Ajax Community Climate Adaptation Plan

Project Breakdown

Phase 1:
Ajax Climate Model

- Data collection
- Stakeholder Consultation
- Climate Model Layer Generation Maps
- Climate Model Analyses Report

Phase 2:
Climate Vulnerability Studies

- Natural Capita and Climate Vulnerability Assessment
- Overland and Stormwater Flooding Forecast Report
- Emergency Preparedness and Response Assessment Report
- Climate Vulnerability Study Summary report

Phase 3:
Community Climate Adaptation Plan

- Branding and Marketing
- Stakeholder Consultation
- Public Consultation
- Final Plan
- Approval
- Implementation

Climate Modelling for Ajax

What's the Issue?

Temperature Increase

- t_{max} >30°C: 3 days/year to **16.8** days/year,
- t_{max} >35°C: 0 days/year to **1-4** days/year
- **4**°C avg; higher in winter

More Heatwaves & Humidity

- 30°C more than 2 days : 0.025 events/year to 3.9 events/year
- Increased Humidex > than 40°C eq. (great discomfort) projected increase from 3 to **17** events/year.
- Greater than 'dangerous' level (45°C eq.): 0 to **3.2** events/year
- Peak humidex in 2040s: **48°C eq.**

Precipitation Changes

- Approx. **16 %** increase in snow & rain
- Increased significant rainfall events (>50mm in 6 hours) from 1.5 events/year 2000-2009 to **5.3** events/year 2040-2049
- Reduction in the number of days with snow more than 5 cm **75%**
  - January more rain **138%** and less snow **67%**
  - February more rain **233%** and less snow **77%**

More severe storms

- Potential for violent storms up **7% for Ajax**
- Projected increase in days with high potential for lightning **59% for Ajax**
- Increased wind storms including tornados (risk of Tornados could increase by **59 %** by 2049.

Risk Assessment (qualitative)

- In order to determine which weather scenarios are most likely to impact trees you must conduct a Risk Assessment.

- **Risk** is a function of:
  - **Likelihood:** The probability of an impact occurring
    - **x**
  - **Consequence:** The known or estimated consequences of the impact

Scoring of risk is on a scale of **1-5**

		Consequence				
		None	Minimal	Moderate	Severe	Extreme
Likelihood	High	2	2	4	5	5
	Frequent	2	2	3	4	5
	Occasional	2	2	3	4	4
	Rare	1	2	2	3	3
	Not Likely	1	1	2	3	3

Main priorities

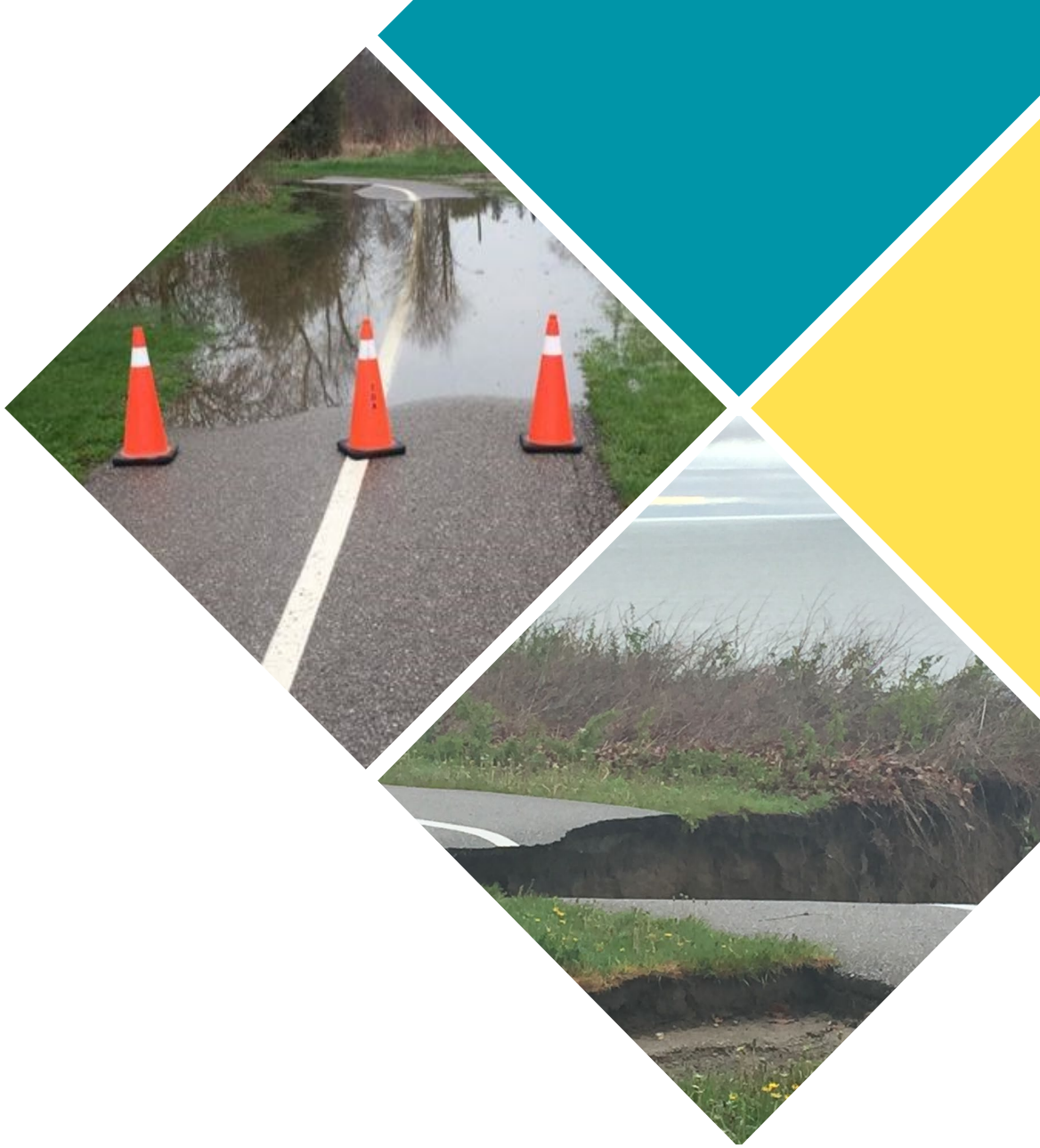
- Flooding (urban & riverine)
- Natural environment & Urban Forestry
- Emergency Response
- Social impacts

