



**T.R. MINISTRY OF  
ENVIRONMENT AND  
URBANIZATION**

General Directorate of Infrastructure and  
Urban Transformation Services

# INNOVATIVE APPROACHES IN TURKEY'S URBAN TRANSFORMATION BASED ON DISASTER RISK REDUCTION



**ADRC**

Asian Disaster Reduction Center (ADRC)

**Asian Conference on Disaster Reduction  
(ACDR)**

25 - 26 November 2019  
Ankara / Turkey



## PRESENTATION PLAN

1. Overview
2. Turkey's Urban Transformation Law No.6306
3. Innovative Regeneration Approaches
  - 3.1. Urban Transformation Strategy Guideline
  - 3.2. Urban Transformation Action Plan
  - 3.3. Sustainability and Smart City Applications
  - 3.4. Cities' Digital Twin Implementation w/GIS
4. Conclusion



## OVERVIEW



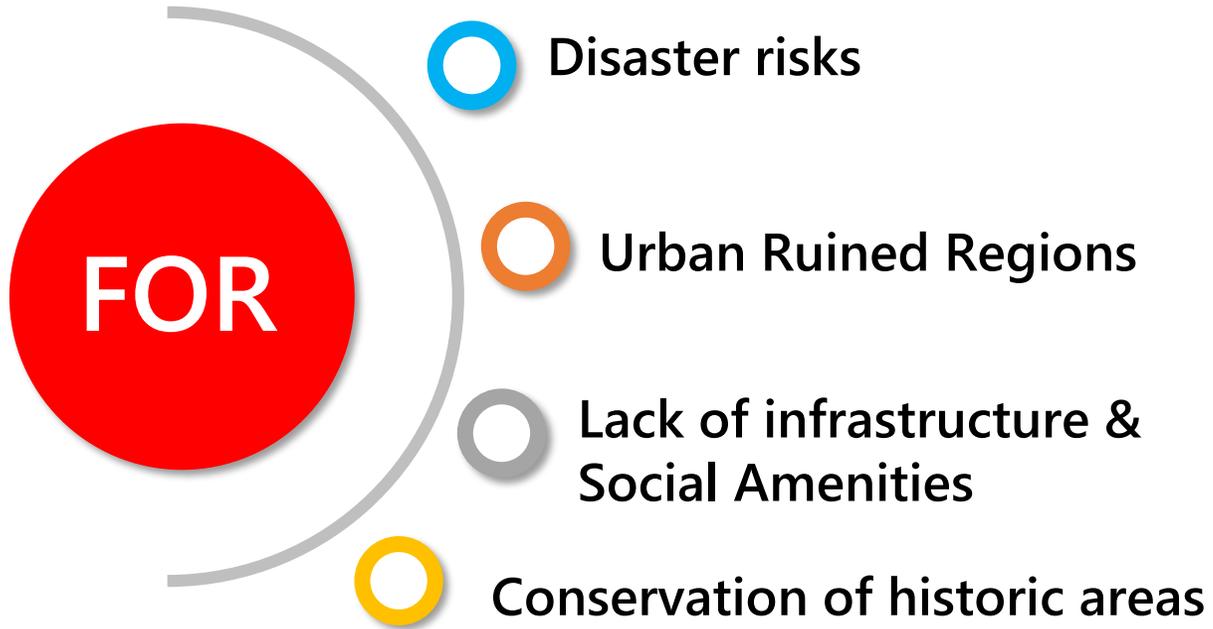
3rd Most Crowded  
Country of Europe  
80,8 million population

The urban population  
has reached to %92

➔ Cause of the rapid urban growth and development, the cities have become increasingly unsustainable, vulnerable and insecure therefore achieving sustainability and resilience for existing and future citizens is critical.



# URBAN TRANSFORMATION CONCEPT

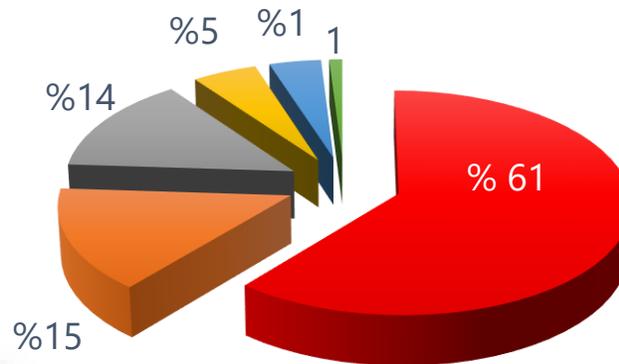


# DISASTER EARTHQUAKE REALITY OF TURKEY

**% 71** of our Population and

**% 66** of our land are on the most vulnerable earthquake zones.

• Turkey has had: (Mw:6 or greater)  
**56** earthquakes in the past 100 years.



