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Addressing the Growing Risk and Increased Costs of Floods

Understand
our planet with AI.

Ecopia's History

2010 - 2013

- Spun core technology out of PhD research at **UWaterloo**
- Commercialized services and refined **AI algorithms,** with a focus on building footprint mapping

2016

- Completed first continental-scale mapping initiative, for the Australian Government: **16 million buildings** across **3 million sq. miles** in **6 months**

2017 - 2018

- Generated complete map of every building in the USA: **169 million buildings** across **3.1 million sq. miles** in **6 months**
- Transitioned from man made objects to high accuracy **land cover mapping**

2018-2020

- Focus on developing **advanced land-cover** for: smart cities, transportation engineering, autonomous vehicles, large scale state and federal operations, etc.

2021 - present

- Largest project to date mapping **51 countries** across Sub-Saharan Africa covering **9.3M sq. miles** – Including **416M buildings, and 11M linear miles of roads in 8 months**
- Development of first **US Nationwide 3D land cover** map

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Our Clients

Ecopia's data is embedded into **hundreds of customer applications**, spanning 100+ countries across the world.

Civil Engineers

BLACK & VEATCH

FEHR PEERS

Telecom

Deutsche Telekom

NTT

Government

STATE OF WASHINGTON

Insurance

Munich RE

CoreLogic®

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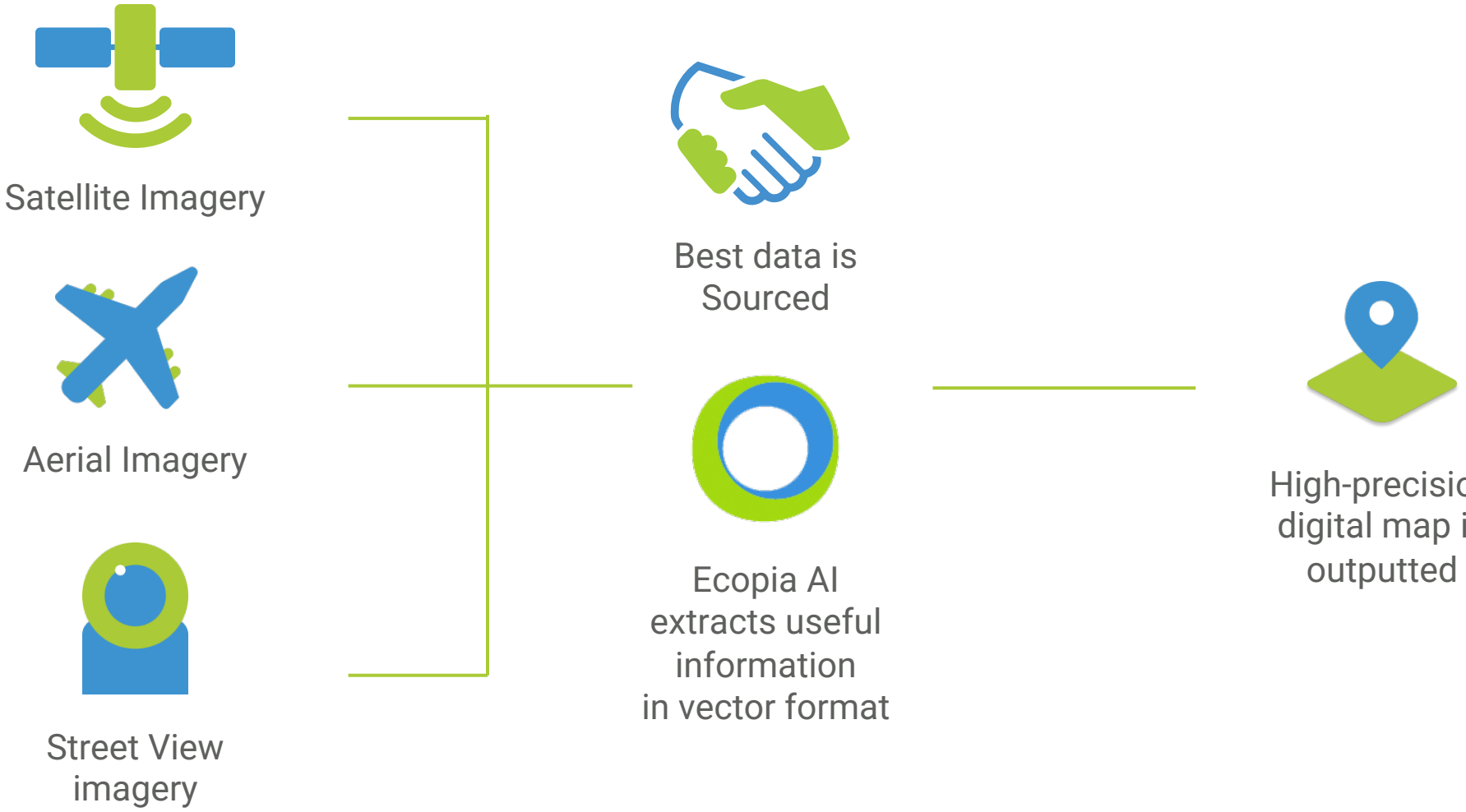
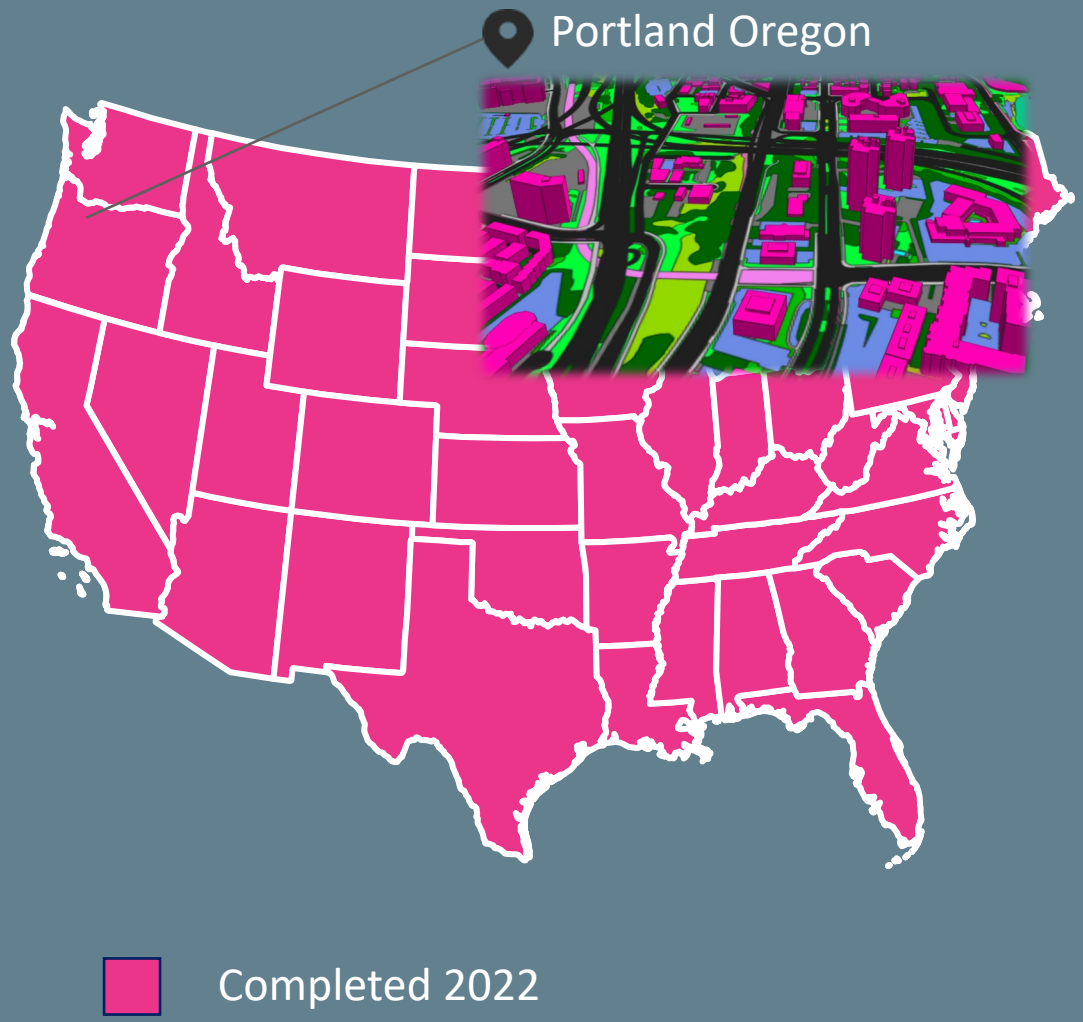
Ecopia forms partnerships and extracts information using AI, outputting a digital representation of reality (digital maps)