Ajax's GIS Climate Vulnerability Model

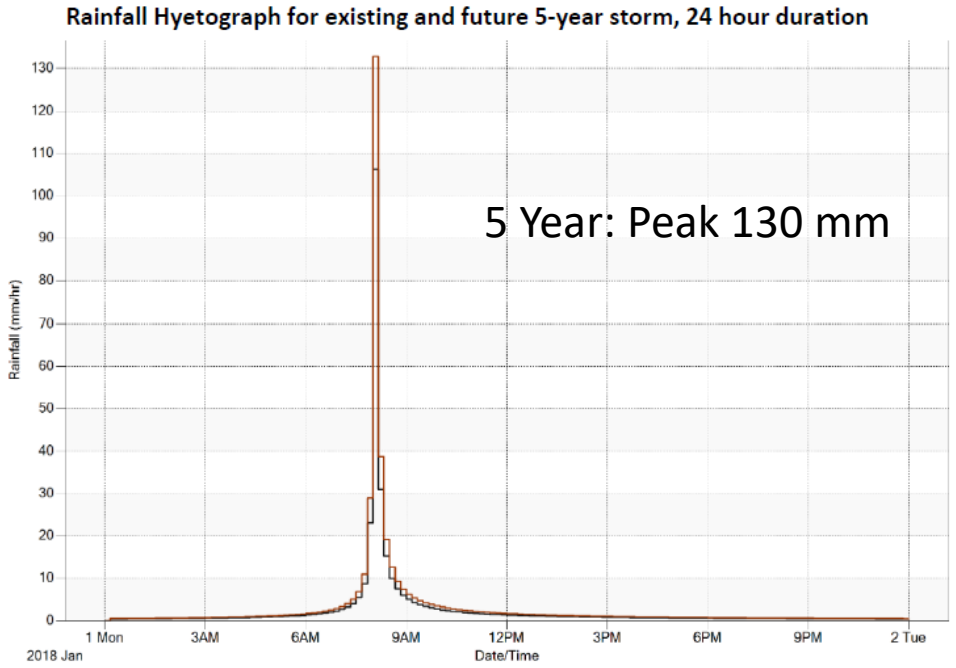
Stormwater and Overland Flooding

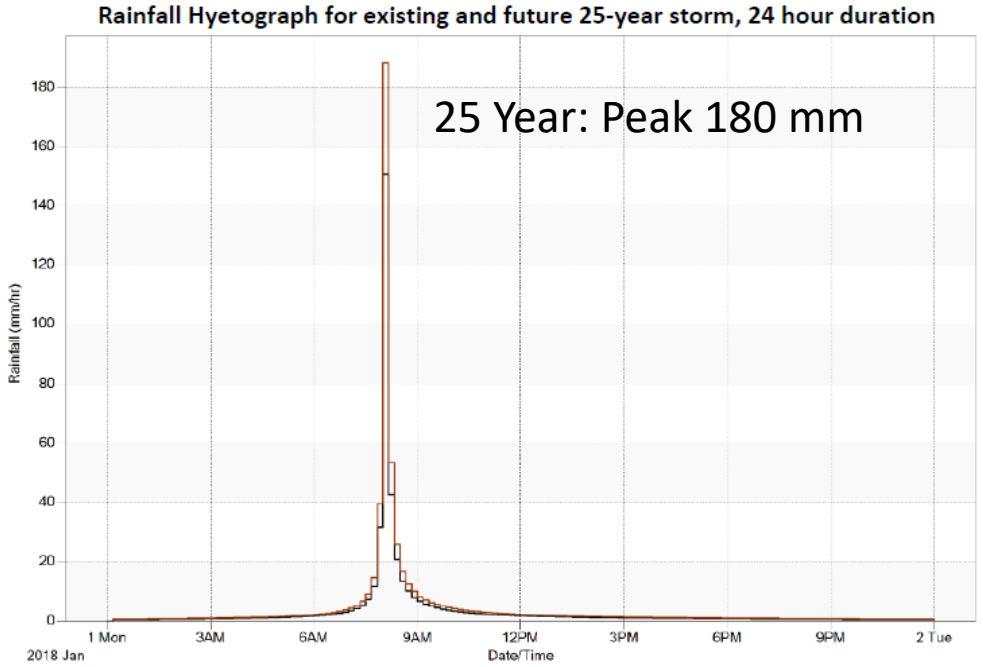
Stormwater and Overland Flooding

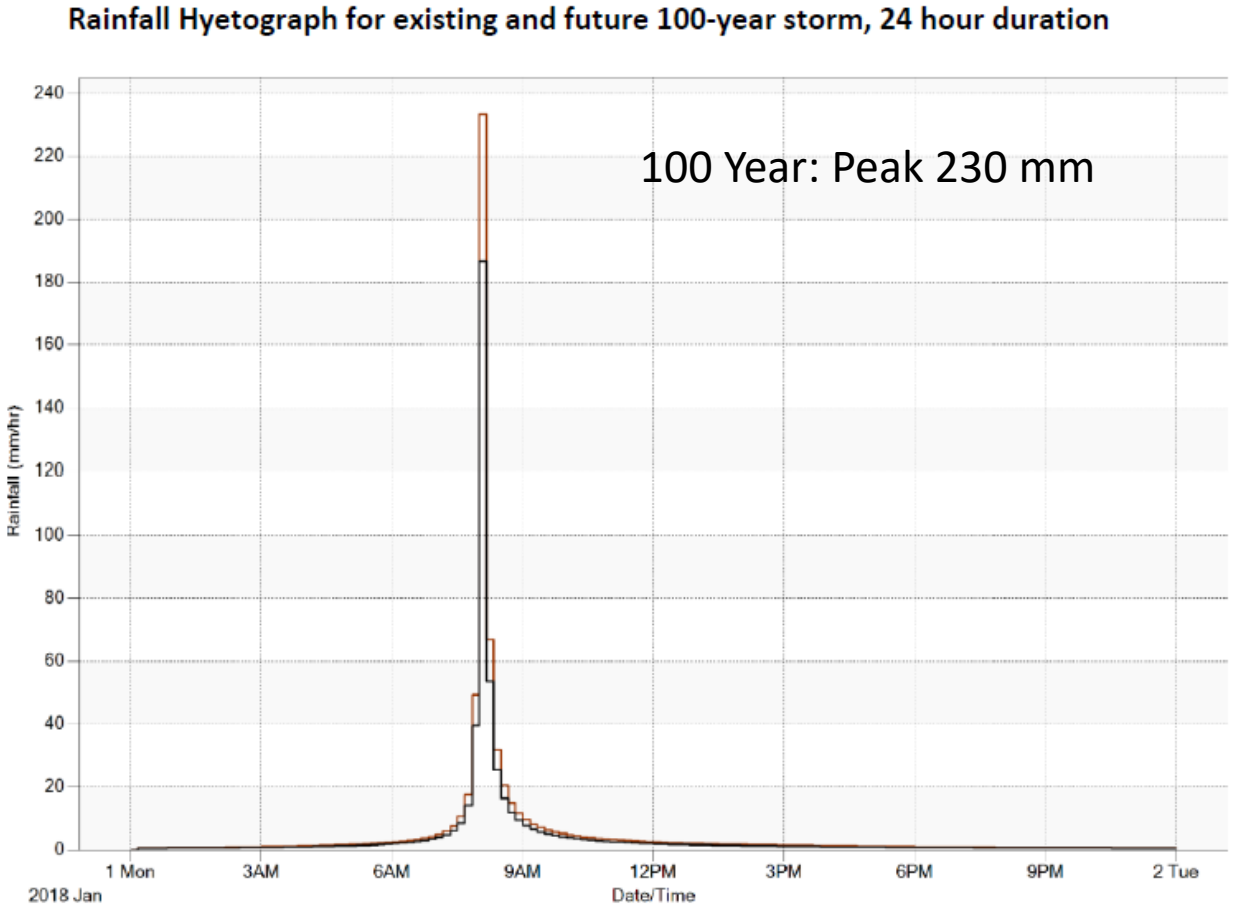
- The Stormwater and Overland Flooding Report identified areas within the Town that are potentially vulnerable to flooding (pluvial & fluvial).
- Included an assessment of the Town's stormwater sewer system performance during minor and major stormwater events
  - **Tested under two scenarios:** current conditions and future climate change conditions



