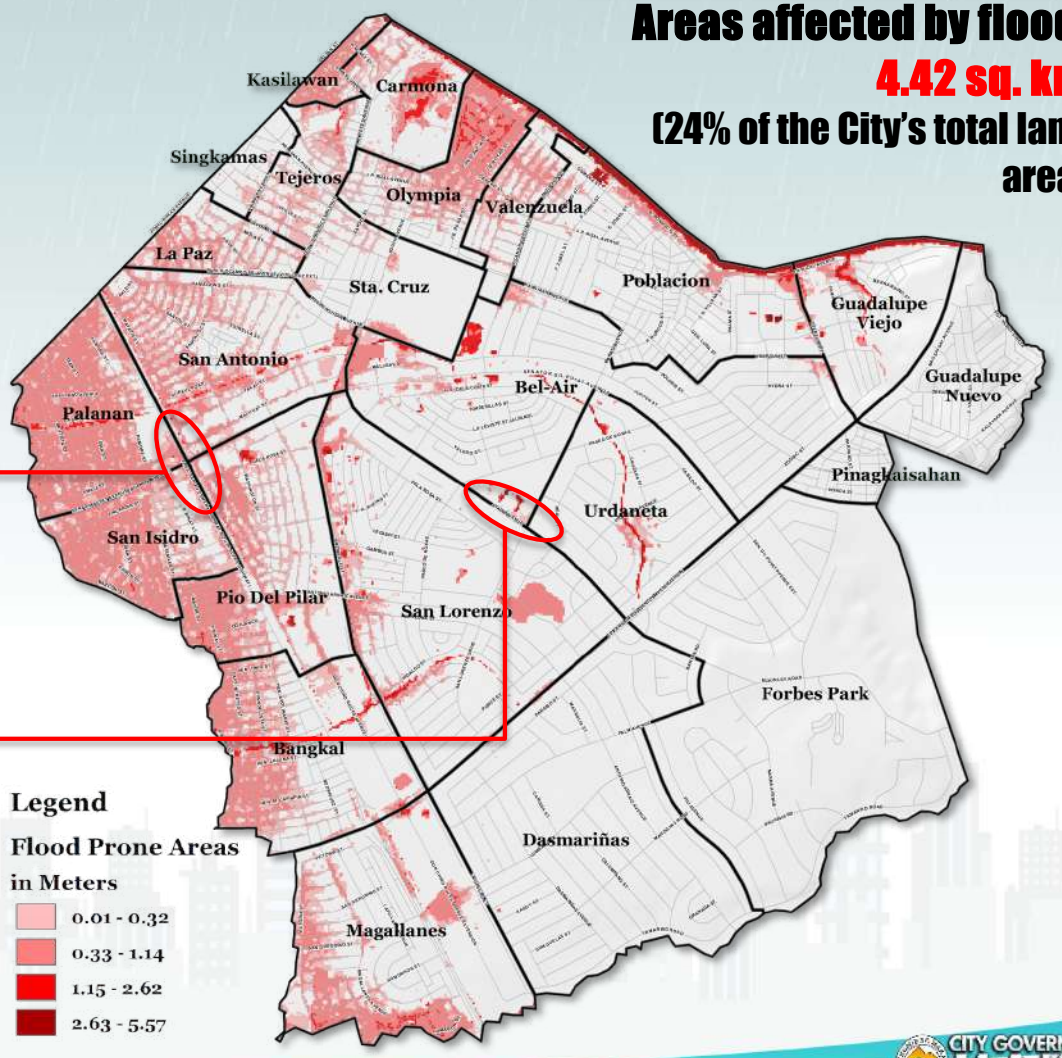
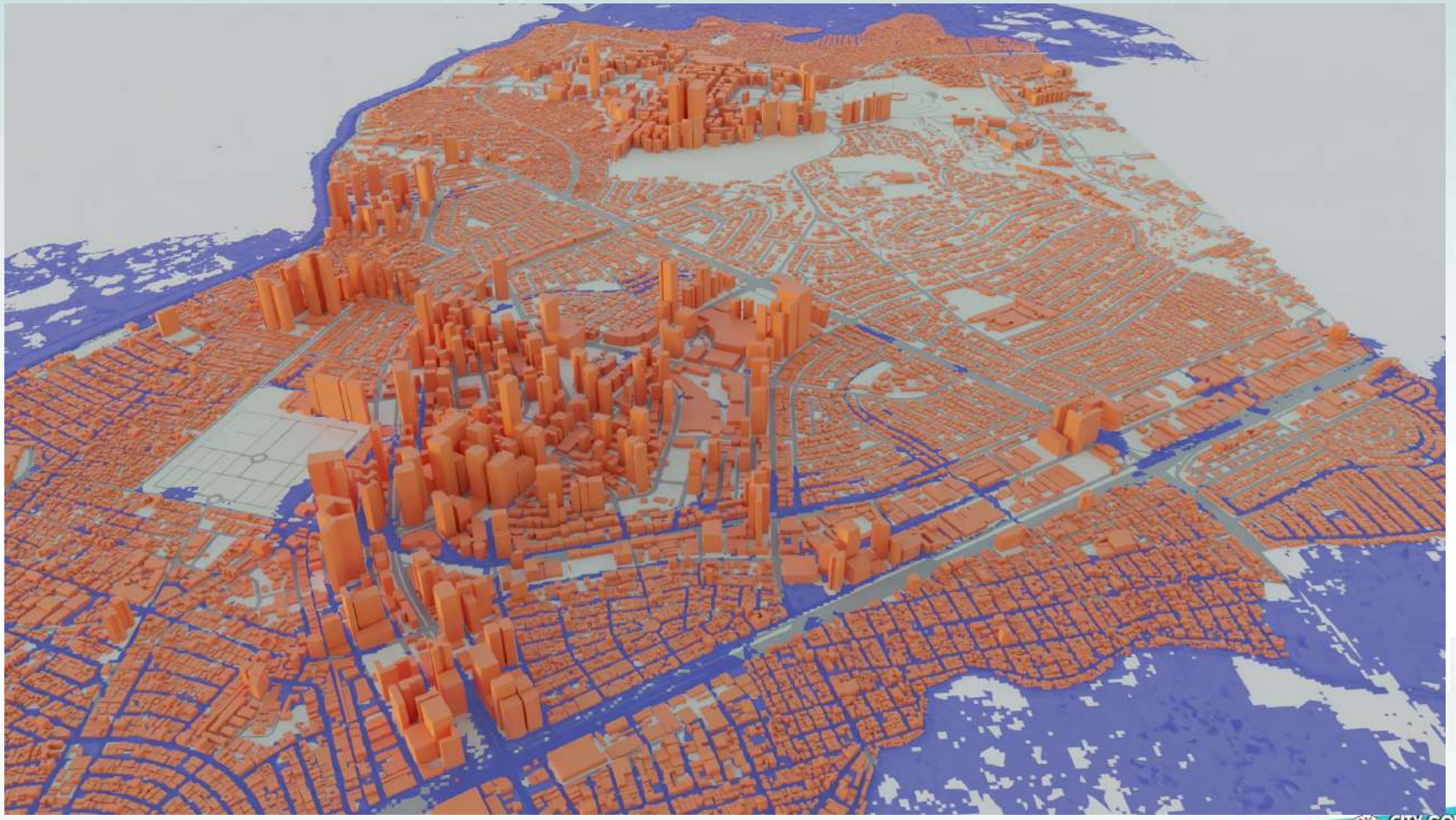