3D Land Cover Across The United States

Project: Build the first 3D nationwide high resolution landcover map of the USA

Data Input: 6-12inch stereo aerial imagery



Height-Attributed Features

Buildings	Trees + Shrub	Bridges

Standard Land Cover Features

Building	Railway	Grass
Driveway	Sidewalk	Bare Land
Pavement	Road	Water Body
Parking	Swimming Pool	Sports Field

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The Why

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The Problem

The total cost of **Climate Disasters** in USA since 1980 is roughly $2.065 Trillion

Source: NOAA National Centers for Environmental Information

Flooding

Flooding causes widespread property damage, loss of life, and environmental disruption.

$8.2B

Average Annual Cost of Flooding in USA

Source: Bloomberg

Wildfires

Wildfires destroy ecosystems, endanger lives, and degrade air quality.

$4.4B

Spent Fighting Wildfires in 2021

Source: National Interagency Fire Center

Extreme Heat

Extreme Heat and Urban Heat Islands have a greater impact on marginalized communities and vulnerable populations.

1,714

Heat-related Deaths in USA in 2022

Source: CDC

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Flooding

Growing Scale

- On average, total annual precipitation has increased over land areas in the United States and worldwide.
- Record-breaking surges observed in 2017 as Hurricane Harvey inundated coastal areas of Texas with a surge height of over 12 feet (3.7 meters).

