THE CLIMATE READY COMMUNITIES SERIES

Welcome Trivia

In response to more frequent extreme weather, which Canadian animal is helping with natural flood prevention, without even knowing it?

A. Moose
B. Beavers
C. Canada Geese
D. Snowshoe Hares

Drop your answers in the chat!

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THE CLIMATE READY COMMUNITIES SERIES

From Data to Action: Exploring Tools for Climate Adaptation in Canadian Communities

Presented by Evergreen with support from FCM

July 24, 2025

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Evergreen Brick Works is located within Treaty 13, Tkaronto.
We are grateful to have the opportunity to work within this territory and to share the gifts of this land with the community.

AGENDA

1. Evergreen & series overview
2. Michele Martin, UW Climate Institute
3. Joshua Welch, Evergreen
4. BREAK (5 minutes)
5. Erik Sparling & Jane Zhang, Climate Risk Institute
6. Breakout out rooms
7. Q&A discussion
8. Wrap up
9. Closing

Evergreen’s Support Services

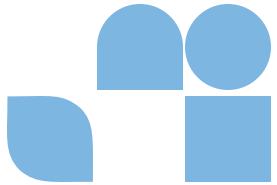
1. We transform public spaces across cities to build a healthier future for people and our planet.

2. We demonstrate the power of public spaces through Evergreen Brick Works.

3. We provide the capacity, resources, tools and network development opportunities for organizations to reimagine their public spaces.

The Climate Ready Communities Series

- Upcoming webinar themes:
  - Social vulnerability mapping
  - Nature-based solutions
  - Community-centered climate emergency planning
- Technical training on Evergreen's AI for the Resilient City's data mapping and visualization tool.
- With experts speaking and diving into data, research, tools, methodologies, platforms and their use, highlighting the relationships between climate resilience, climate adaptation, nature based solutions and vulnerable populations.



Speakers

Michele Martin

Training Program Specialist; Adjunct Assistant Professor, Waterloo Climate Institute

Joshua Welch

Sr. Program Officer, Evergreen

Rik Logtenberg

Director, Climate Risk Institute

Jane Zhang

Product Manager, Climate Risk Institute

Let's Welcome the Waterloo Climate Institute

Michele Martin

AI for the Resilient City

Joshua Welch

Evergreen

July, 2025

Program Led by

Supported by

Technical Partner

AI for the Resilient City: A scalable data visualization and analytics tool that allows government stakeholders to recognize the areas most impacted by Urban Heat Island effect, with the ability to identify where investments and policy decisions for adaptation and mitigation interventions may be most suitable and have the greatest benefit to the community and environment.

A variation of this tool can be replicated by a municipality using open-source data to advance their climate resilience/adaptation efforts.

EVERGREEN

Program Led by

RBC Tech for Nature

Supported by

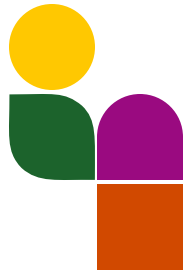
Gramener
Insights as Stories

Technical Partner

AI for the Resilient City – Program Overview

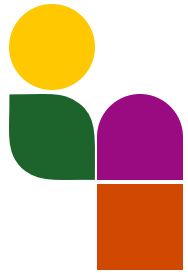
- Identifies UHI Hotspots within an area or region to support data-driven decision making
- Explores building infrastructure and typology (height, old/new built types, pervious/impervious surfaces, residential/commercial/industrial)
- Provides comparison of heat variation in relation to what's on the ground (water bodies, greenspace, open field)
- Relates population density to UHI at fine resolution
- Provides insight into vegetation healthiness of an area
- Using a machine learning algorithm to determine changes over time (1-5 years) using custom variables at census tract level

The tool generates UHI maps that can be downloaded and integrated into any other geospatial tools.



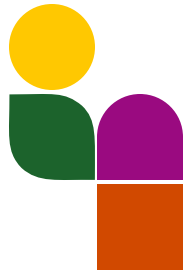
Program Methodology/Approach

1. **Scoping & Initiation**
   - Identify cities that are advancing climate resilience efforts, particularly extreme heat.
2. **Community Consultation & Outreach**
   - Showcase guided demos to inform and influence how the UHI tool could be helpful in data-driven decision-making.
3. **Exploration & Mapping**
   - Explore key datasets to understand, identify and map the impacts and risks of urban heat island (UHI) effects.
4. **Planning & Design**
   - Develop an interactive UHI tool to provide a “baseline” of most impacted areas in the city/region.
5. **Evaluate & Monitor**
   - Report on the integration of UHI tool for better planning and decision-making to cope with climate change impacts.



Datasets/Variables

- **LandSat** Data: Open-Sourced High Resolution Satellite Imagery
- **Heat Analysis:** UHI heat analysis using USGS methodology for radiative land surface transfer, incorporating other variables and datasets.
- NDVI: **Vegetation Index** which measures the healthiness (greenness) of vegetation
- NDBI: **Building Index**, which measures the variation in pervious (grass) versus impervious (concrete) surfaces
- **Building Footprints & Typology**: Municipal datasets that map all permitted buildings in a geographic location.
- **Building Age & Height:** Age (where applicable) and heigh of all permitted buildings in a geographic location.
- **Population Density**: Population density by ward and census tract
- **Age Distribution**: Distribution based on largest majority of distribution per ward/ census.