CITY GOVERNMENT OF MAKATI

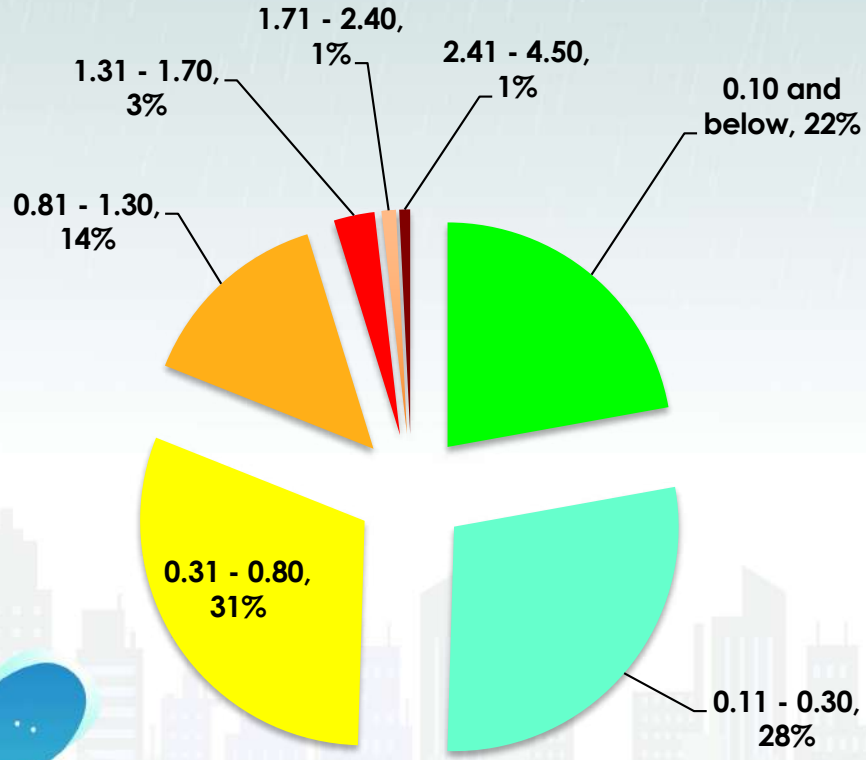
ELEMENTS AT RISK

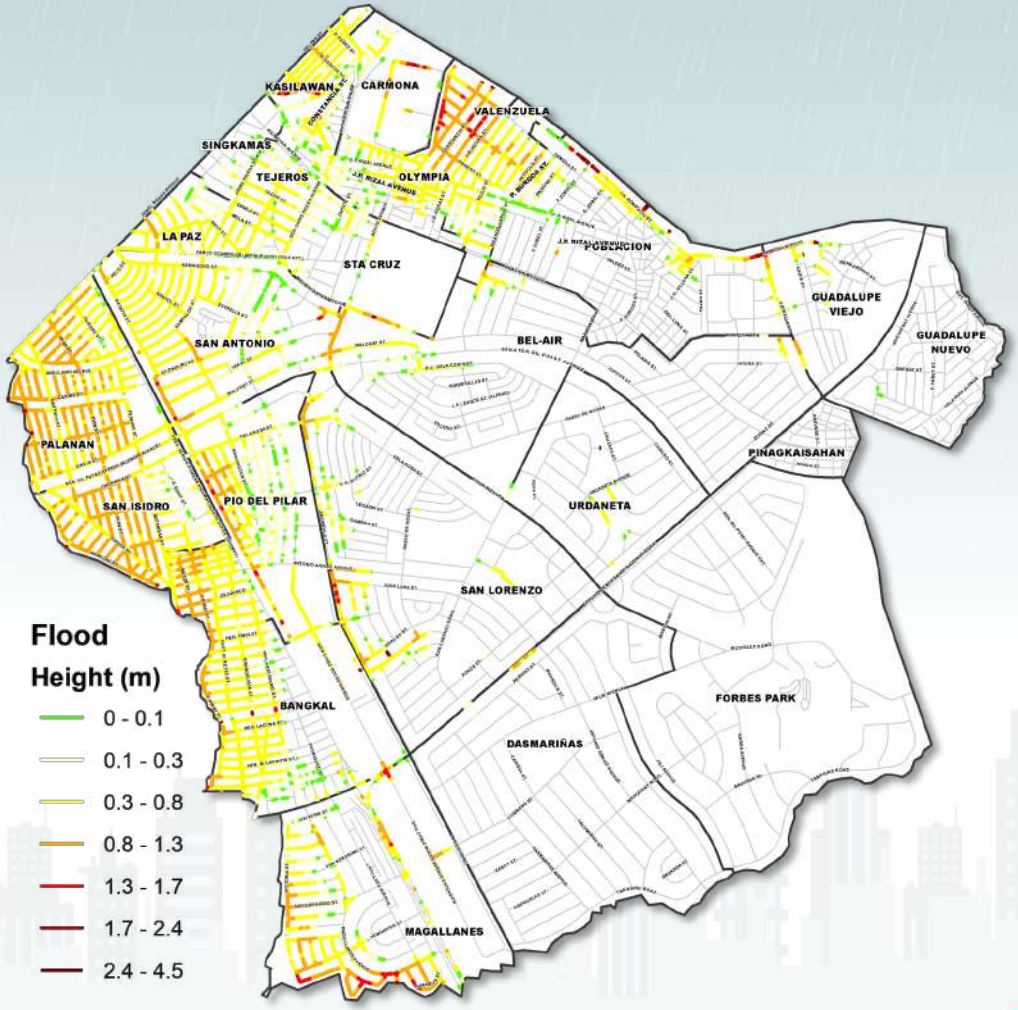
Building Stock



ELEMENTS AT RISK

Percentage of Roads Affected by 200-Year Flood (by Level in Meters)