Loss of Life

- Since 1970, nearly 60% of the 600 deaths within the U.S. due to floods associated with tropical cyclones occurred inland.
- At least 1500 lost their lives in Hurricane Katrina, and many of these deaths occurred as a result of storm surge

Additional Impacts

- Extensive property loss
- Severe economic impact
- Damage to habitats
- Destruction of infrastructure foundations such as roads, railroads, bridges, pipelines

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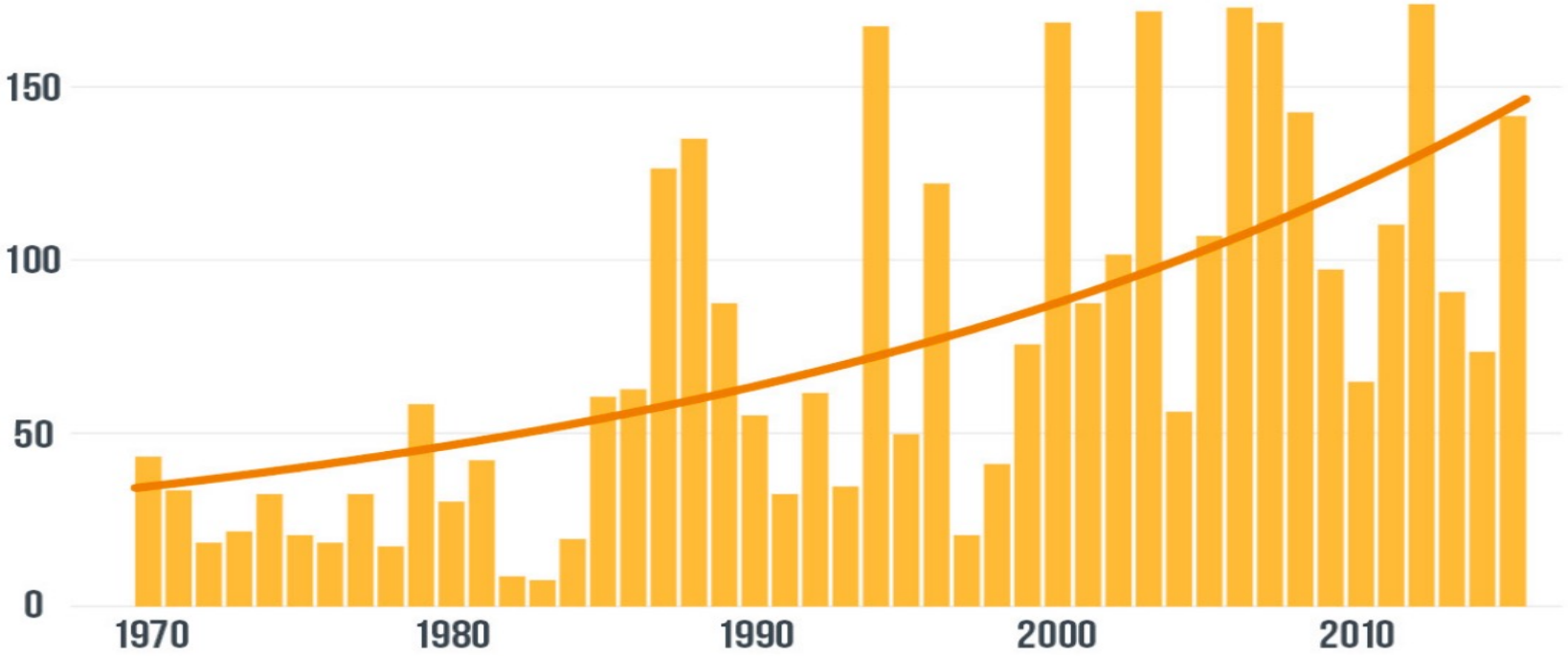
Wildfires

Wildfires are growing in frequency and intensity, threatening communities, forests, and the economies that depend on them.

Number of fires larger than 1000 acres per year on U.S Forest Service land



Source: Climate Central analysis on U.S. Forest Service records

Since 2000, **15** forest fires in the United States have caused at least $1 billion in damages each.

Extreme Heat / Urban Heat Islands

Elevated temperatures from heat islands can affect a community's environment and quality of life in multiple ways.