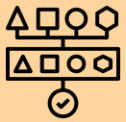


Data Processing

Datasets

- 30m Landsat satellite image
- Infrastructure Dataset
- Populations
- Weather and RCP data

Data Acquisition

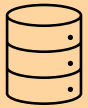


Datasets have been acquired from Satellite, Census data and City municipality mapped data

Data processing

Using Landsat Bands we were able to calculate LST,NDVI,NDBI
Urban morphological variables were calculated using Individual building datapoints

Storage



The processed data is stored in Azure PostgreSQL database enabled with PostGIS extension for GeoAnalysis

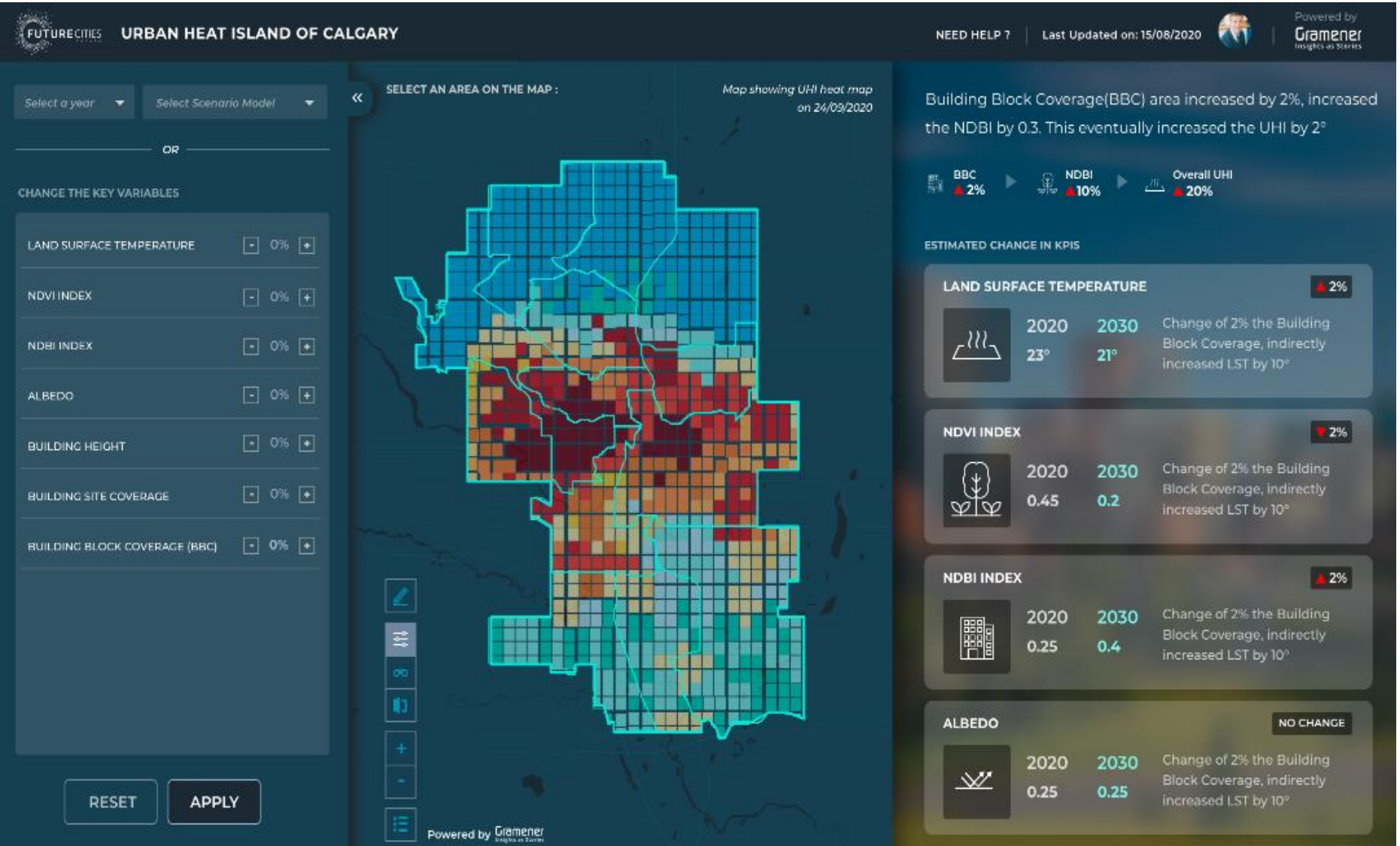
Computation

The ETL server dumps data onto Staging DB to perform Data & Regression validations, post validation the data is synced to Production DB.