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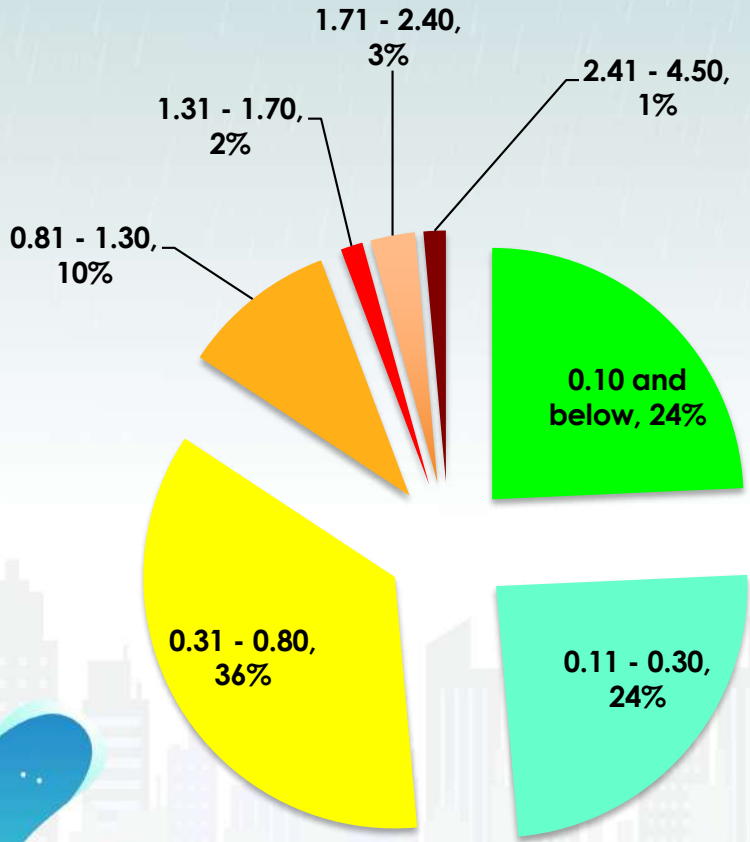
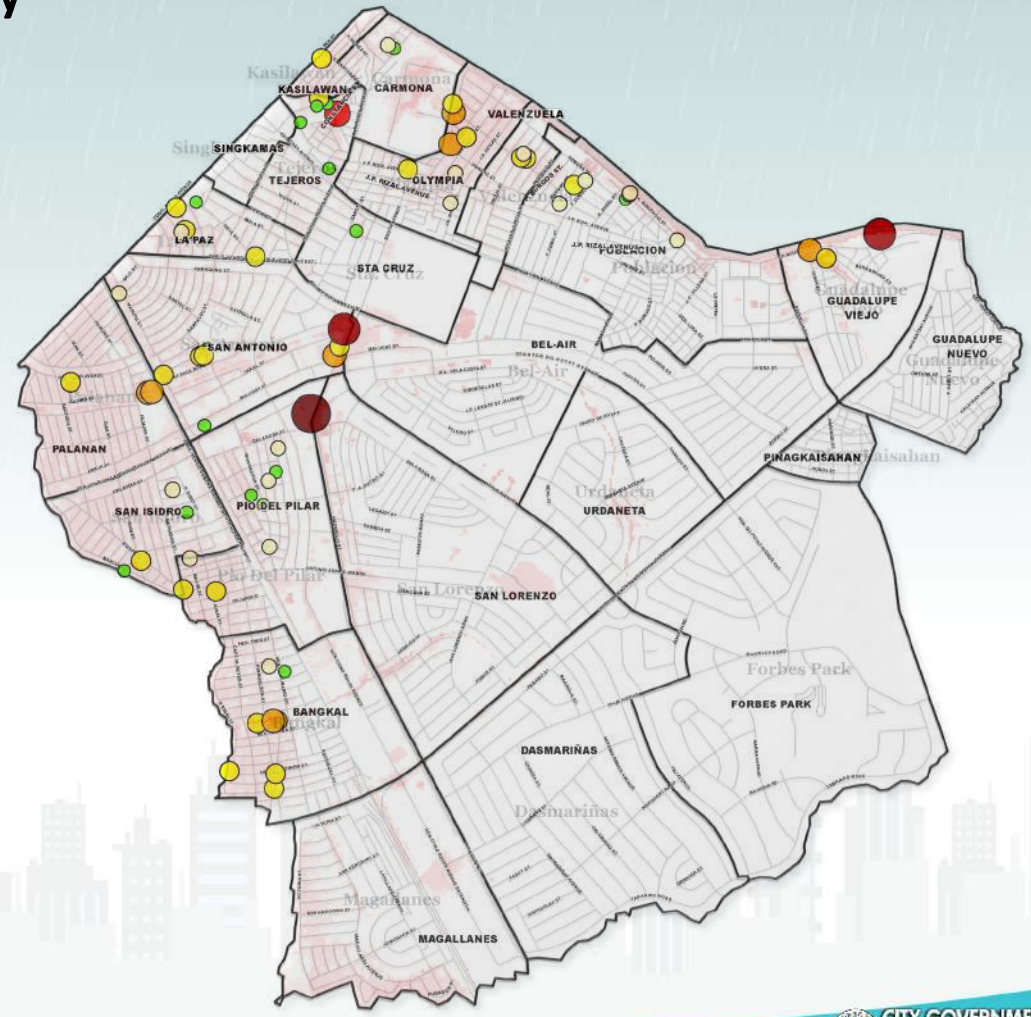
ELEMENTS AT RISK

Percentage of Public Building Affected by 200-Year Flood (by Level in Meters)





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4. Flood Risk Management Interventions