Increased Energy Consumption

Increase in air conditioning of 1-9% for every 2˚F increase

Compromised Human Health

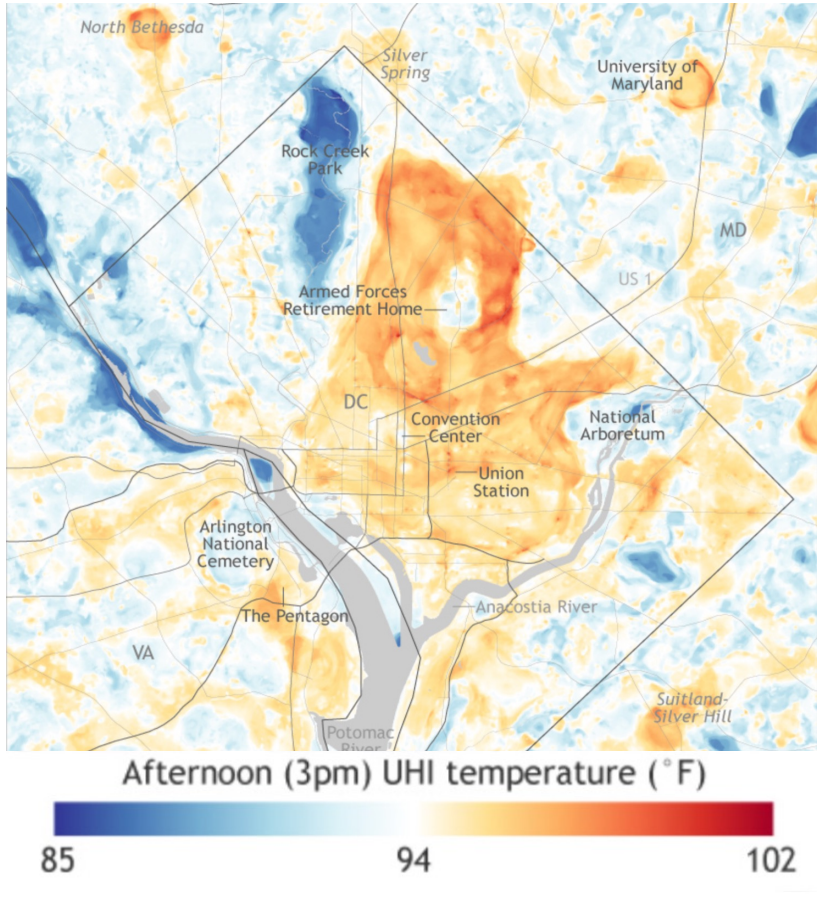
Leading cause of weather-related deaths over the last 30 years

Impaired Water Quality

Hotter stormwater runoff flows into surrounding water bodies and causes rapid temperature changes

Elevated Emissions

Elevated temperatures can directly increase the rate of ground-level ozone formation



Washington DC, Urban Heat Island Effect

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The Solution … kind of

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What is a Climate Resiliency Strategy?

1. Assessing Climate Risks & Vulnerabilities
2. Developing Adaptation Plans
3. Building Resilient Infrastructure
4. Protecting Ecosystems
5. Enhancing Community Resilience
6. Investing in Research & Development

"A climate resiliency strategy refers to a comprehensive and integrated set of actions, policies, and measures designed to help individuals, communities, and ecosystems adapt and withstand the impacts of climate change. It involves proactive planning, risk assessment, and management aimed at enhancing the capacity of natural and human systems to cope with the changing climate conditions. " **- Chat GPT**

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The City of Peterborough's Integrated Flood Model

Planimetric Details

Peterborough acquired a 13 layer dataset that not only maps their impervious surfaces but provides **valuable** natural feature information

Speed

Results were provided in under **6 weeks** and over 1000 hours of manual extraction time was saved

Contract

In 2020, Peterborough partners with Ecopia to **digitize** features of their community to build an IFM

Impervious Surface

Peterborough leverages the impervious surface data to develop **highly accurate** runoff coefficients

Looking Forward

Peterborough is already in the process of renewing its contract to ensure it can **maintain the same quality of data in the future**

"Ecopia's ability to **efficiently extract** all land cover features, whether manmade or natural, enables us to develop flood models that represent reality. The **planimetric level detail** map was critical for our stormwater engineering consultants, Jacobs, to help support the development of our IFM."

Ian Boland, Senior Watershed Project Manager
City of Peterborough

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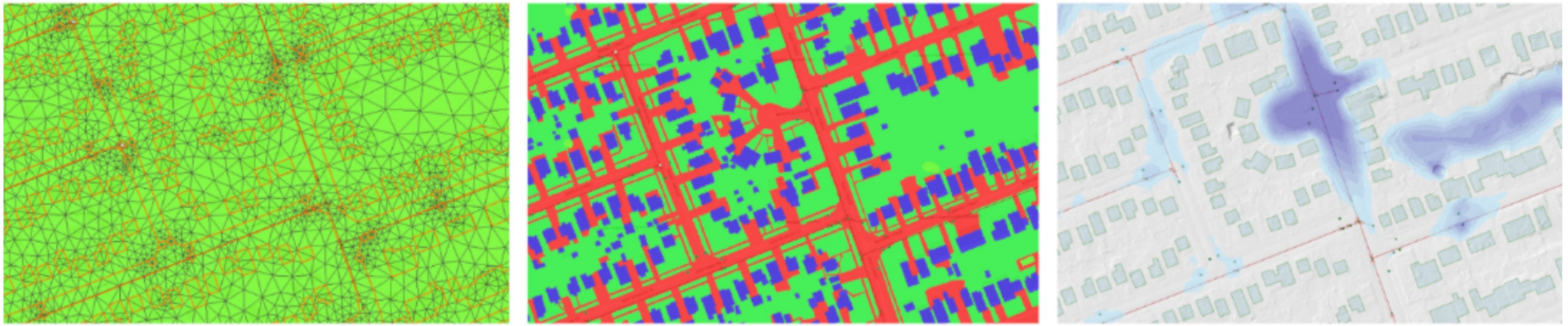
Predicting Stormwater Effects with Flood Models

- Data Challenges
- Accurate and Up-To-Date
- Integrated Flood Model (IFM)
- Applications of The IFM

A sample of land cover Ecopia extracted for the City of Peterborough's flood modeling