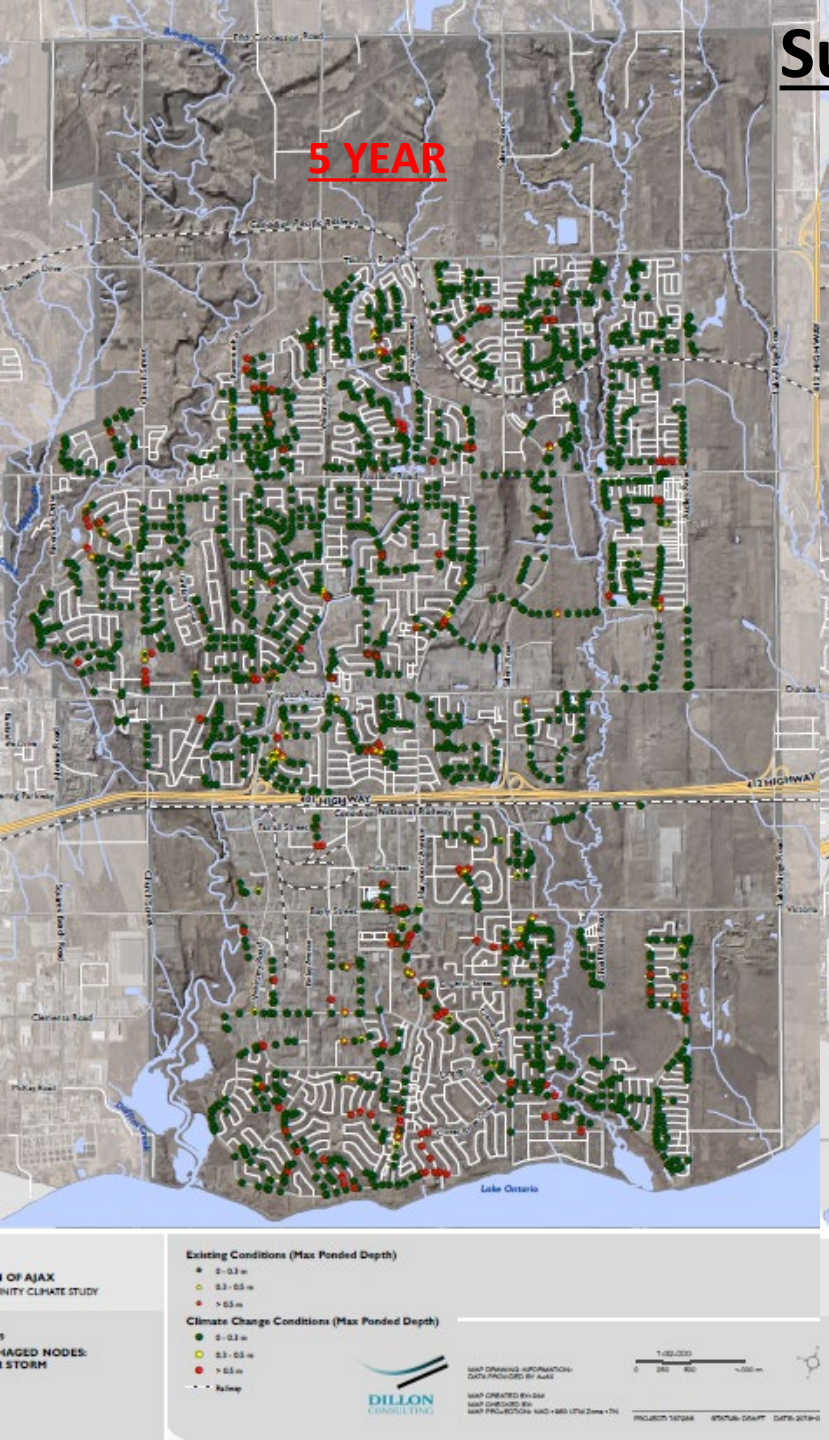
PC SWMM Model Hyetograph for Precipitation