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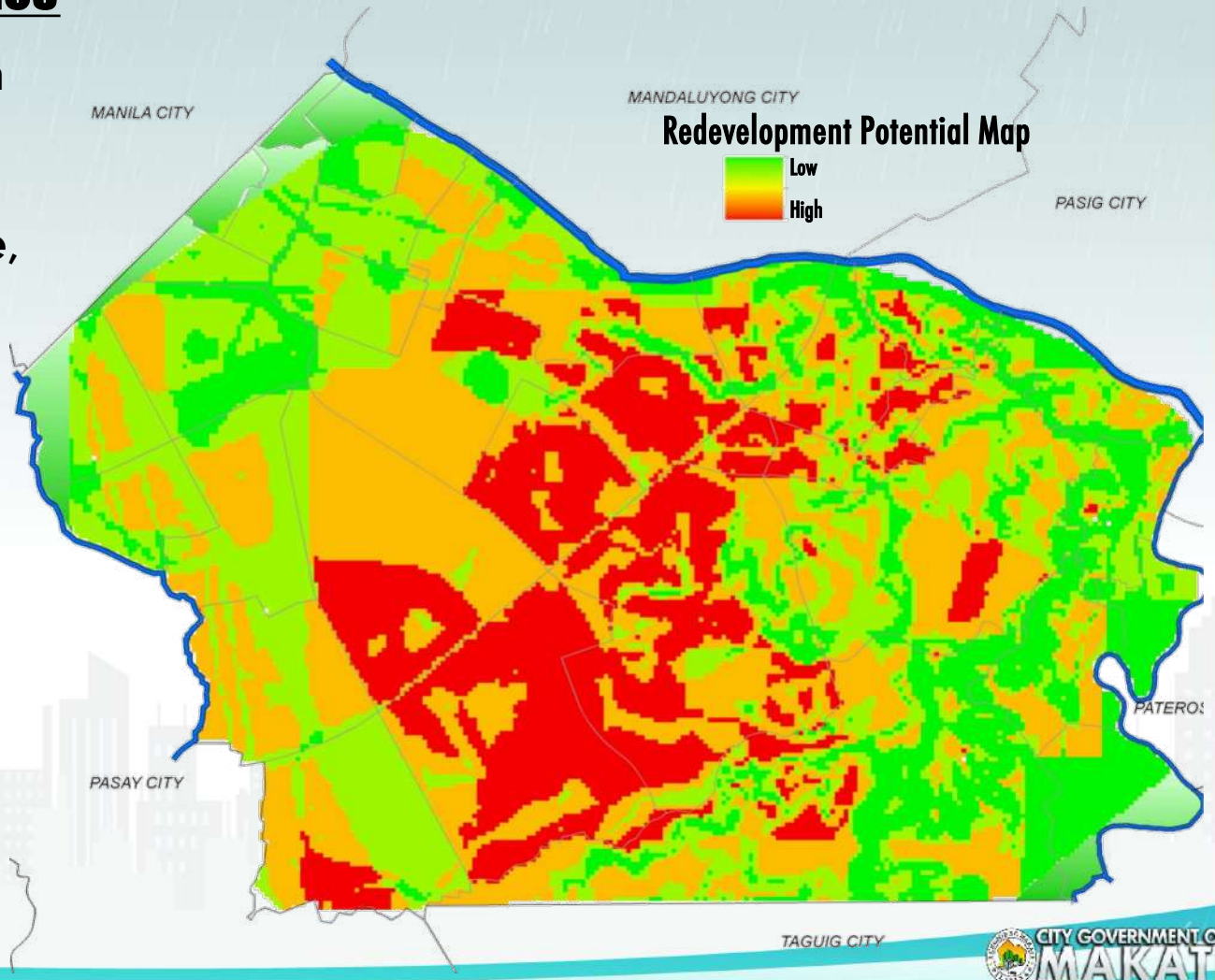
FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

- Flood hazards, along with earthquake hazards and other factors such as slope, elevation, land use, land cover, etc. were considered in the preparation of the Redevelopment Potential Map.

- This Redevelopment Potential Map was the basis in formulating the City's Structure Plan