The City of Peterborough's Integrated Flood Model



From left to right: Peterborough's flexible 2D mesh to model surface flow; the IFM's surface roughness layer derived from Ecopia's land cover data; the output layer of flood extents based on the other two layers and including the area's pipe network

"With the IFM, we have a far greater understanding of flood risks in our community. Our flood reduction capital program uses this intelligence to identify future projects, test a range of scenarios, and prioritize work, all with the goal of achieving the highest level of flood reduction with limited capital funding. Land-use planning is also better informed with the IFM, resulting in future development that is protected from flood risk and limits or eliminates exacerbating flood risks for other areas of the City." - Ian Boland, Senior Watershed Project Manager for the City of Peterborough

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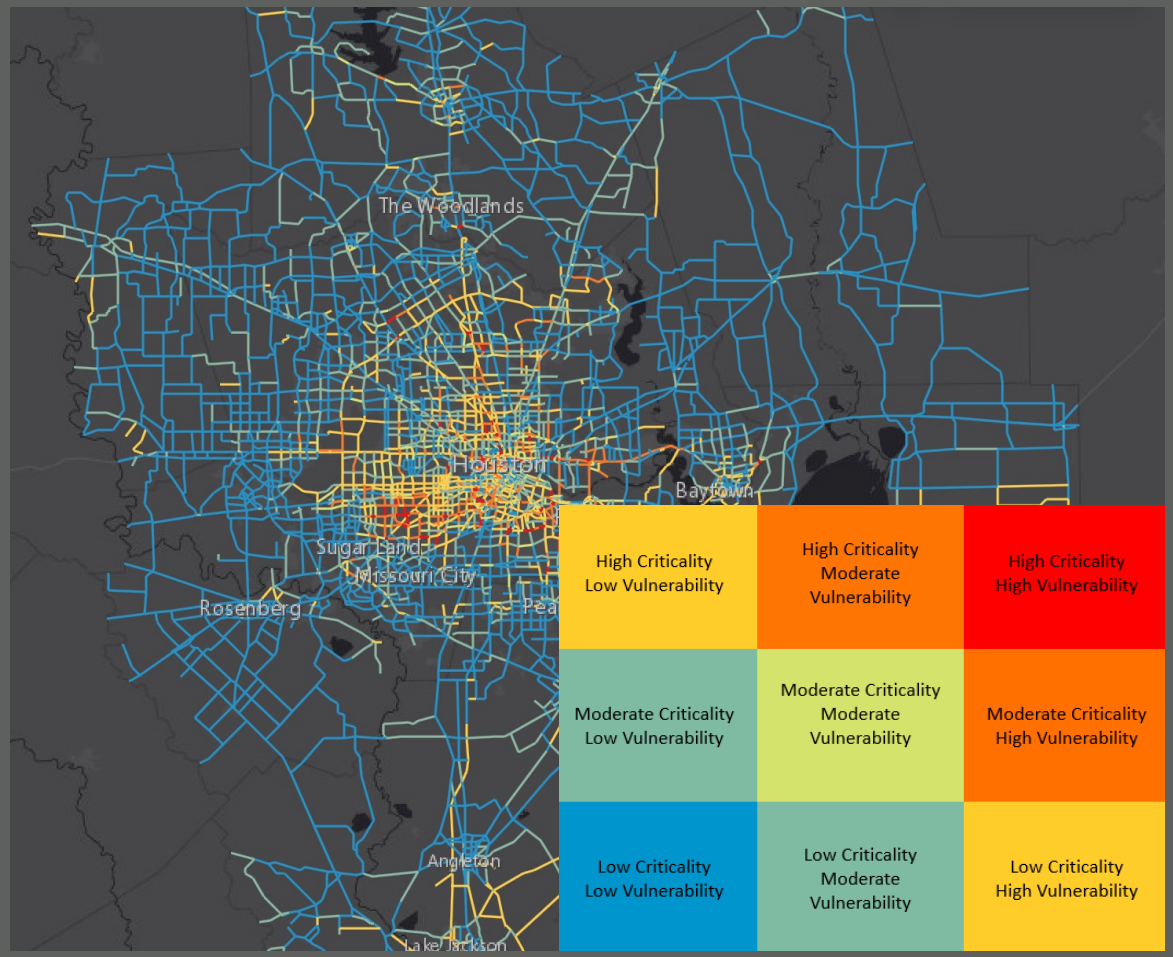
Leveraging Geospatial Data in Texas