Vector tile generation

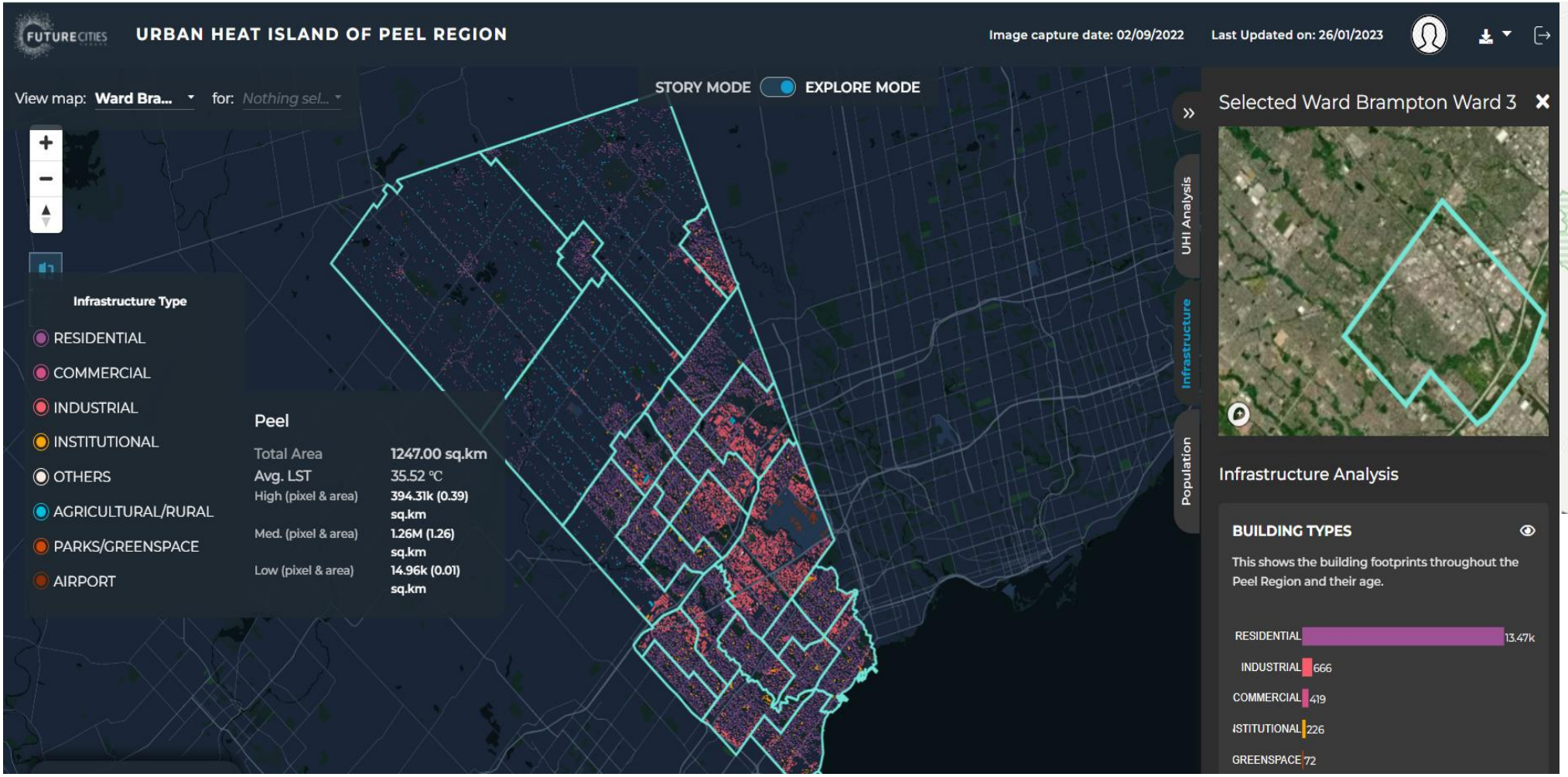
Vector tiles are generating packaging LST and urban morphological variables which are further aggregated at 100M grid level across the city

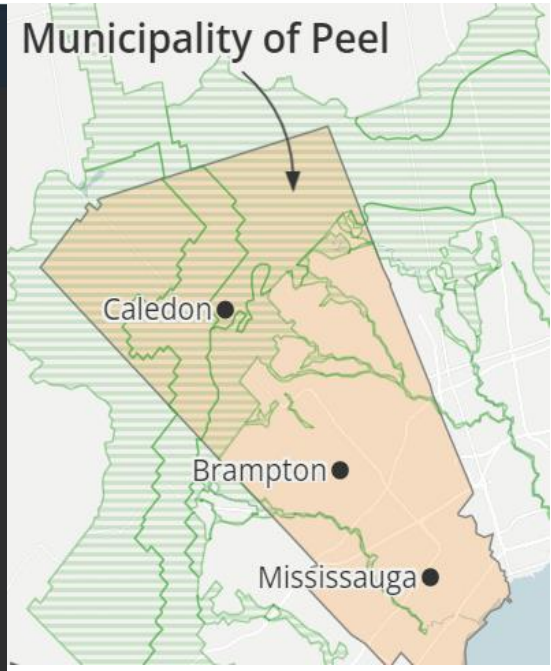
City of Calgary AI Tool – Phase I



Developed in partnership with the City of Calgary and Gramener, the first phase included the creation of a tool with multiple, layered data sets that examines extreme heat in the city, otherwise known as **Urban Heat Islands (UHI).**