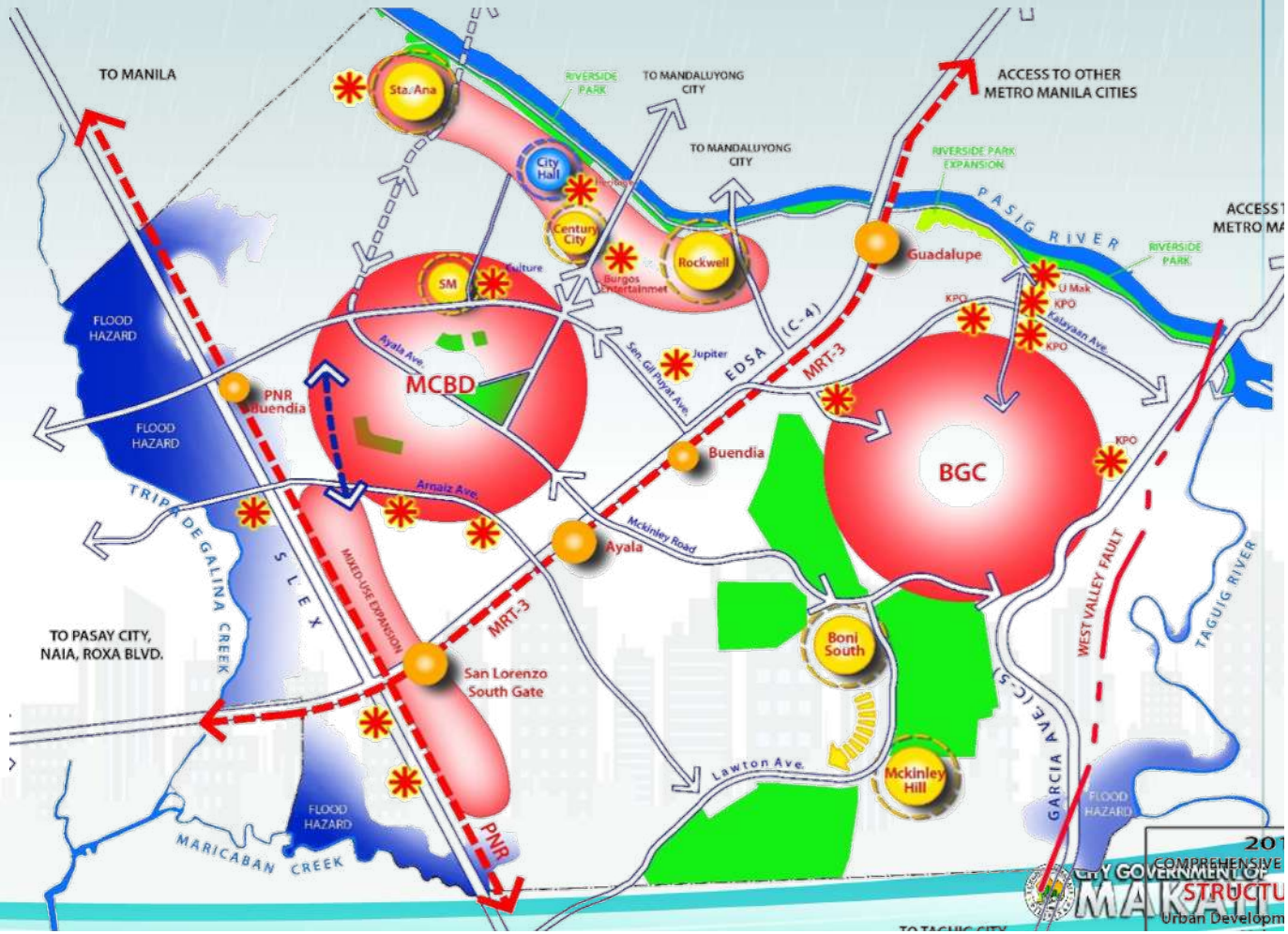
CITY GOVERNMENT OF MAKATI

FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

- This Structure Plan was the basis in designating the type of land use and zoning classifications in Makati.
- New developments/ redevelopments are directed towards the center of the City and in areas with low disaster risk.
- Areas prone to flood hazard (blue) retain their existing uses but the City introduced mitigating and adaptation measures.