1. Vulnerability Mapping
2. Land Use Planning & Management
3. Infrastructure Planning & Design

Saving Lives



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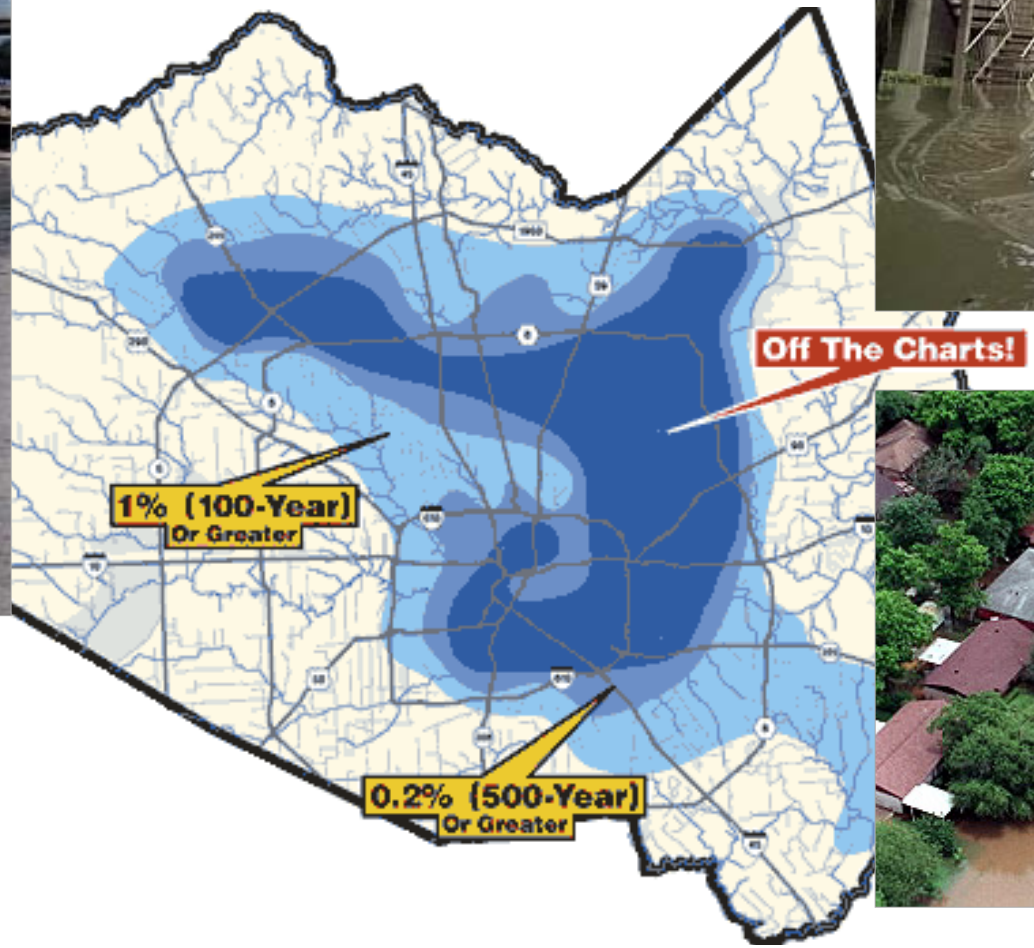
Tropical Storm Allison, 2001



Off The Charts!

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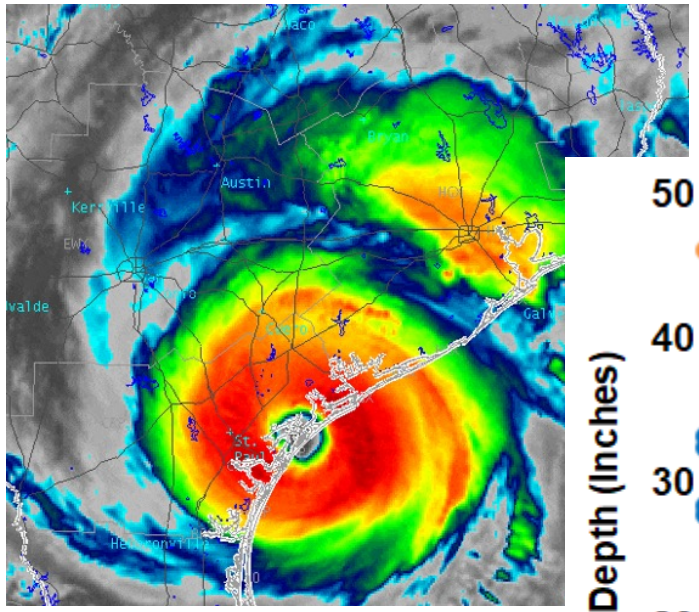
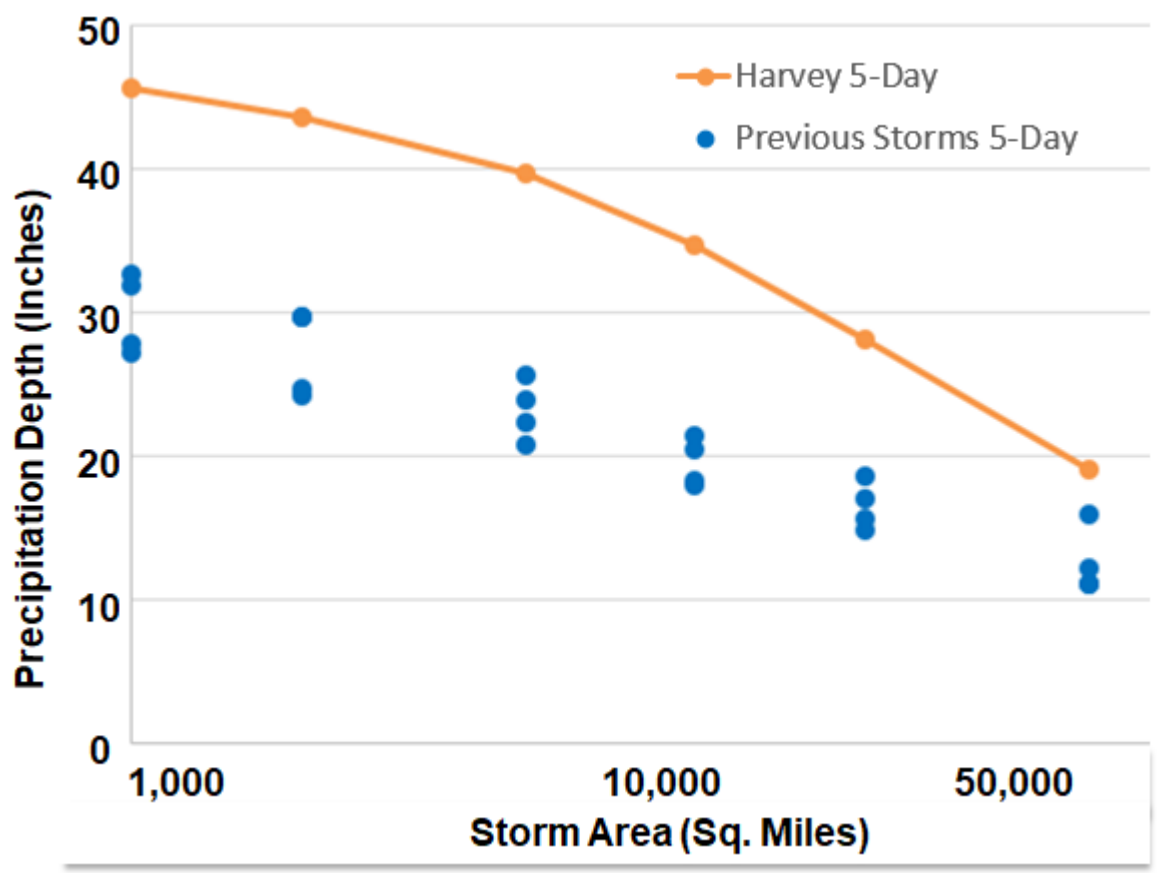
Hurricane Ike, 2009