Structural Damages Caused by:

■ Earthquake ■ Landslide ■ Flood ■ Rockfall ■ Fire ■ Avalanche

**TARGET**  
VIA URBAN TRANSFORMATION  
"TURKEY IS PREPARED FOR  
DISASTERS"

Due to Earthquakes in the Last Century

100.000  
Life Loss<sup>2</sup>

100 Billion \$  
total financial  
loss<sup>1</sup>

Annual  
average loss  
of 1% GNP

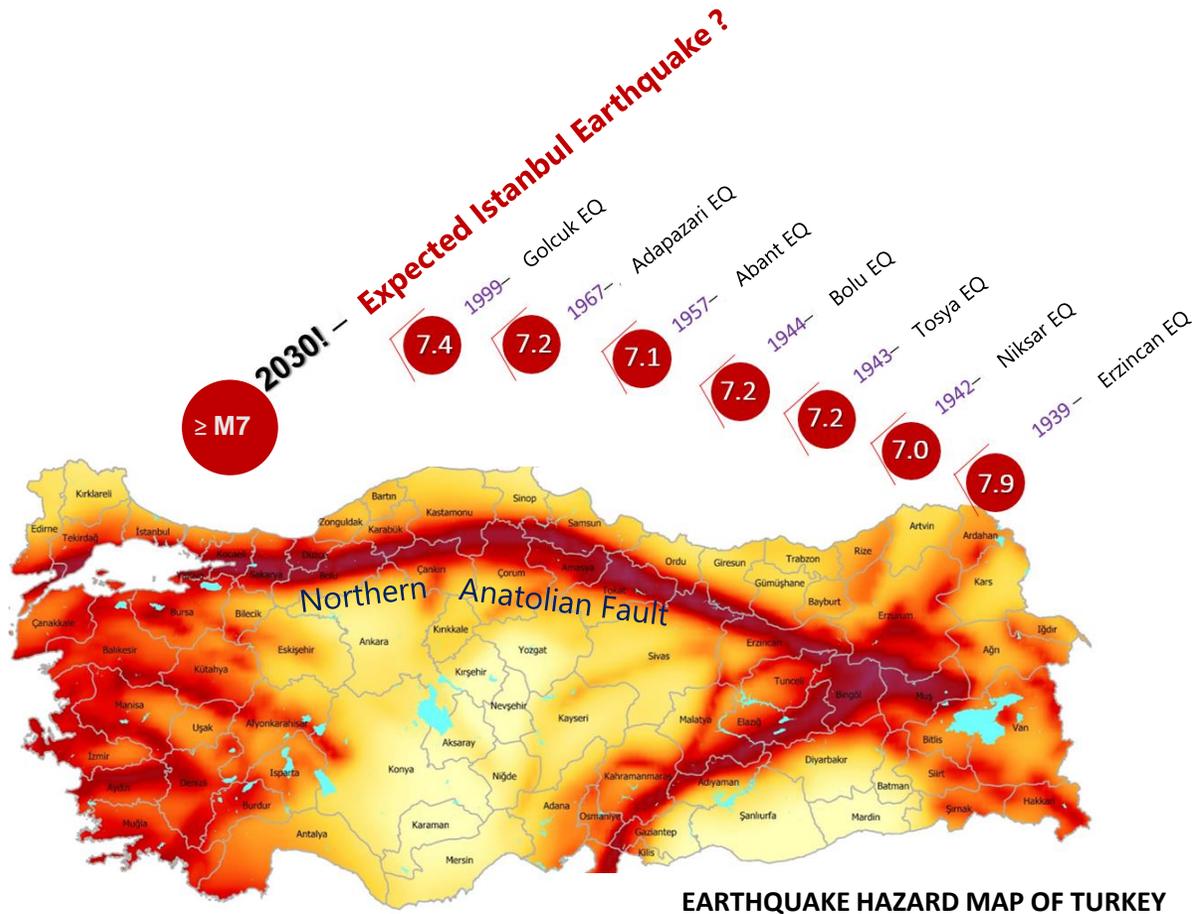
<sup>1</sup> Parliamentary Research Commission Report July 2010

<sup>2</sup> KENTGES Disaster Preparedness and Urban Risk Management Commission Report



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# PROBABLE ISTANBUL EARTHQUAKE



Probabilistic Seismic Hazard Map of Turkey (SA at 0.2s – 475 years RP -10 percent in 50 years)

Biggest City of TURKEY  
w/

**15.07**

MILLION POPULATION

The Most Dense City of TURKEY  
w/

**2.764**

Per KILOMETER<sup>sq</sup> [km<sup>2</sup>]