Makati Structure Plan

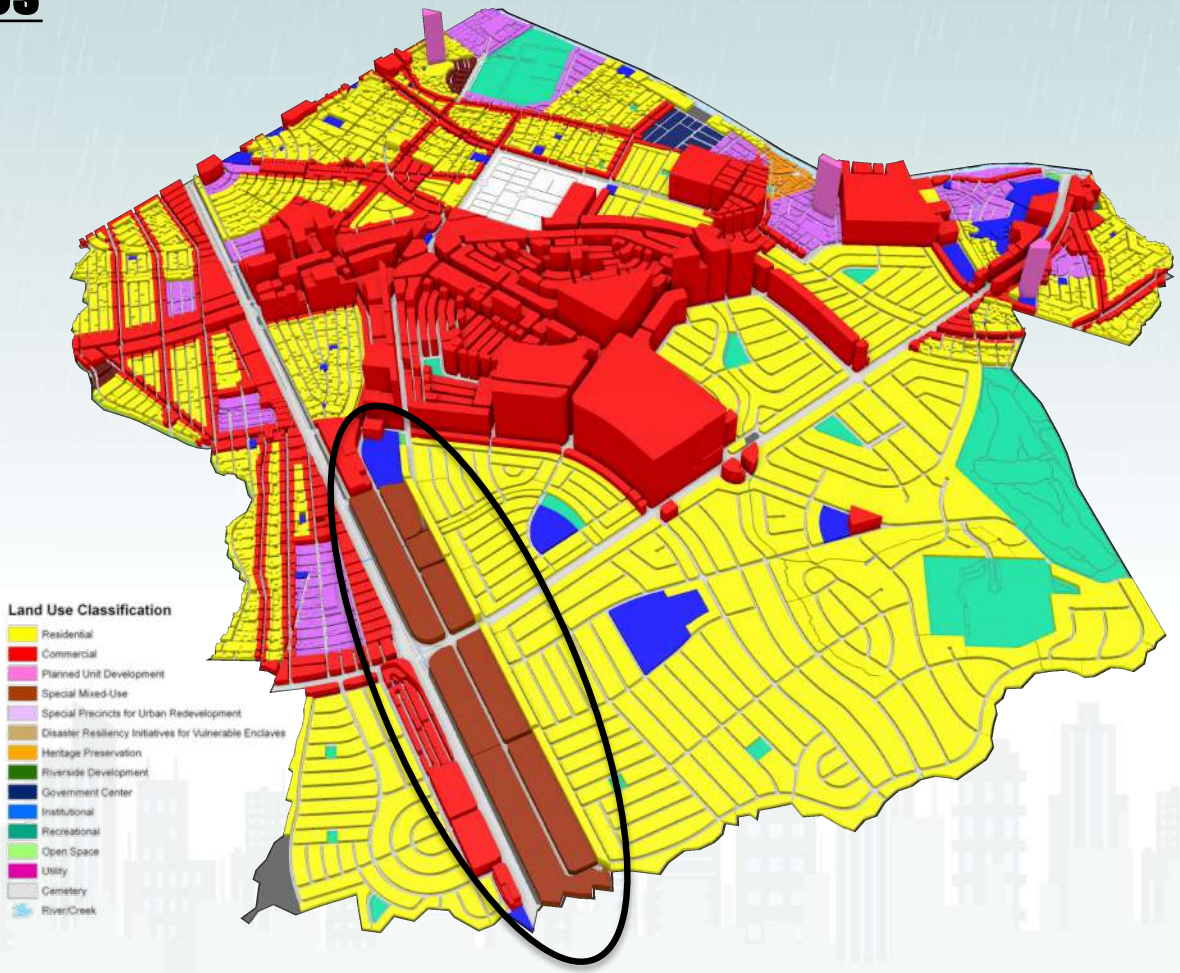


FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

- The Makati CLUP designate area for **Special Mixed-Use Development** a resilient-urban design approach to deal with exposure of the community to (flood) hazard.

- This include a redevelopment of the area by providing a continuous protected **ELEVATED WALKWAY** on both sides of the 2.6km stretch.



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FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Special Mixed Use (SMU) Zone

Features of the Initiative

- Public Transport, Access, and Links
- Pedestrian-Friendly Design
- Placemaking and Open Spaces
- Functional Infrastructure
- Good Land Use Mix
- Signature Skyline
- **Disaster Resiliency**
  - Green infrastructure, interconnected public spaces
  - Continuous covered elevated walkway

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FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Special Mixed Use (SMU) Zone

SMU Current Development Context

Alphaland Southgate

San Lorenzo Place

Wilcon

*Photo credit: BusinessWorld

Mint Residences

Fortis Residences

Vion Tower

Jade Residences

Mirax Triple Tower

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FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