Hurricane Harvey, 2017





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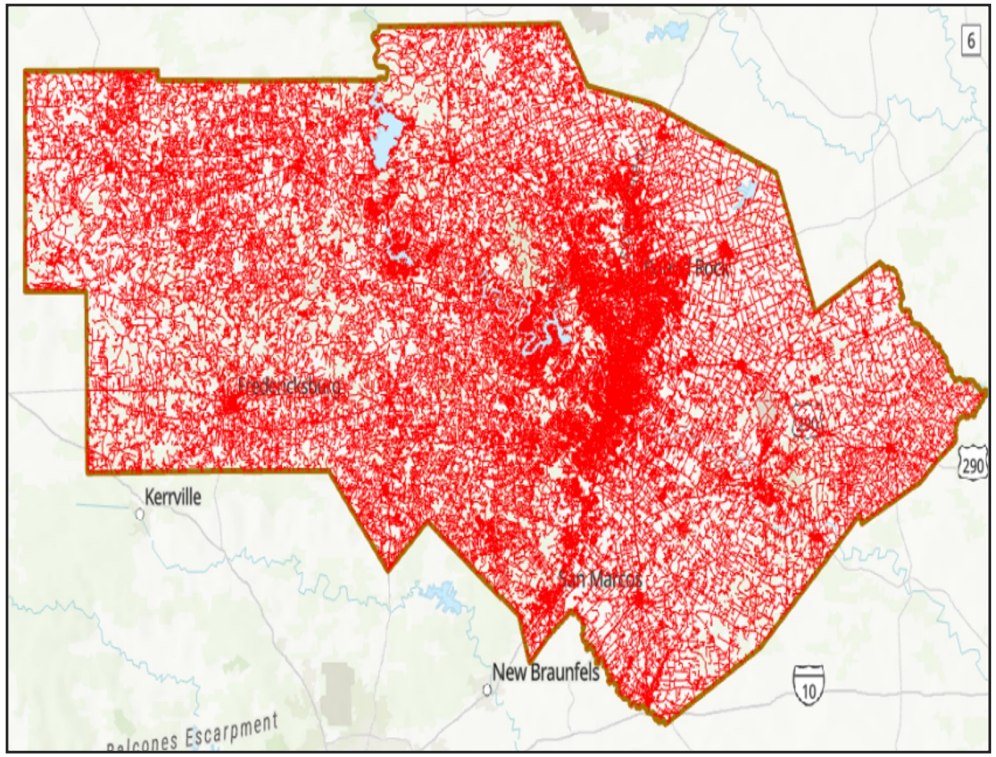
A case study in critical infrastructure resiliency across Texas

Designing a road elevation model that takes into account the height of bridges and roads to support emergency services

Why?

Texas leads the nation in flood deaths.
More than half of these people die in their car.

The Road Elevation Model enables the creation of precise real-time flood inundation maps. These help TxDOT to be proactive in its flood response, and provide better flood information for citizens and communities



TxDoT – Austin District (11 counties) 38,000 miles of road extracted by Ecopia

CWE
The University of Texas at Austin
Texas Department of Transportation
Oak Ridge National Laboratory
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The 38,000 miles of roads in the TxDOT Austin District covers only 1.6% of the landscape. High Performance Computing is used to filter the data collections and select the most accurate and recent data for the road system. Each point is labelled with its elevation in feet above geodetic datum.