**TOURISM, TRADE AND INDUSTRIAL CAPITAL CITY OF TURKEY**

**PROVINCIAL CONTRIBUTION LEADER WITH APPR. 30% of the GDP BREAKDOWN OF TURKEY**

**ONE OF THE 10 CITY OF THE WORLD WITH THE HIGHEST EARTHQUAKE RISK (Tokyo – Osaka – Shanghai – Los Angeles)**

**600,000 HOUSEHOLDS UNDER RISK IN ISTANBUL**



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# PROBABLE ISTANBUL EARTHQUAKE

## Probable Affects in Istanbul



**GBP**

240 BILLION \$



**PROVINCE POP.**

15.000.000 P.



**BUILDING STOCK**

5.500.000

## Aim For Istanbul

### TARGET

- Regeneration of 2 Million of Total 5.5 Million Units
- Renewal of minimum 100 K units per year

### CURRENT STATE

|                 | Detected | Demolished | Ratio |
|-----------------|----------|------------|-------|
| Risky Buildings | 321.000  | 251.000    | %78   |
| Risky Areas     | 127.000  | 15.000     | %12   |



Till Now Throughout Istanbul;

- 51,990 buildings,
- 251,110 housing units were demolished by detection of risky buildings.

It shows that approximately **854,000** people are ensured safety through urban transformation.



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# URBAN REGENERATION GOALS

## TARGET

VIA URBAN TRANSFORMATION

**“TURKEY IS PREPARED FOR DISASTERS”**

### TARGET

- Regeneration of **6,5 Million** of Total 20 Million Units
- Renewal of minimum 300000 units per year

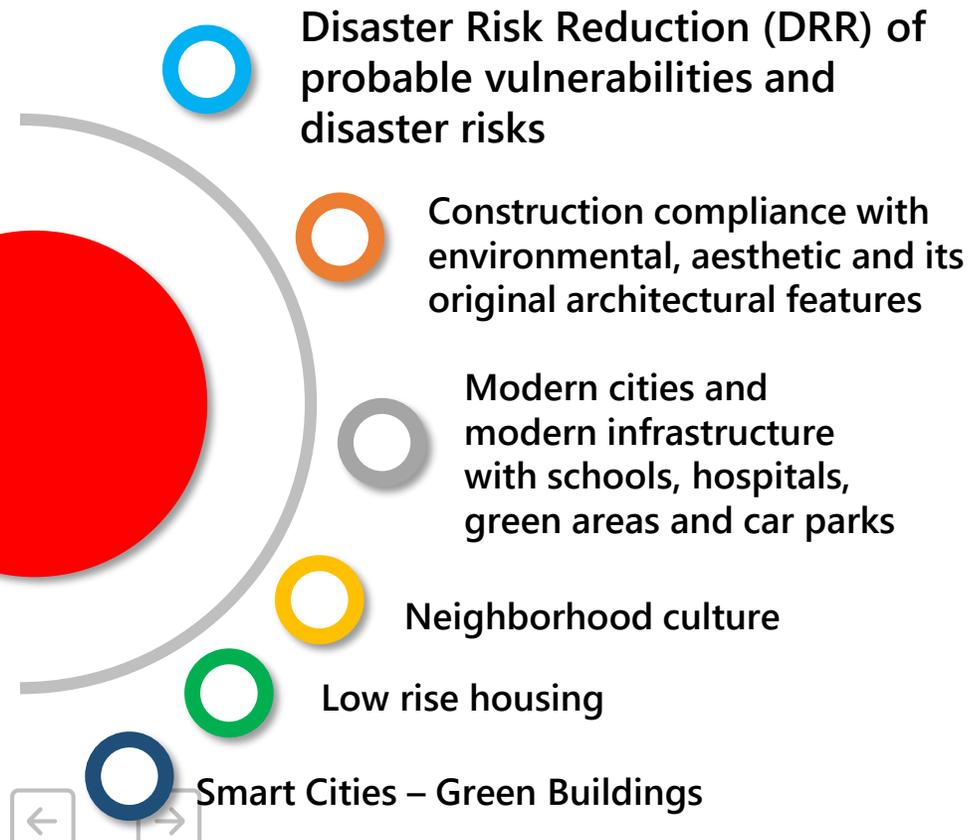
### CURRENT SITUATION

|                 | Detected | Demolished | Ratio |
|-----------------|----------|------------|-------|
| Risky Buildings | 597.000  | 458.000    | %76   |
| Risky Areas     | 664.000  | 87.000     | %13   |



# LAW NO.6306

Urban transformation process in Turkey has started with major legal development in seismic risk reduction in Turkey with the creation of the **Law No. 6306** on the Transformation of Areas under Disaster Risk in 2012.