- Increasing the allowable height for medium density residential zone (R-2) **from 14 meters to 18 meters**. Provided that the ground floor **should be designed as open area** (no walls) with no permanent use.

FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

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FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

Promoting the Innovative Development Approaches

- **Innovative Techniques or Design (IT) –** are projects that promote urban renewal and creative design solutions aligned with the principle of sustainability
- **Bonus Incentives (BI) –** projects that provide public-benefit facilities such as **green spaces**, heritage features, iconic landmarks, or **sustainable, green-certified designs.**

FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

- The 3-meter easement of creeks and other tributaries are being recovered, **converting them into open spaces**.

Recovered Easement along Estero de Tripa de Gallina (Brgy. San Isidro)

FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

- The 3-meter easement of creeks and other tributaries will be recovered, **converting it to open spaces**.

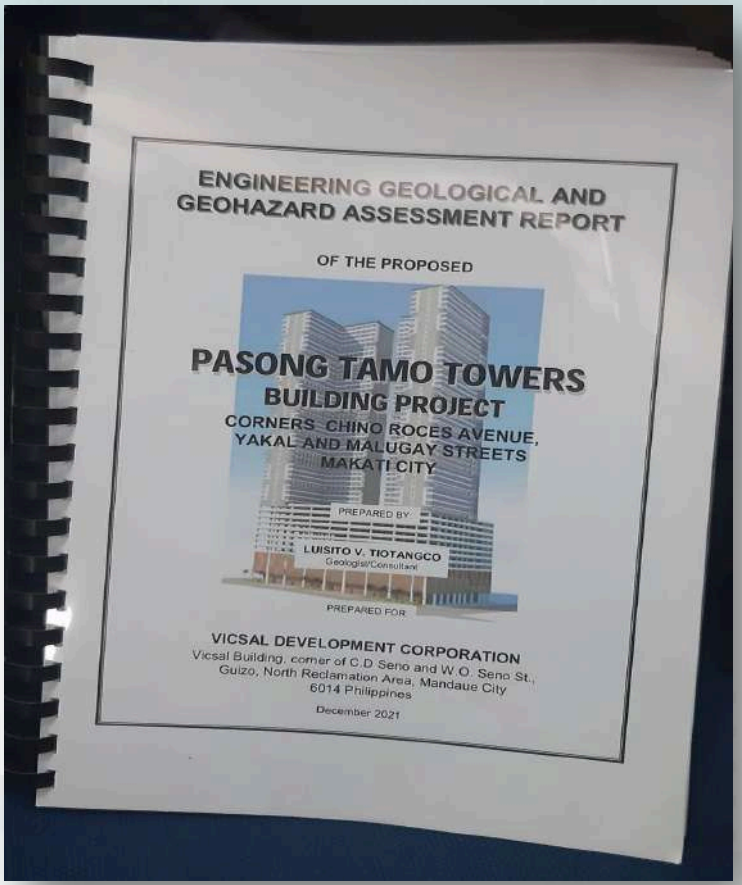
Total length of river/creek easements recovered : **7.59 km**