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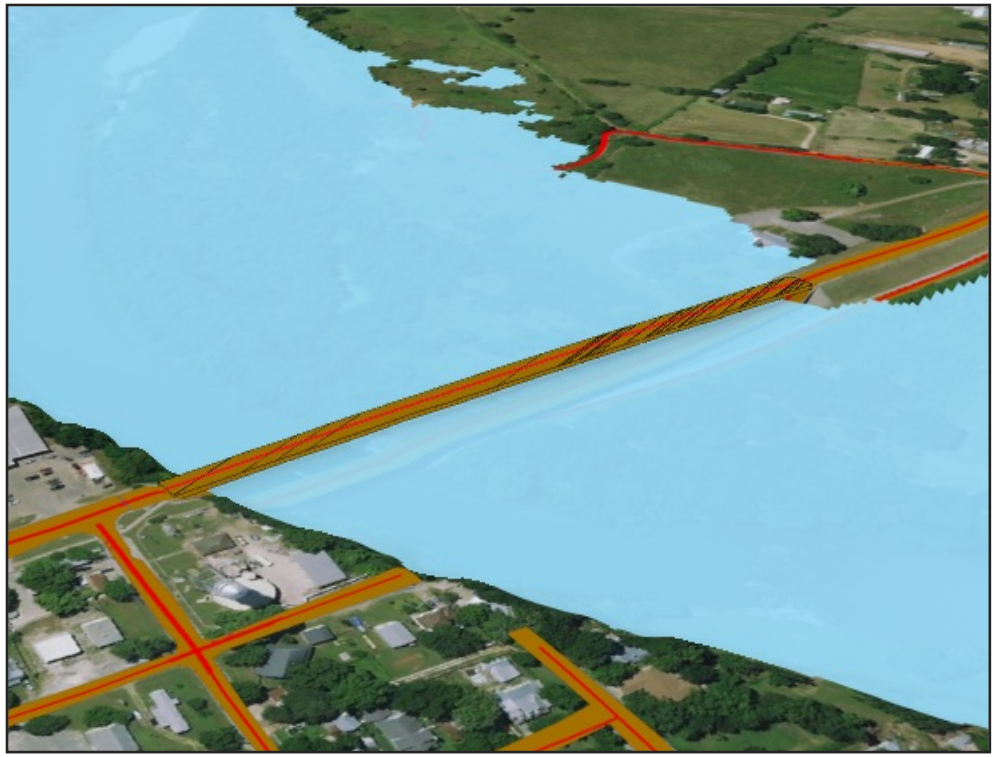
Outcome? Lives Saved



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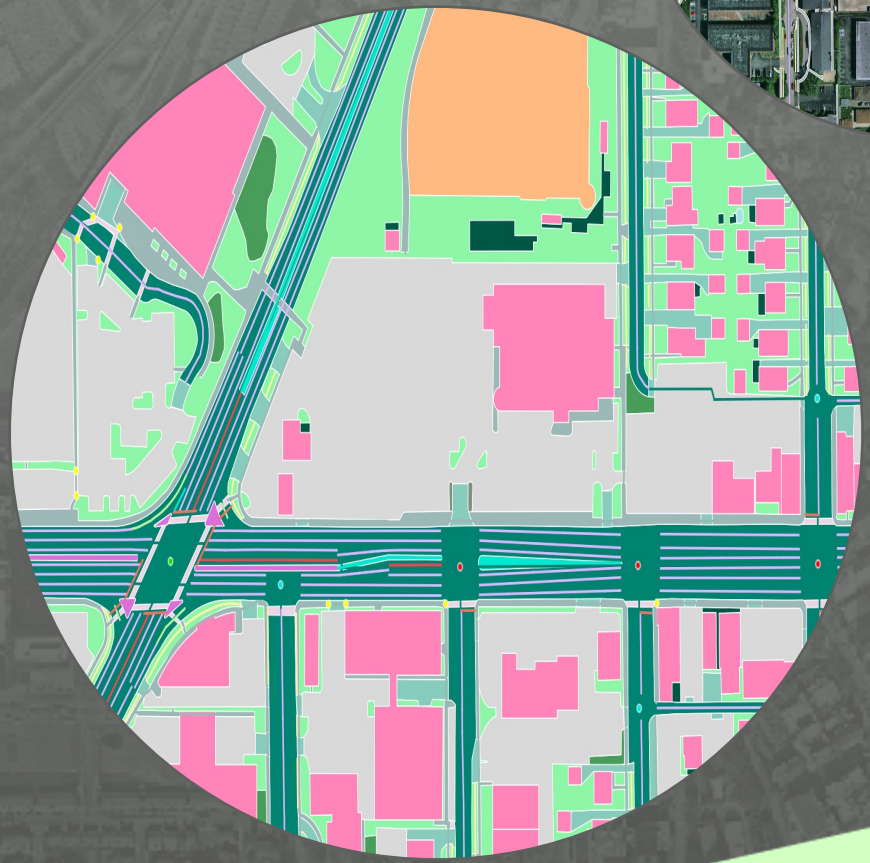

Geospatial Data

Supporting climate resilience and infrastructure development

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