- Disaster risk reduction
- Ensuring safety of life&property
- Building better environment&cities

Execute the processes and procedures for determining the transformation, renovation and transfer areas, detecting the risky buildings to implement urban transformation



The Law defines 3 categories— “Risky Buildings,” buildings that have finished their economic life or are otherwise determined to be prone to collapse or significant damage during natural disasters;

“Risky Areas,” areas that, based on local conditions could be subject to loss of lives or property during natural disasters;

“Reserve Building Areas,” new settlement areas to absorb the displacement through the implementation of urban redevelopment.



# Innovative Regeneration Approaches & Reforms

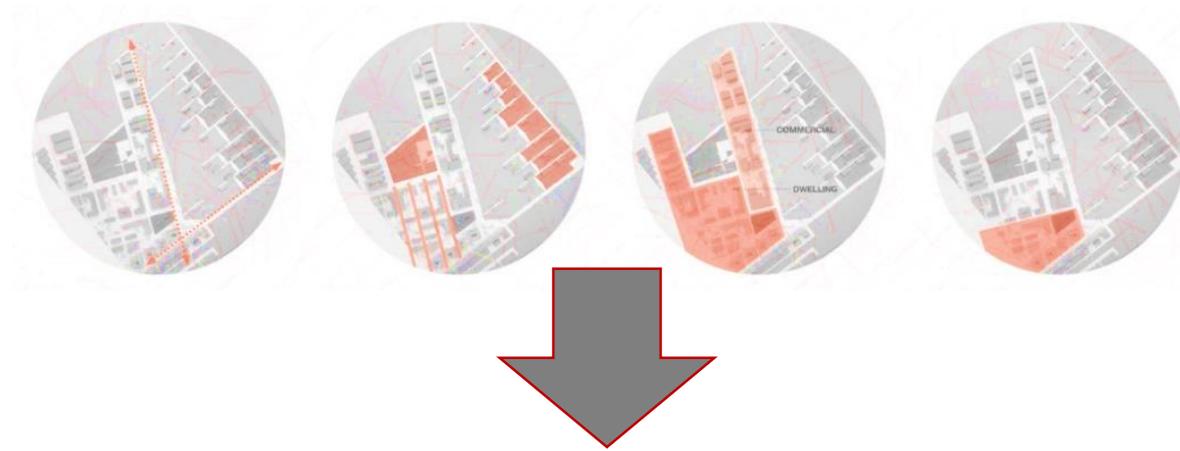
to better mitigate and reduce seismic risk

- 
- Sustainable urban transformation model
  - Holistic planning and designing principles
  - Low-rise city
  - Environmental-friendly projects
  - Innovative, domestic, sustainable technology and materials



# URBAN TRANSFORMATION STRATEGY GUIDELINE

In the frame of Ministry's 2023 vision agenda



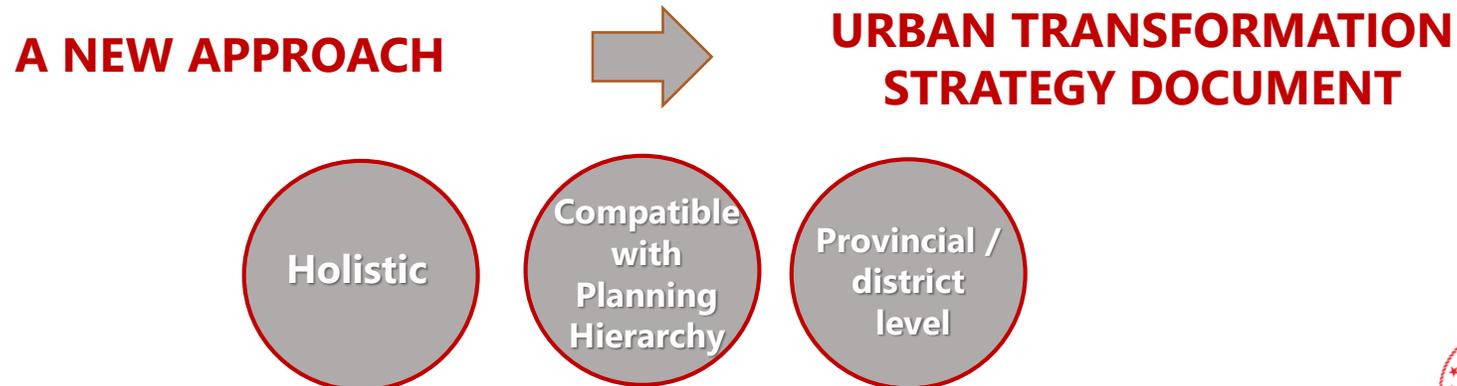
- ❖ Assessing all types of risk factors at the city scale,
- ❖ Analyzing social-economic structure in the risky areas,
- ❖ Prioritization of risky areas and zoning,
- ❖ Developing a financial model for each zone.