CITY GOVERNMENT OF MAKATI

FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Land Use and Zoning Policies

- Developments to be located in identified hazard zone such as liquefaction, landslide, and flood prone area shall be required to submit an **Engineering Geological and Geohazard Assessment Report (EGGAR).**



FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Disaster Resilient Infrastructures

This aims to lessen the infrastructure exposed to different hazards and prevent potential damages

- ❑ Structural Assessment and Monitoring Project
- ❑ Preventive Retrofitting Project
- ❑ Road Construction and Improvement
- ❑ Drainage Construction and Improvement

FLOOD RISK MANAGEMENT – Prevention/Mitigation/Adaptation

Plans Formulations and Implementation

- **Parks/Open Space and Green Program**
  - Pasig Riverside Master Development Plan
  - Parks Development

- **Environment and Disaster Risk Reduction and Climate Change Adaptation Measures**
  - Makati Drainage Masterplan and Implementation
  - Makati Waterways Improvement Program
  - Citywide Upgrading of Sanitation and Drainage System
  - Flood Retention Facilities
  - Makati Environment Master Plan Updating and Implementation
  - Citywide Waste Management Program
  - Material Recovery Facilities Improvement

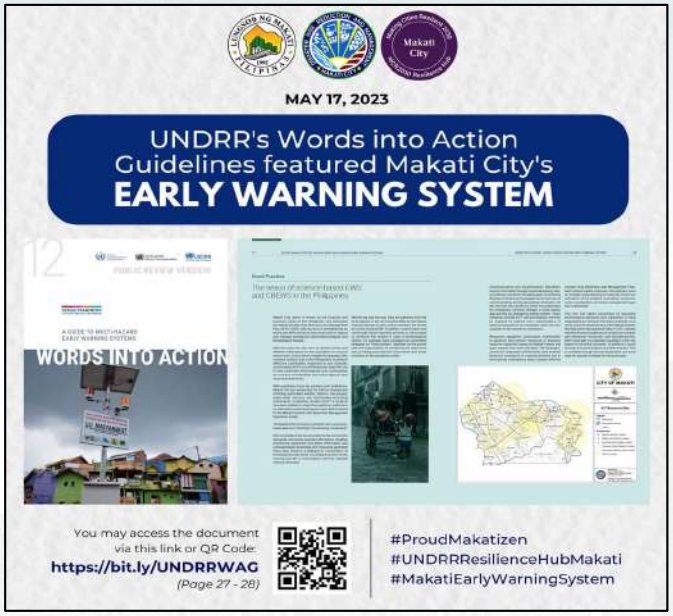
- **Renewable and Redevelopment Program**
  - Formulation of DRIVE/SPUR Masterplans and Guidelines
  - Makati Risk-Sensitive Urban Redevelopment Program
  - Formulation of a Strategic Recovery and Rehabilitation Plan
  - West Valley Fault/ Open Space Zone Guidelines and Implementation
  - Climate Change Framework and Plan
  - Multi-Hazard and Risk Assessment

FLOOD RISK MANAGEMENT – Preparedness

Risk Information Services

This aims to continuously improve and strengthen the information management system of the City for monitoring, assessing and gathering data by providing accurate and real-time information needed for risk informed decision making and management, as well as identifying DRRM interventions and strategies.

- ❑ **Early Warning System**
- ❑ **Climate and Disaster Risk Information Management System**



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FLOOD RISK MANAGEMENT – Preparedness

DRRM Education

This aims to develop and/or enhance the capacity of the Makati DRRM Personnel, DRRM Council Members, and other DRRM key players in preparing for and responding to disasters and/or emergencies.

- ❑ DRRM IEC and Awareness Building
- ❑ DRRM Academy
- ❑ DRRM Skills and Knowledge Training

FLOOD RISK MANAGEMENT – Response

Incident and Disaster Management Program

- DRRM Operations Center Services Enhancement Project
- Search and Rescue Services Enhancement
- Mandatory allocation of Quick Response Fund (QRF) – 30% of 5% of the total City revenue from regular sources

FLOOD RISK MANAGEMENT – Rehabilitation/Recovery

Post-Disaster Waste Management

This aims to institutionalize the practices, knowledge, and resources of the City to strengthen its capacity to manage all wastes generated by various disasters.

- **The City conducted declogging and clearing operation right after the flood event.**
- **To prevent intense flood events in the City again, it has been a regular activity of the City Government to declog the waterways and drainage facilities.**

FLOOD RISK MANAGEMENT – Rehabilitation/Recovery

Relief and Recovery Program

- This program aims to establish the necessary mechanisms and systems, as well as ensuring the availability of resources for recovery, rehabilitation, and reconstruction

Thank You!

CITY GOVERNMENT OF MAKATI