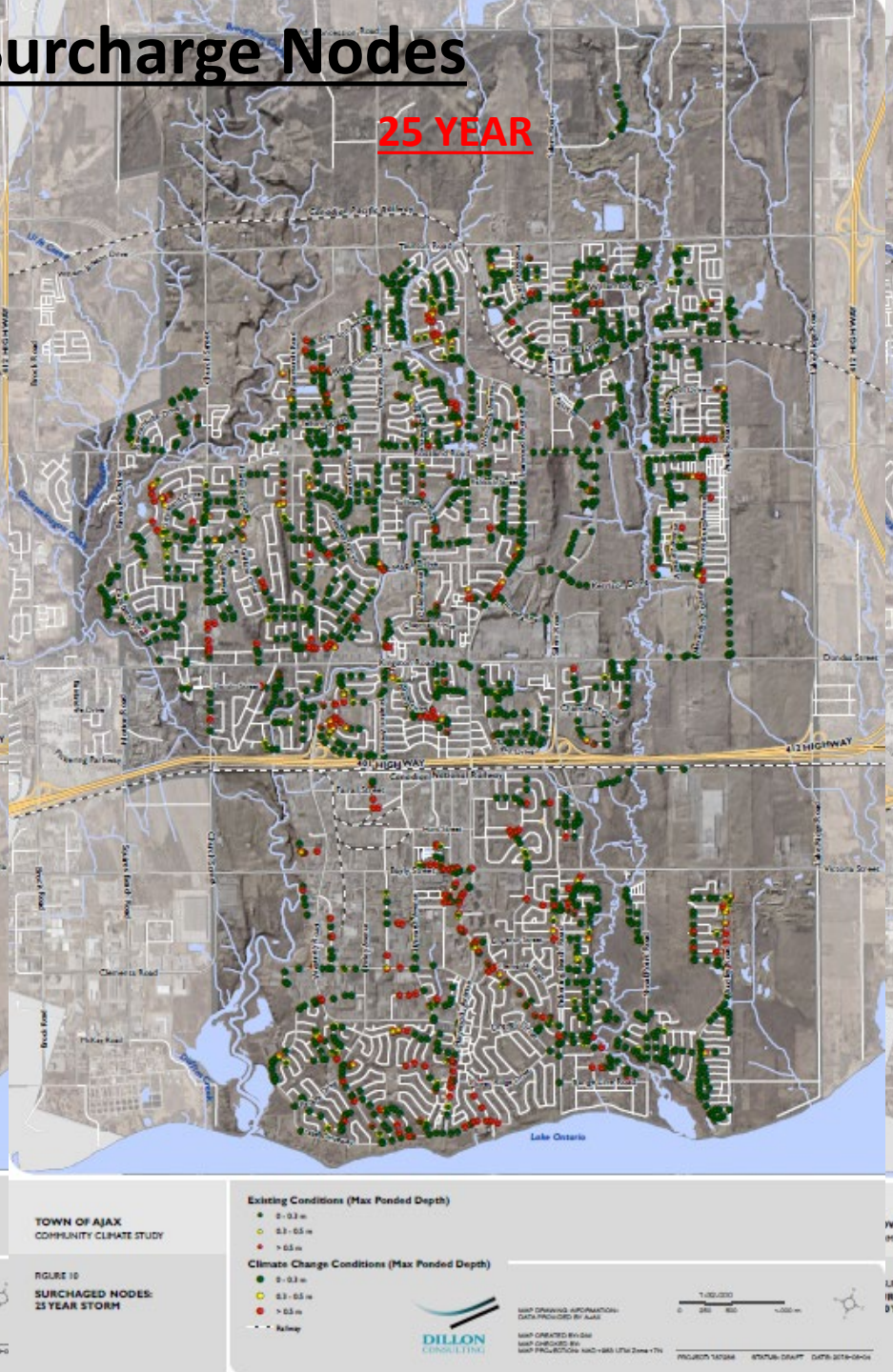


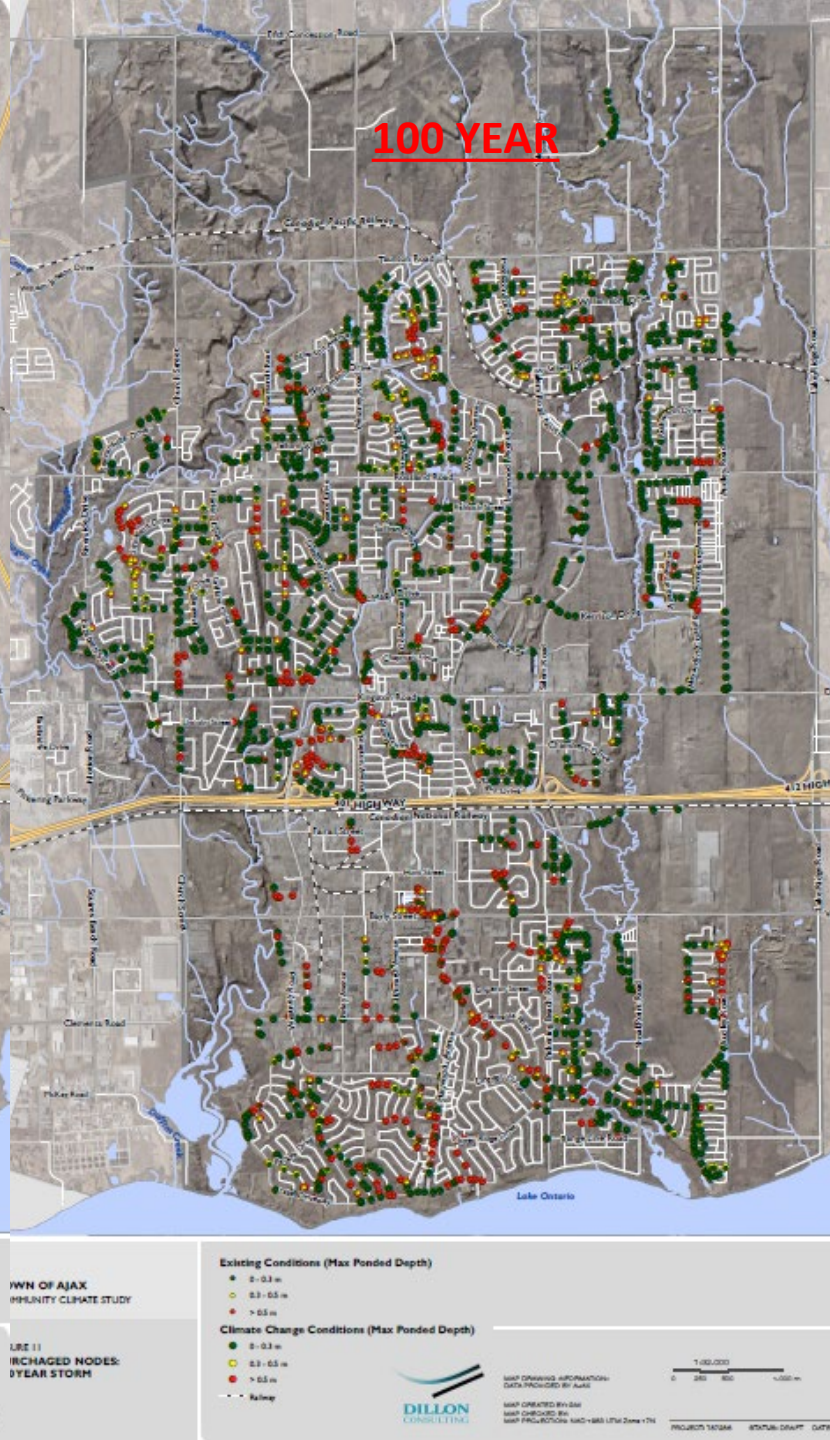


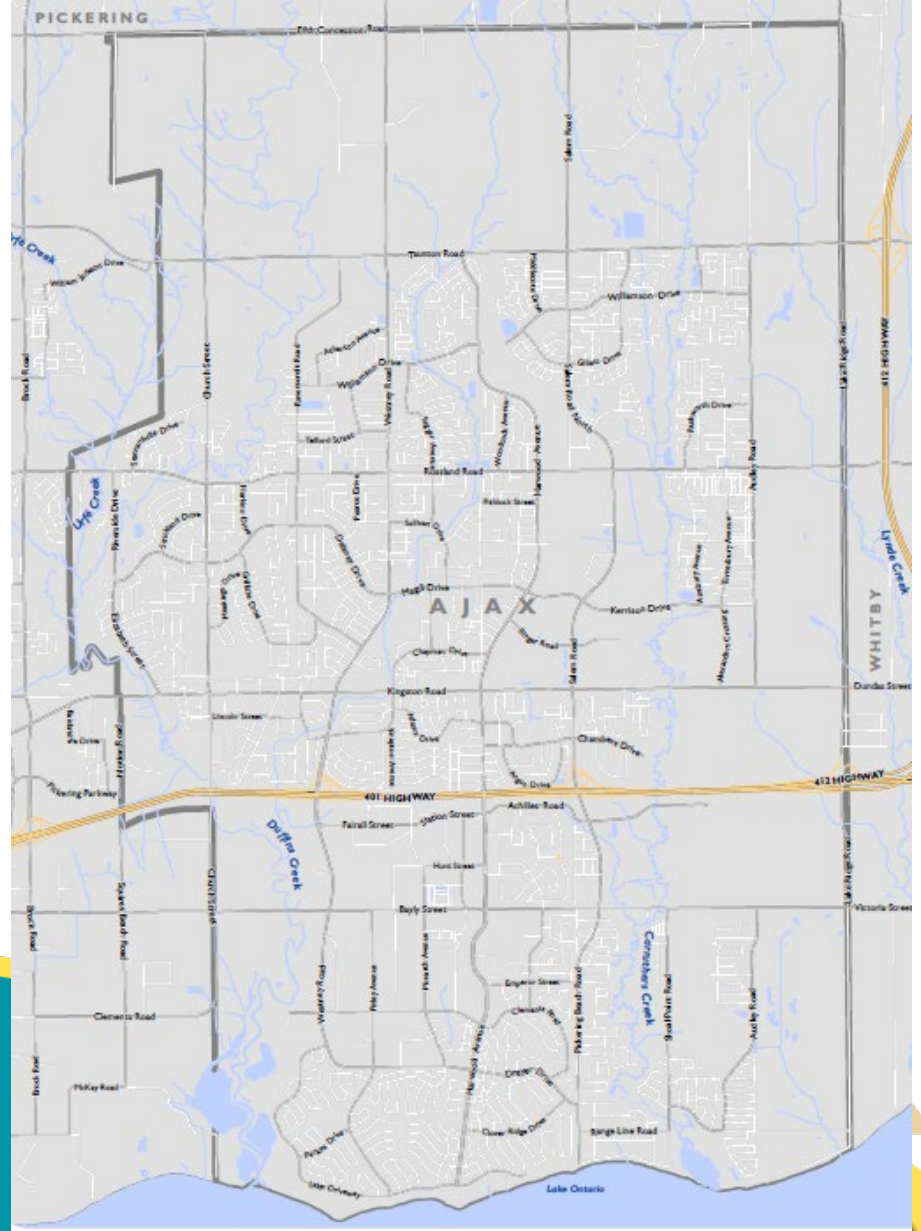


Surcharge Nodes





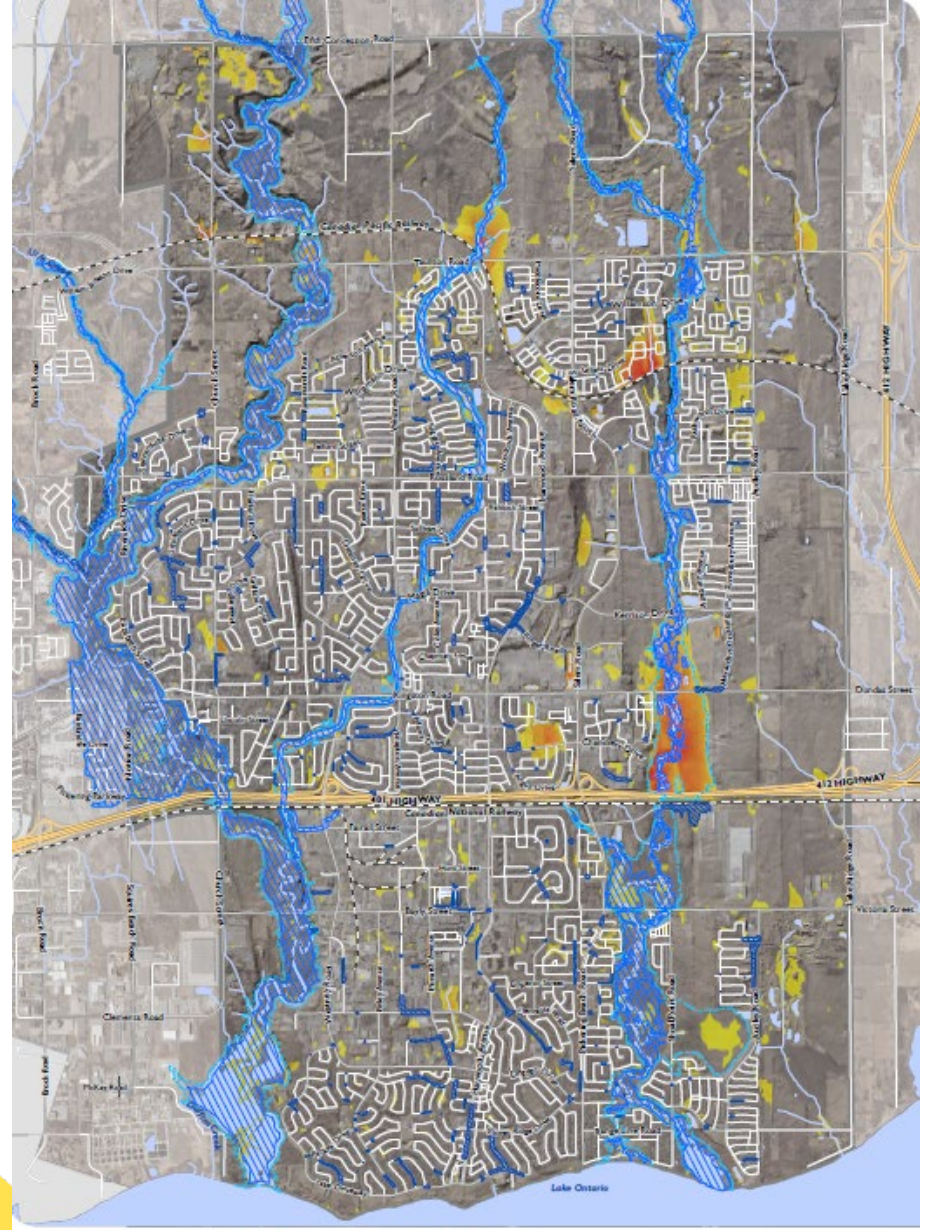




TOWN OF AJAX