Peel Region AI Tool – Phase II



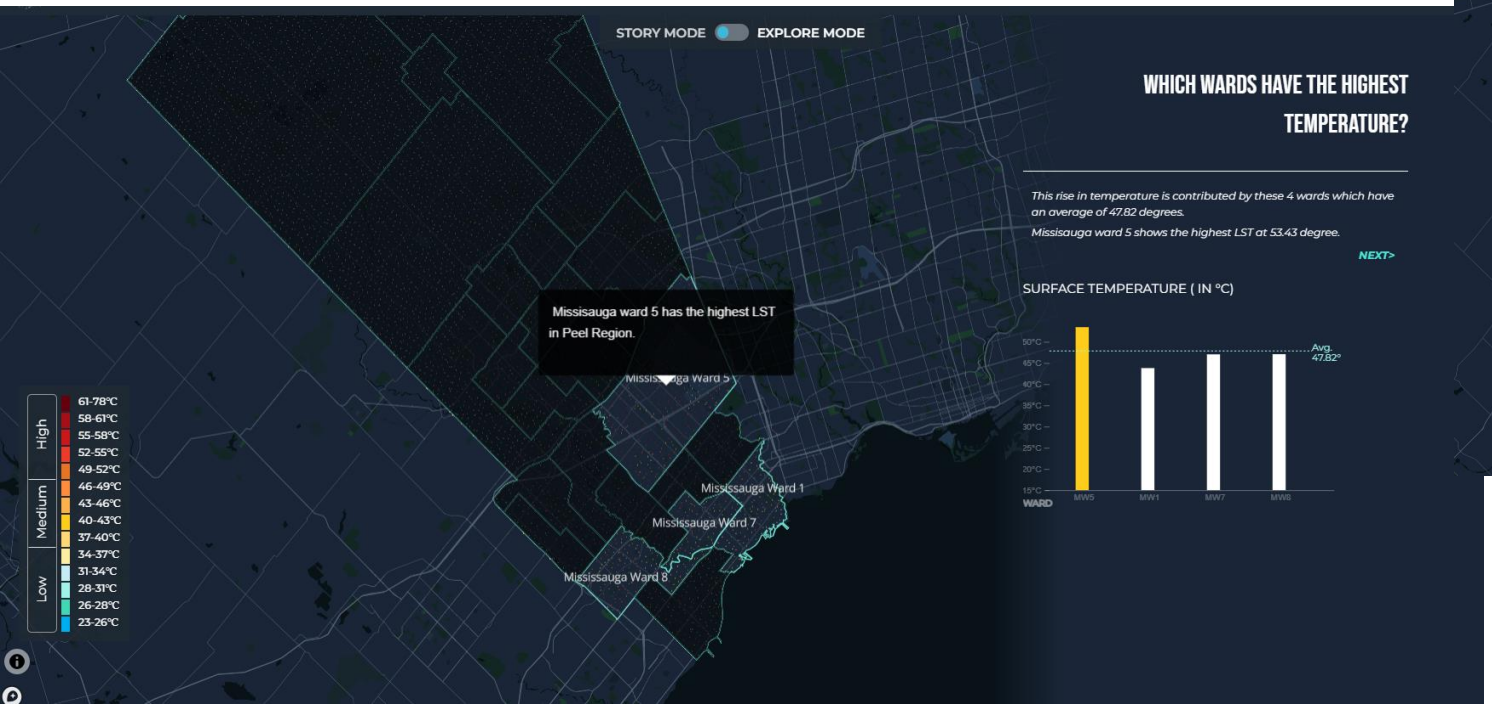


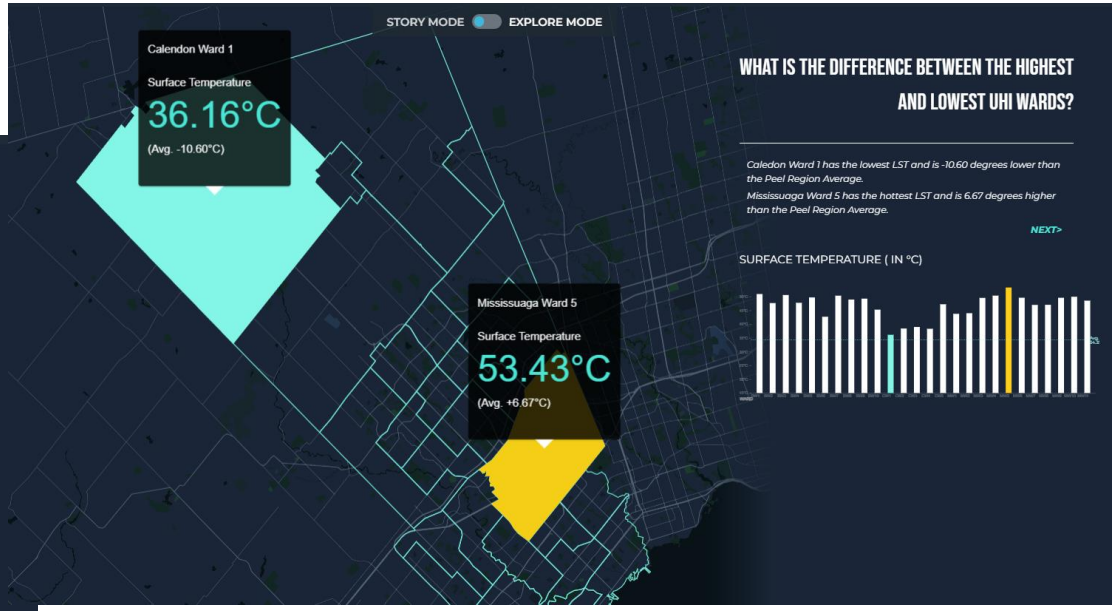
Halifax Regional Municipality – Phase 3+