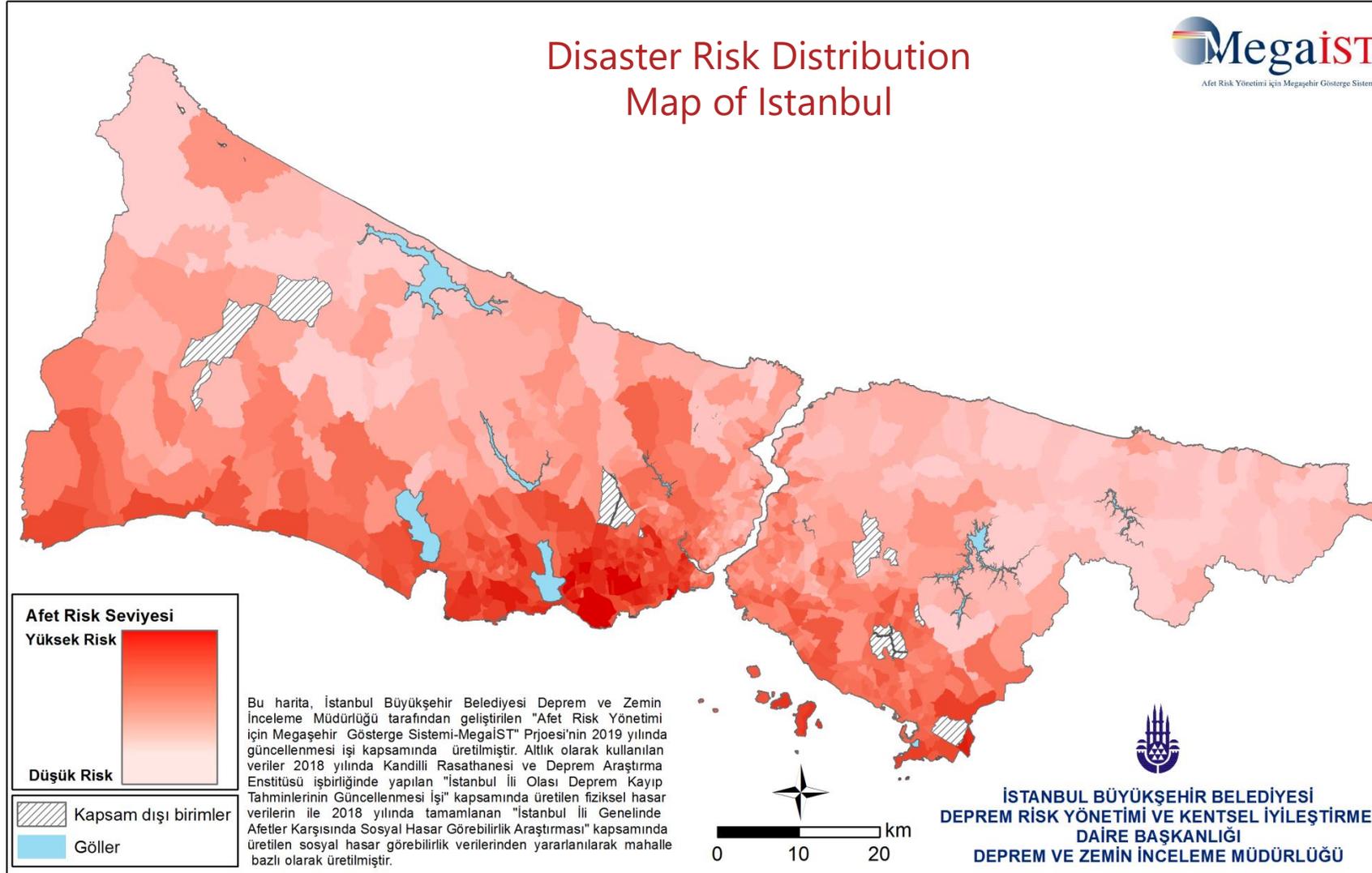
# "PRINCIPLES AND GUIDELINES FOR THE PREPARATION OF STRATEGIC DOCUMENTS FOR URBAN TRANSFORMATION (2019)"

The Urban Transformation Strategic Document Requirements for every metropolitan municipalities, district municipalities and special provincial administrations :

1. Analysis of Urban Conditions and Data Collection
2. Prioritization of Urban Transformation Areas
3. Determination of Legal Basis for Urban Transformation
4. Determination of Financial Management Model,
5. Implementation Schedule for Urban Transformation
6. Determination of Urban Design Principles



# SAMPLE OUTPUT



Within the scope of the study;

- ✓ Earthquake,
- ✓ Liquefaction,
- ✓ Tsunami,
- ✓ Building Damage,
- ✓ Landslide,
- ✓ Flood

Risks examined.