COMMUNITY CLIMATE STUDY

FIGURE 1
OVERVIEW OF WATERBODIES

DILLON CONSULTING

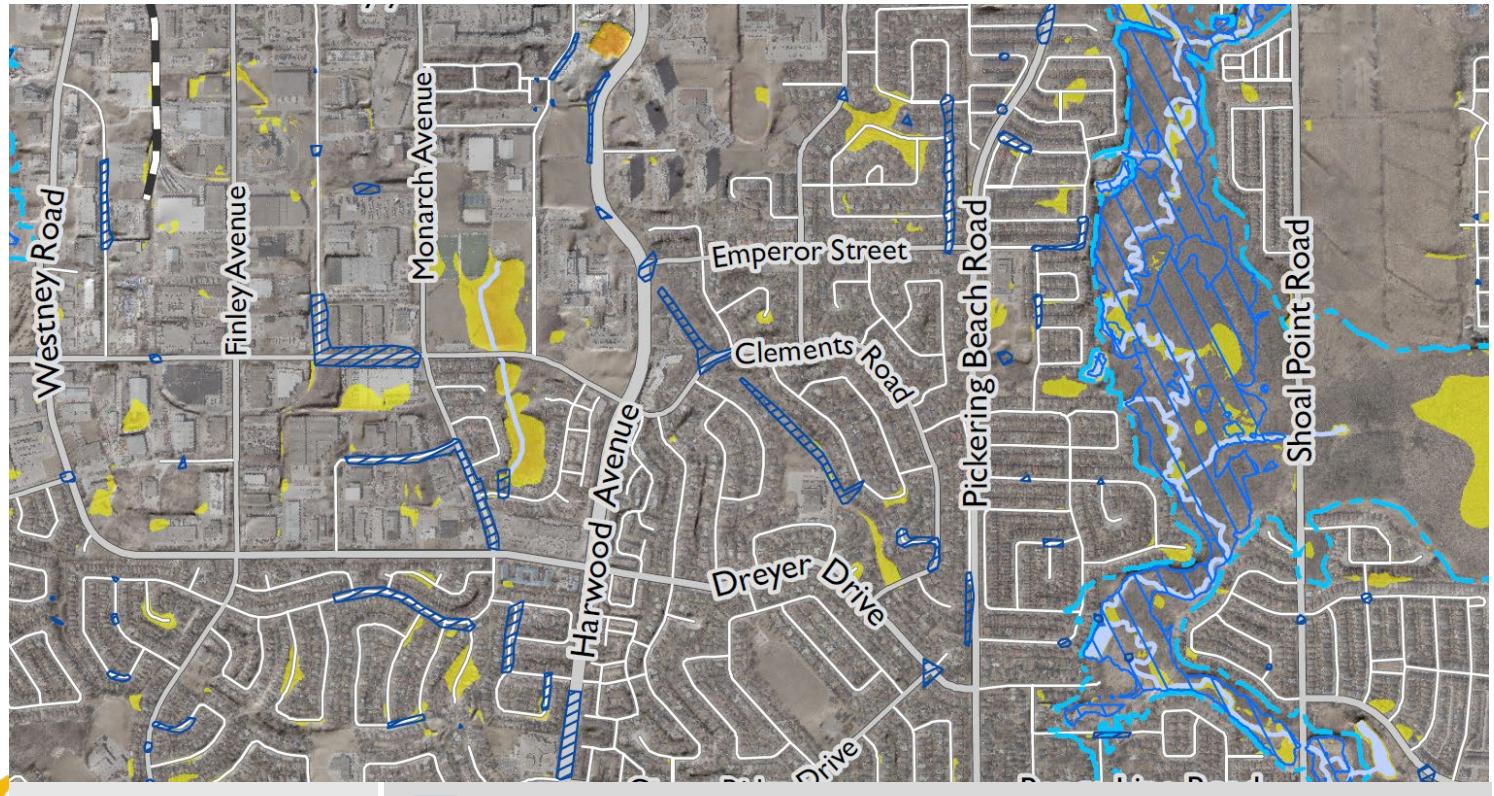


TOWN OF AJAX
COMMUNITY CLIMATE STUDY

FIGURE 12
FLOOD VULNERABILITY MAP

Depression (m)