FOUR MODES OF THE APPLICATION

Tool Mode: Story

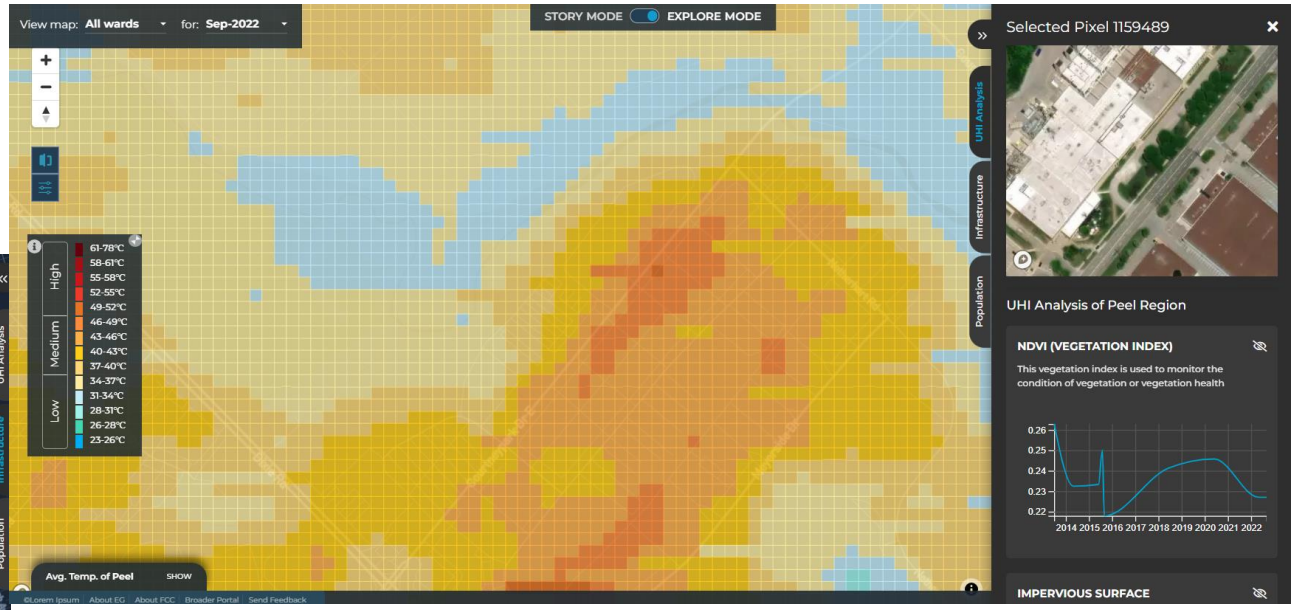
- Allows users to see data insights (like temperature, Infrastructure, demographic data) as easily digestible stories.





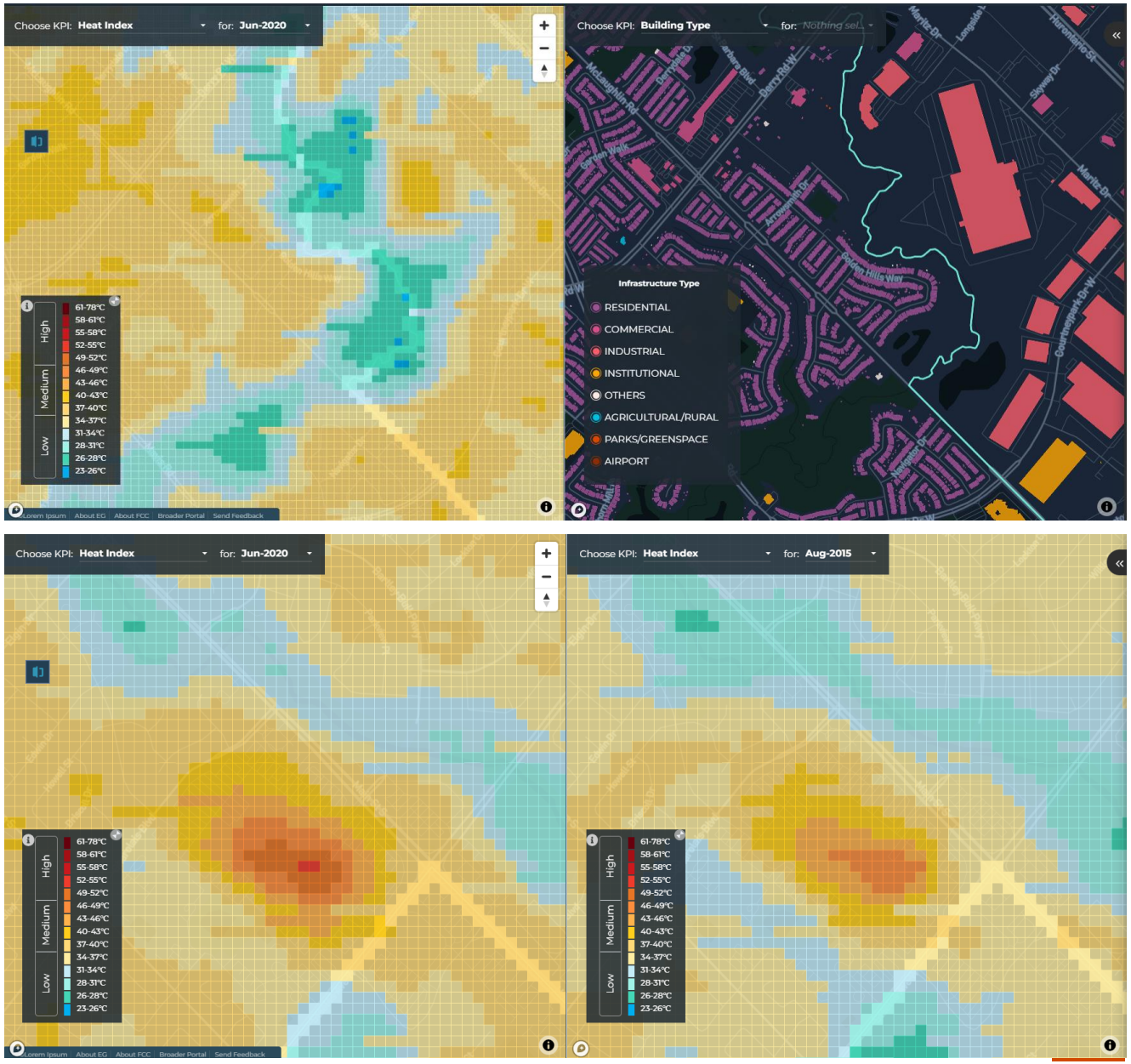
Tool Mode: Explore

- Showcases the historical and present day ‘as-is’ city and its associated urban heat islands (UHI).