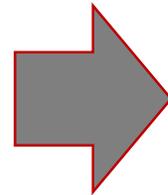
- Loss of life,
- Severe Injuries,
- Demolition of Building,
- Damages in Drinking Water Lines,
- Damages in Natural Gas Lines,
- Road Closure,
- Firefighting

The possibilities are discussed.



# URBAN TRANSFORMATION ACTION PLAN

The Urban Transformation Action Plan was announced on September 2019 after the evaluation of the strategic documents prepared by local authorities and prioritization of the transformation areas.



- ❖ The areas and the risky buildings under earthquake risk
- ❖ The areas under flooding and landslide risk
- ❖ Historic city centers and squares
- ❖ Transformation and transportation of industrial areas



# URBAN TRANSFORMATION ACTION PLAN

- 
- Transferring structures in stream beds
  - Action Plan of Climate Change of the Blacksea Region
  - Urban Regeneration Strategy Documents
  - Financial Solution Center
  - Low-Rise Buildings and Neighbourhood Culture



# SUSTAINABILITY & SMART CITY APPLICATIONS

Case Study Area : Esenler Reserve Building Area

**455.000**

POPULATION

**8.705 Person**

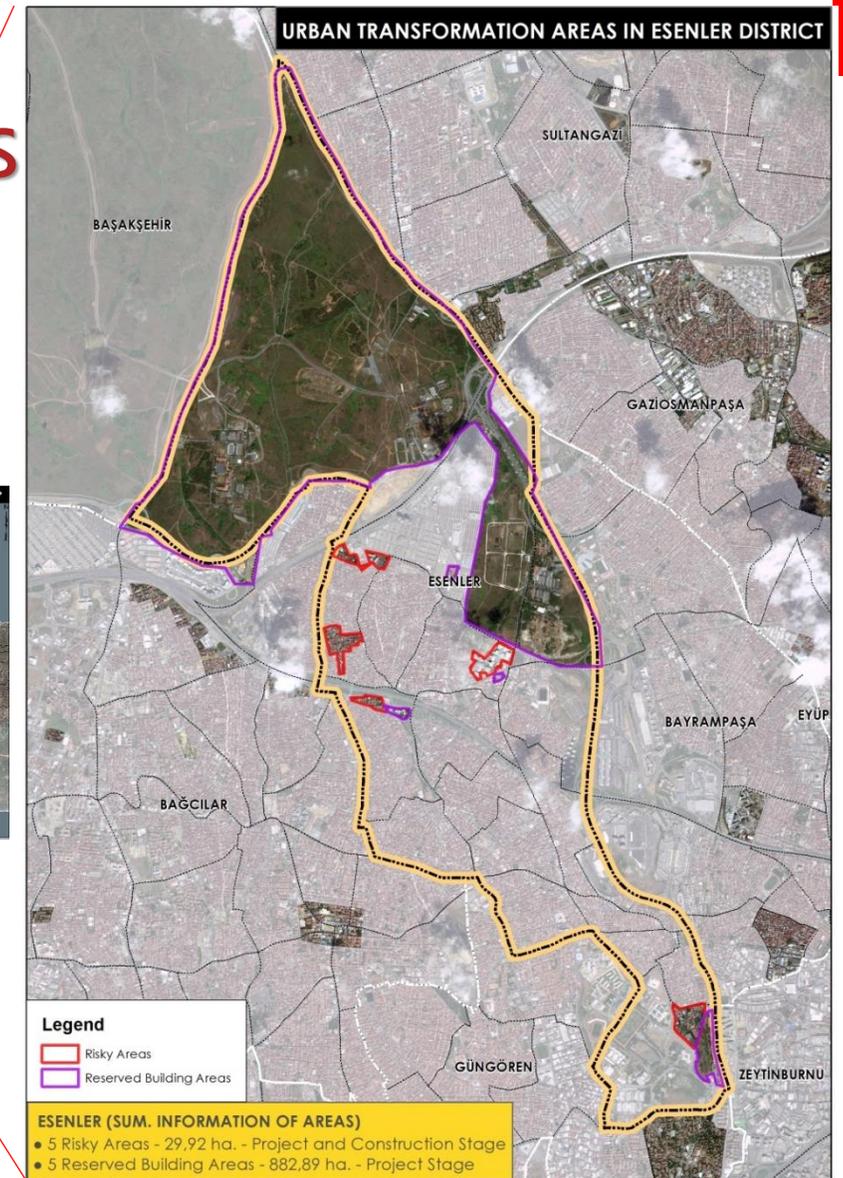
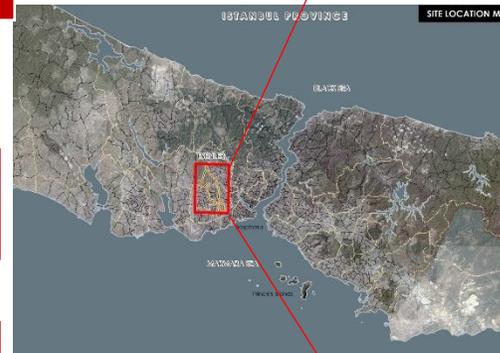
PER KILOMETER<sup>2</sup>