DILLON CONSULTING



TOWN OF AJAX
COMMUNITY CLIMATE STUDY

FIGURE 21

FLOOD VULNERABILITY MAP

100 Year Climate Change Overland Flooding Extent
100 Year Climate Change Riverine Flooding
Railway
Regional Floodline

Depression (m)
High : 0
Low : -8.87717

DILLON CONSULTING

2017 Breaklines, Contours, Drainage or DTM provided by © First Base Solutions
2017 Orthophotography provided by © First Base Solutions

MAP CREATED BY: GM
MAP CHECKED BY:
MAP PROJECTION: NAD 1983 UTM Zone 17N

1:32,000
0 250 500 1,000 m

PROJECT: 187286 STATUS: DRAFT DATE: 2018-10-12

Natural Capita

Natural Capita

The potential vulnerabilities of natural capita assets in response to conditions predicted in the 2049 Durham Region climate model were assessed and evaluated.

Natural Capita Assets included within the model included:

MUNICIPAL TREES

WOODLAND AND WETLAND COMMUNITIES

OPEN SPACE

Natural Capita Study Objectives

Urban Forest

- Threats to urban forests based on species & plant hardiness;
- Tree conflicts with infrastructure (electrical and communication)
- Identification of areas susceptible to heat island effect
- Response of major diseases & pests to climate change

Natural Environment

- Areas where climate change could impact species at risk
- Wetland & other sensitive habitat susceptible to drought

Municipal Tree Data

Ajax's Existing Municipal GIS Inventory data for trees found on boulevards and parks (*excluded private or woodlot trees*)

- Additional species added based on the presence of known ELC communities
- In total, 57 tree species were selected for analysis (93.3% of the total municipal trees within the Town's tree database)
  - Trees removed by Town due to Emerald Ash Borer (EAB) infestation were not included in analyses

1,455 trees in the data set were missing information (e.g. species name, etc.)

- These data points were removed from the data set

45.465 individual trees included in the Town data set

Bioclimatic Data

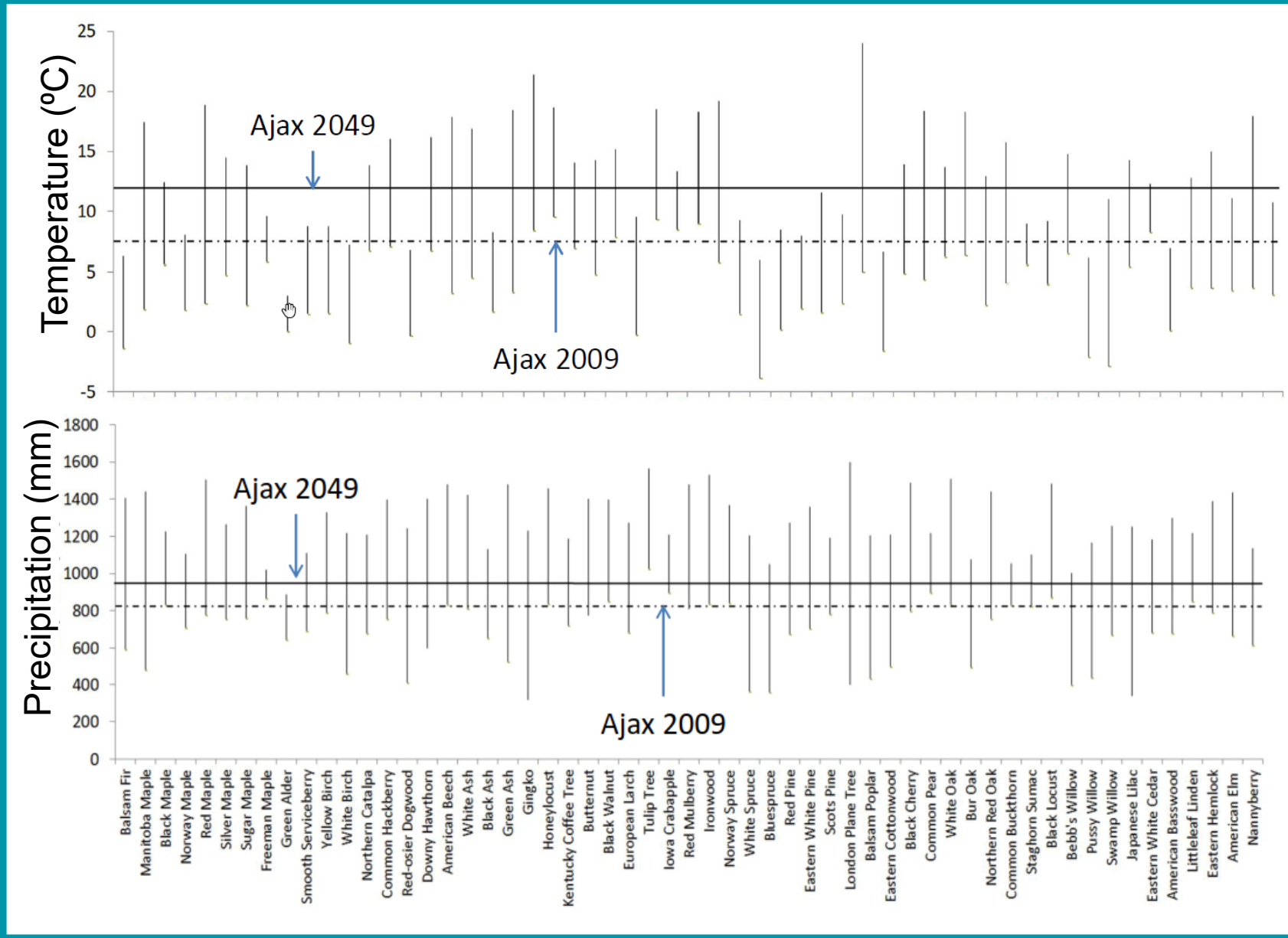
Six Natural Resource Canada bioclimatic variables were used in the model to represent the climate envelope of each tree species:

- ANNUAL MEAN TEMPERATURE
- MINIMUM TEMPERATURE OF THE COLDEST MONTH
- MAXIMUM TEMPERATURE OF THE WARMEST MONTH
- ANNUAL PRECIPITATION
- PRECIPITATION IN THE WARMEST QUARTER
- PRECIPITATION IN THE COLDEST QUARTER