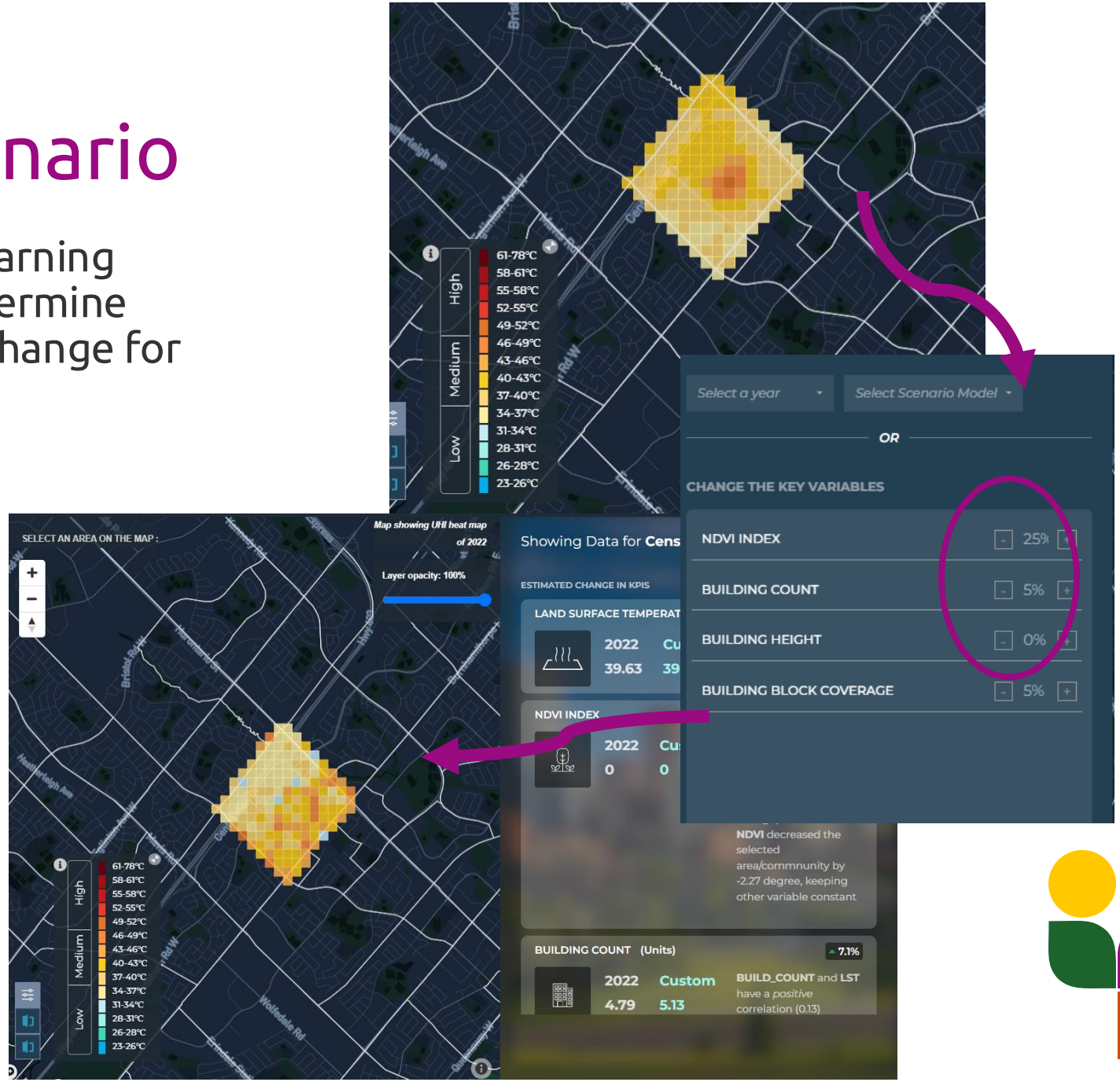
Tool Mode: Compare

- Users can compare correlating variables at the same time, or the same variables at different points in time. For example, changes in extreme heat and UHI in comparison to building age or vegetation cover or pervious (plants and grass)/impervious (concrete and homes) surfaces.



Tool Modes: Scenario

- Uses a predictive machine learning algorithm in real time to determine the expected outcome UHI change for an area.