The most dense district in Istanbul

Inadequate distribution of green areas

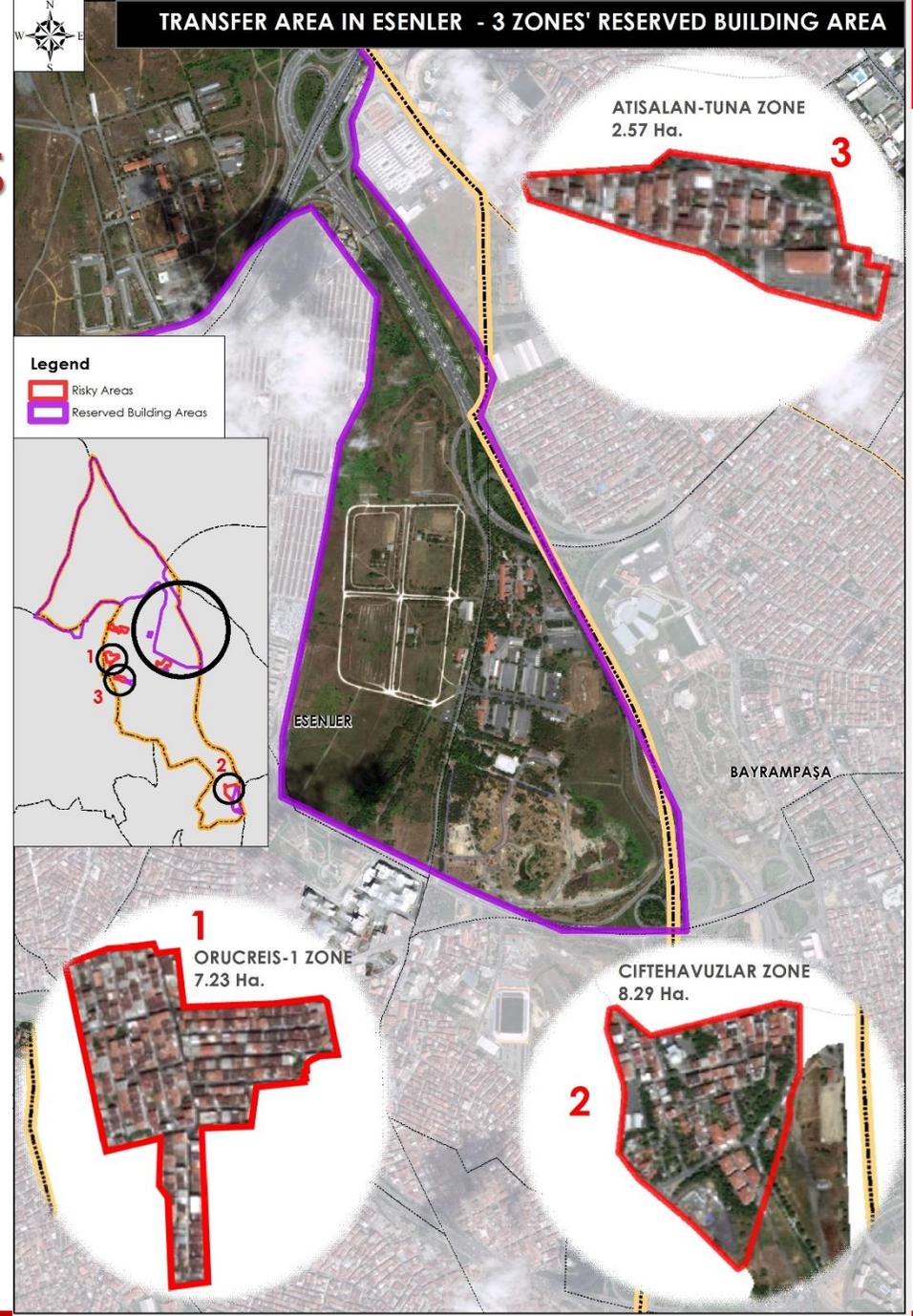
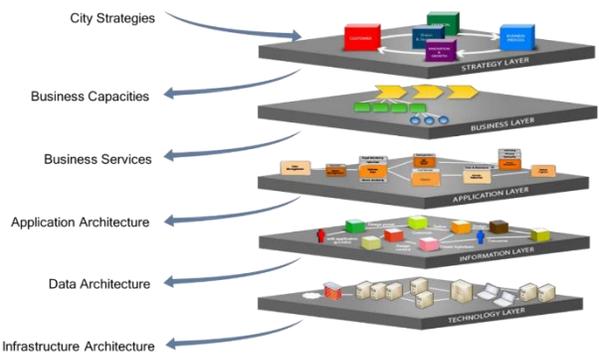
Underdeveloped settlement area of Istanbul