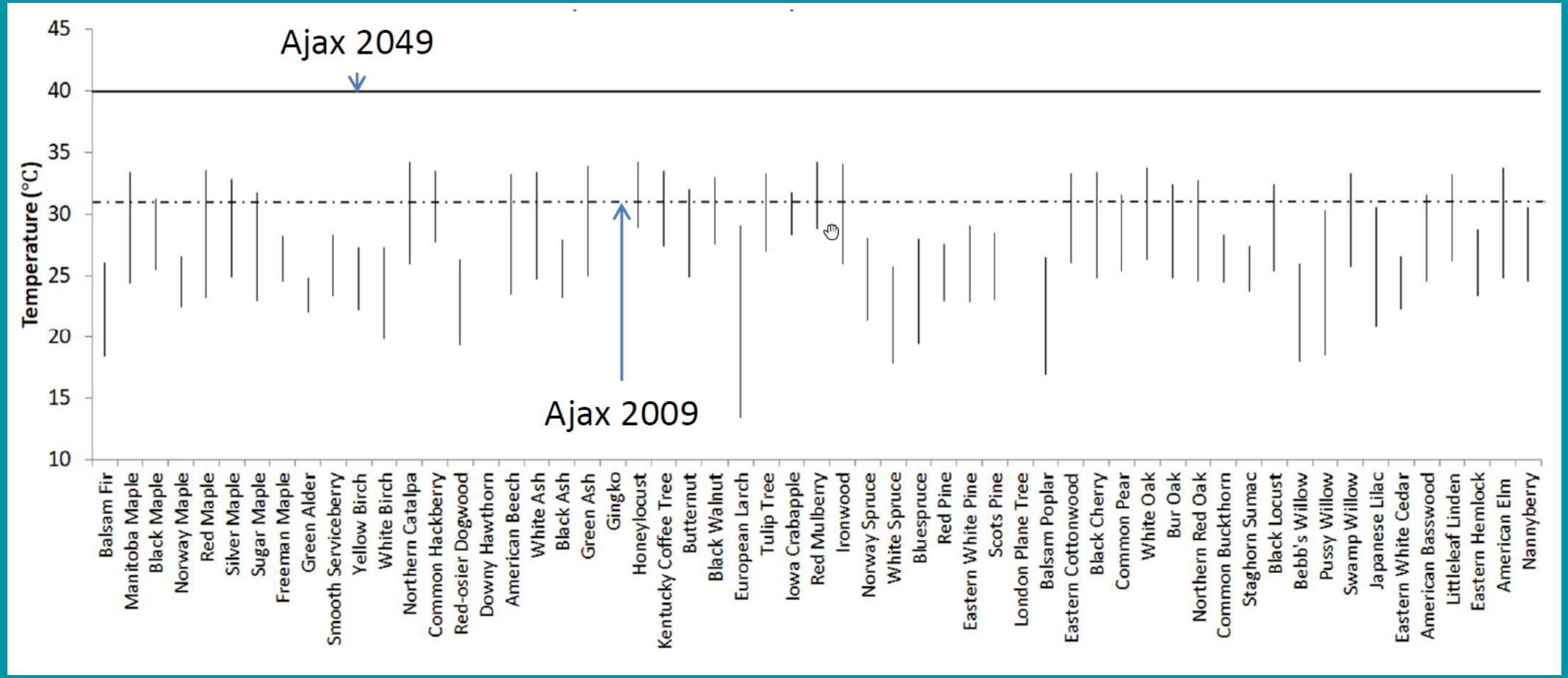
Bioclimatic Envelopes

Several tree species had bioclimatic envelopes outside of the predicted mean <u>ANNUAL</u> temperature level:

- Eastern White Cedar (*Thuja occidentalis*)
- Bebb's Willow (*Salix bebbiana*),
- Freeman Maple (*Acer x freemanii*),
- Green Alder (*Alnus viridis*),
- Yellow Birch (*Betula alleghaniensis*),
- White Birch (Betula papyrifera)
- European Larch (*Larix decidua*),
- Norway Spruce (*Picea abies*)
- White Spruce (*Picea glauca*)

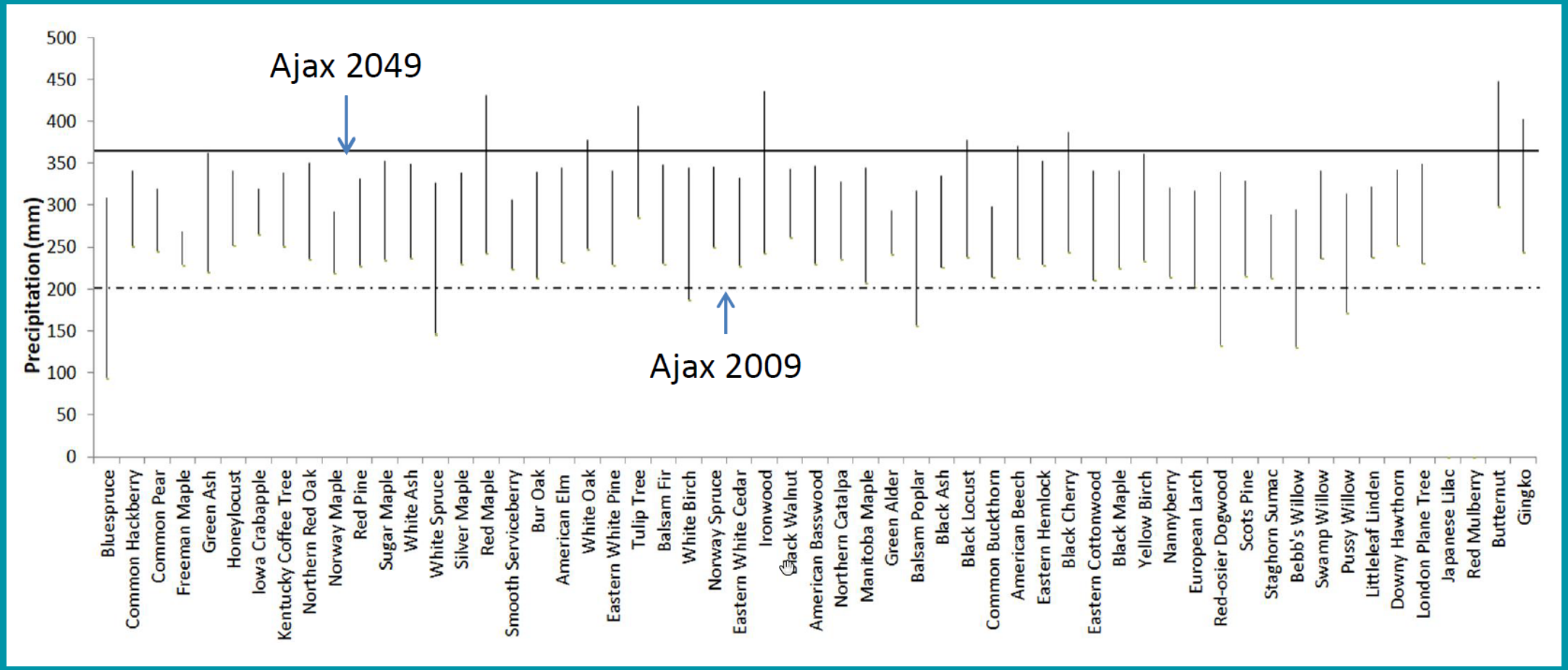


Bioclimatic Envelopes- Maximum Temperature



Trees assessed contained bioclimatic envelopes below the maximum predicted temperature (40 °C) according to the regional climate model.