Scenario Mode Processing

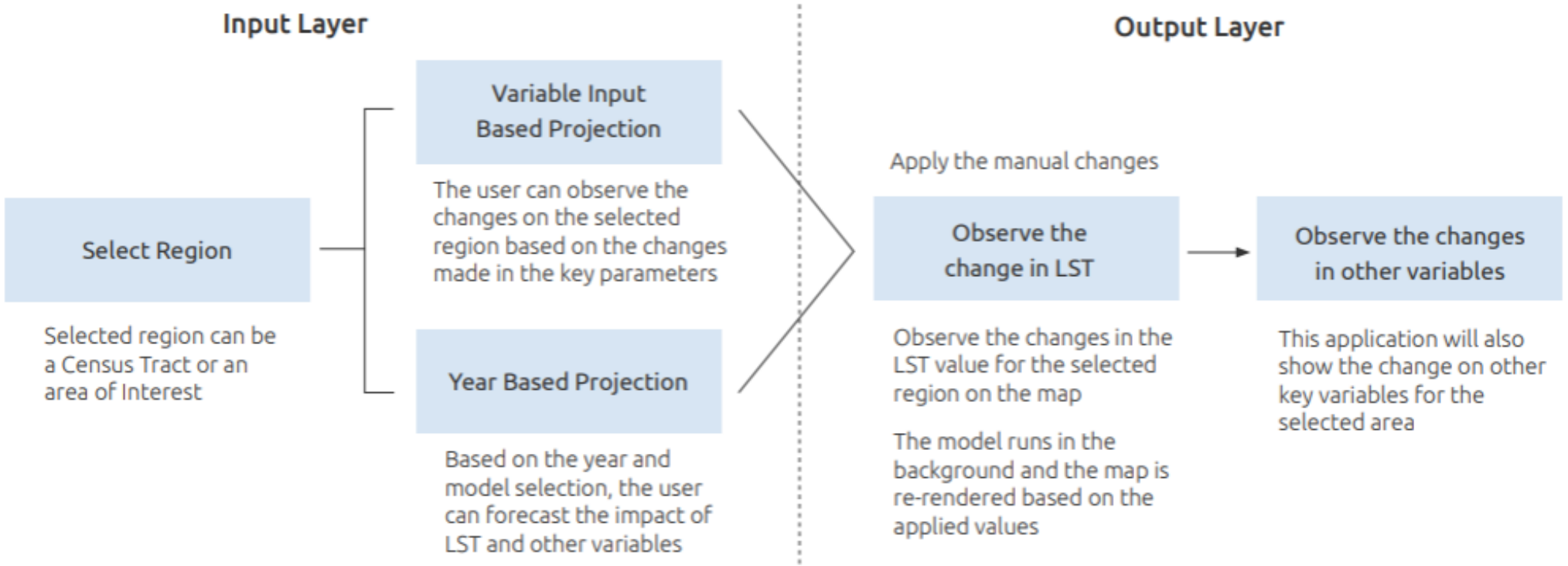
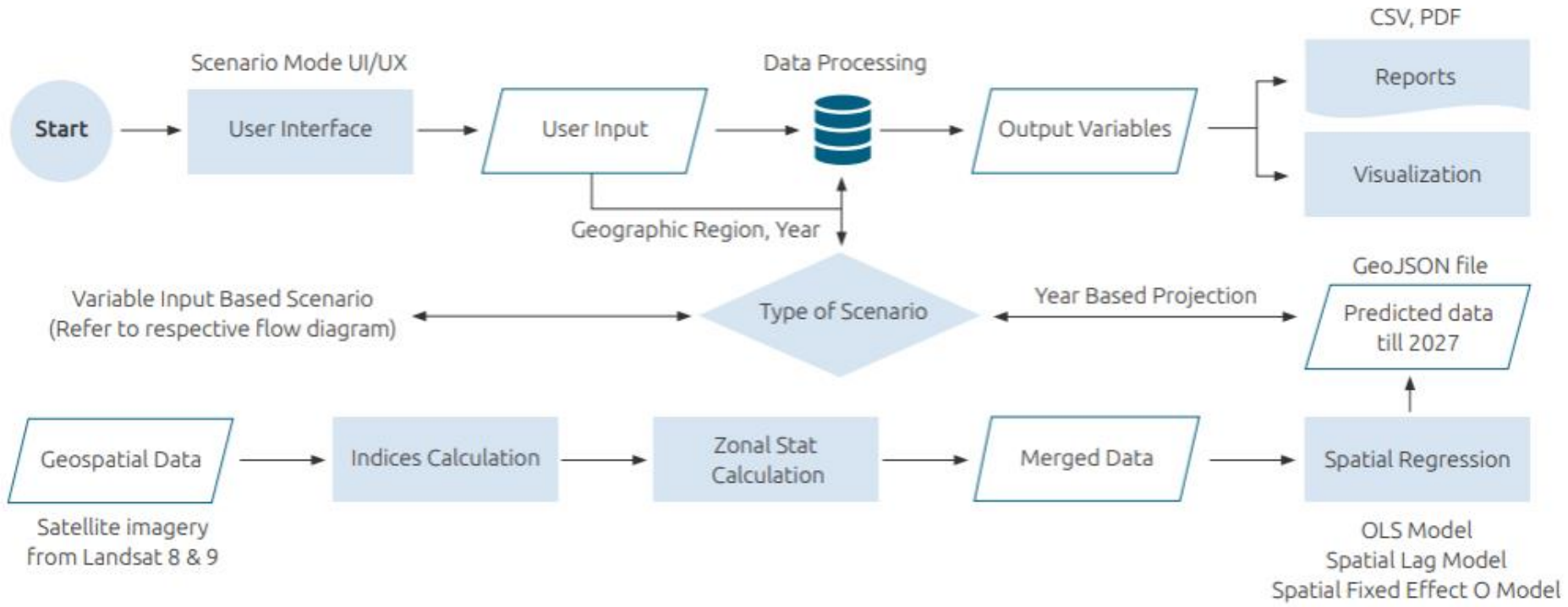


Figure 3 - Overview of the Scenario Mode

Scenario Mode: Year Based Projection Work Flow



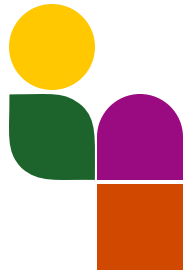
Impacts & Use-Cases Among Partners

City of Calgary

- Climate risk profiles for all 23 neighbourhoods
  - Helped identify where to prioritize locations of shading and cooling amenities by setting higher standards for street trees and cooling in the warmest areas.
- Planning of 10 public infrastructure projects, 5 planning proposals.
- Demonstrated the effect of roads and paved spaces on heat, with the highest temperatures being around paved parking lots and rooftops.
- Demonstrated the cooling effect of park and natural assets, particularly of water bodies.
- Replicated the application for direct integration into their own data visualization platform.