Centrally located in Istanbul



# SUSTAINABILITY & SMART CITY APPLICATIONS

Case Study Area : Esenler Reserve Building Area



**DISTRIBUTION OF RISKY AREAS IN ESENLER - PRESENT SITUATION**

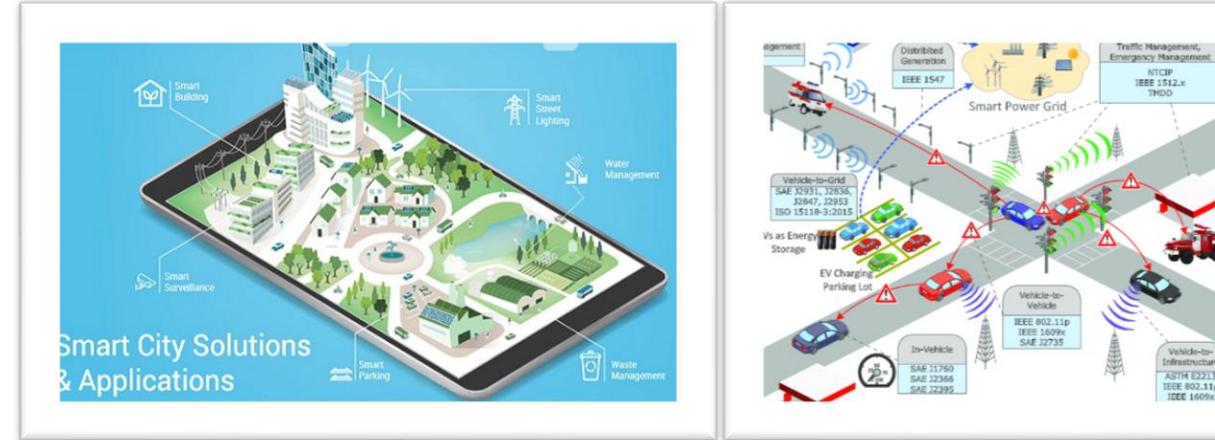
In Esenler District it has determined apprx. 30 hectare Risky Areas in size.

5000 housing units

15000 people

# SUSTAINABILITY & SMART CITY APPLICATIONS

Case Study Area : Esenler Reserve Building Area



In the project area; it is expected that domestic and national technology products will have a significant place and it is thought that it will be the first hosting area for smart city and mobility application test center of the country.

As outstanding aspects; common use, security and integrated management of smart city infrastructures will be realised in project area.



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# DRR via DIGITAL TWIN TECHNOLOGY TO BUILDINGS

- real-time digital twins of all cities creation with ortho-photos done acting as a virtual replica of the physical environment
- orthophoto project scope previously implemented ground control points 22000, with 6 aircraft photogrammetric aerial camera with 196 megapixels
- 1500 hours flight, 517000 stereo aerial photos taken, after completing the Orthophoto Project in 2017, it is connected to **'Urban Settlement and Development Areas 3D Topography and Building Model Project**



40000 square kilometers in area that the completion of the 12 million buildings photographed and digitized



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# CITIES' DIGITAL TWIN TECHNOLOGY



General Directorate of GIS 3D Building and City Topography Datasets Production Project

Source : <https://cbs.csb.gov.tr/3-boyutlu-bina-ve-sehir-topografyasi-veri-setlerinin-uretimi-projesi-calistayi-gerceklestirildi.-haber-251095>



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# CONCLUSION For a Resilient & Liveable World

In this regard, transformation of the risky areas and identifying safe areas by strengthening the regulations to achieve urban transformation in a variety of urban contexts are considered to be significant.

Our cities are becoming more organized by founding a new infrastructure and transportation system with a holistic planning approach for the demolished areas.



Further plans set out a sustainable vision for Turkey's future growth, including smart applications and strengthening the regulations.



**THANKS FOR YOUR  
ATTENTION**

ATTENTION



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