Toronto & Region Conservation Authority

- Sustainable Neighbourhood Action Plan (SNAP) and Partners for Project Green (PPG) program teams
- Integrated in PPG's Heat Mitigation and Adaptation Module



Impacts & Use-Cases Among Partners

Peel Region

Asset & Service Vulnerability Initiatives:

Enterprise Climate Change Risk, Financial Planning and Infrastructure Adaptation Assessment

Urban Forest Initiatives:

Urban Forest Strategy Update

Urban Forest Management Plan

Peel Canopy Cover Assessment Update

Natural Green Infrastructure Inventory and Condition Assessment

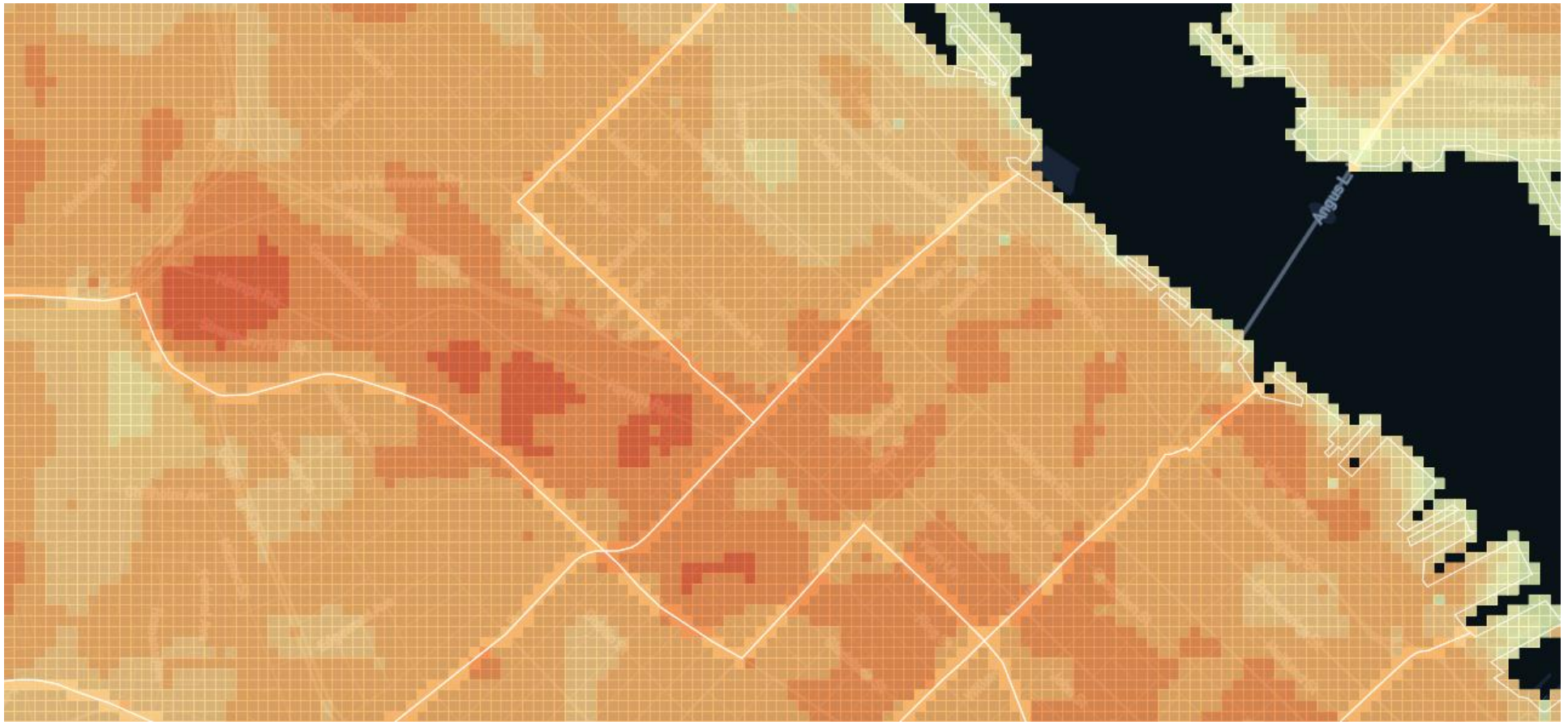
Other Initiatives:

Engineered Green Infrastructure Inventory and Condition Assessment

Climate-informed Emergency Management Planning

Other stakeholders: e.g., Peel Climate Change Partnership

Live Tool Walkthrough



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Thank you!

If you have any questions, please reach out to us.

For more information, please contact:
airesilientcity@evergreen.ca

OR

Joshua Welch

Senior Program Officer
Evergreen
jwelch@evergreen.ca

BREAK

5 minutes

Trivia

Which Canadian city is known for one of the first municipal strategies specifically focused on integrating climate change adaptation into urban forestry planning?

A. Toronto
B. Vancouver
C. Edmonton
D. Montreal

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Toronto launched Canada's first comprehensive municipal climate adaptation strategy in 2008. It included urban forest initiatives to combat heat, manage stormwater, and improve air quality. The plan positioned green infrastructure, like trees and parks, as key tools in building a resilient city, especially in vulnerable neighborhoods most affected by climate change.

Let's Welcome the Climate Risk Institute

Erik Sparling & Jane Zhang

Breakout Rooms

10-15 minutes

Q&A GROUP DISCUSSION

Wrap up

- Our next webinar on social vulnerability mapping is on **August 13, 2025**.
- Please fill out the upcoming survey linked in the chat.
- Look out for the MUNICIPAL CLIMATE & ADAPTATION NEEDS DATA TEMPLATE

Closing

If you have any questions from today's presentations or would like to leave a comment about our series, please email Josh Welch, at **jwelch@evergreen.ca**.

THANK YOU