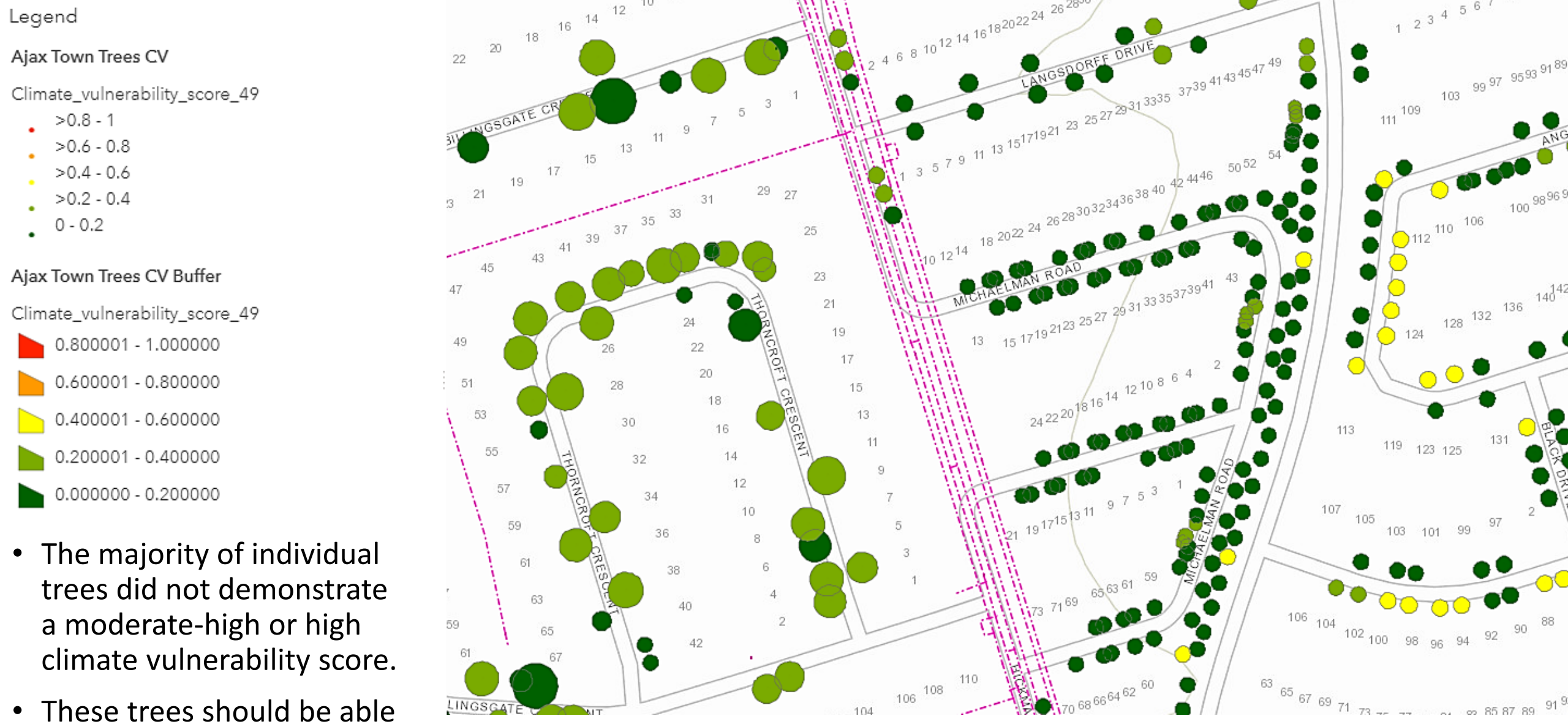
Bioclimatic Envelope - Precipitation



Most municipal tree species have bioclimatic envelopes that fall between the 2009 and 2049 levels modeled for precipitation in the warmest months

CPA (estimated by dbh) are represented in individual trees by the size of circles.

Climate Vulnerability Score (Trees)



- The majority of individual trees did not demonstrate a moderate-high or high climate vulnerability score.
- These trees should be able to survive under projected climate conditions.

Climate Vulnerability Score (Tree Canopy & Infrastructure)

- Supplemental data provided to the Town can be queried to determine the location of salt tolerant tree species.

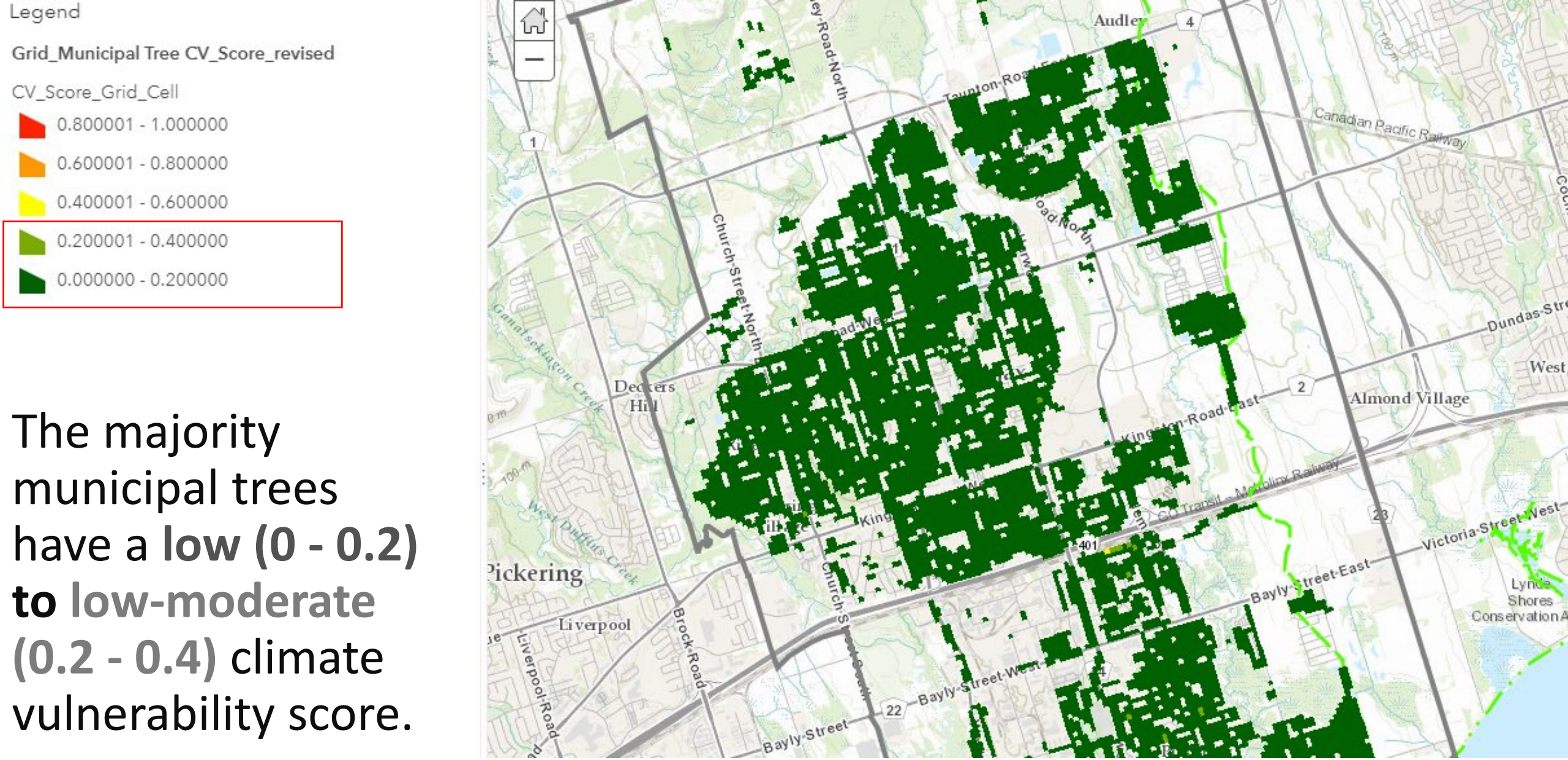
- **1 = salt tolerance**
- **0 = salt intolerant**

Climate Vulnerability Score (Salt Tolerance)

- Supplemental data provided to the Town can be queried to determine the location of drought tolerant tree species.

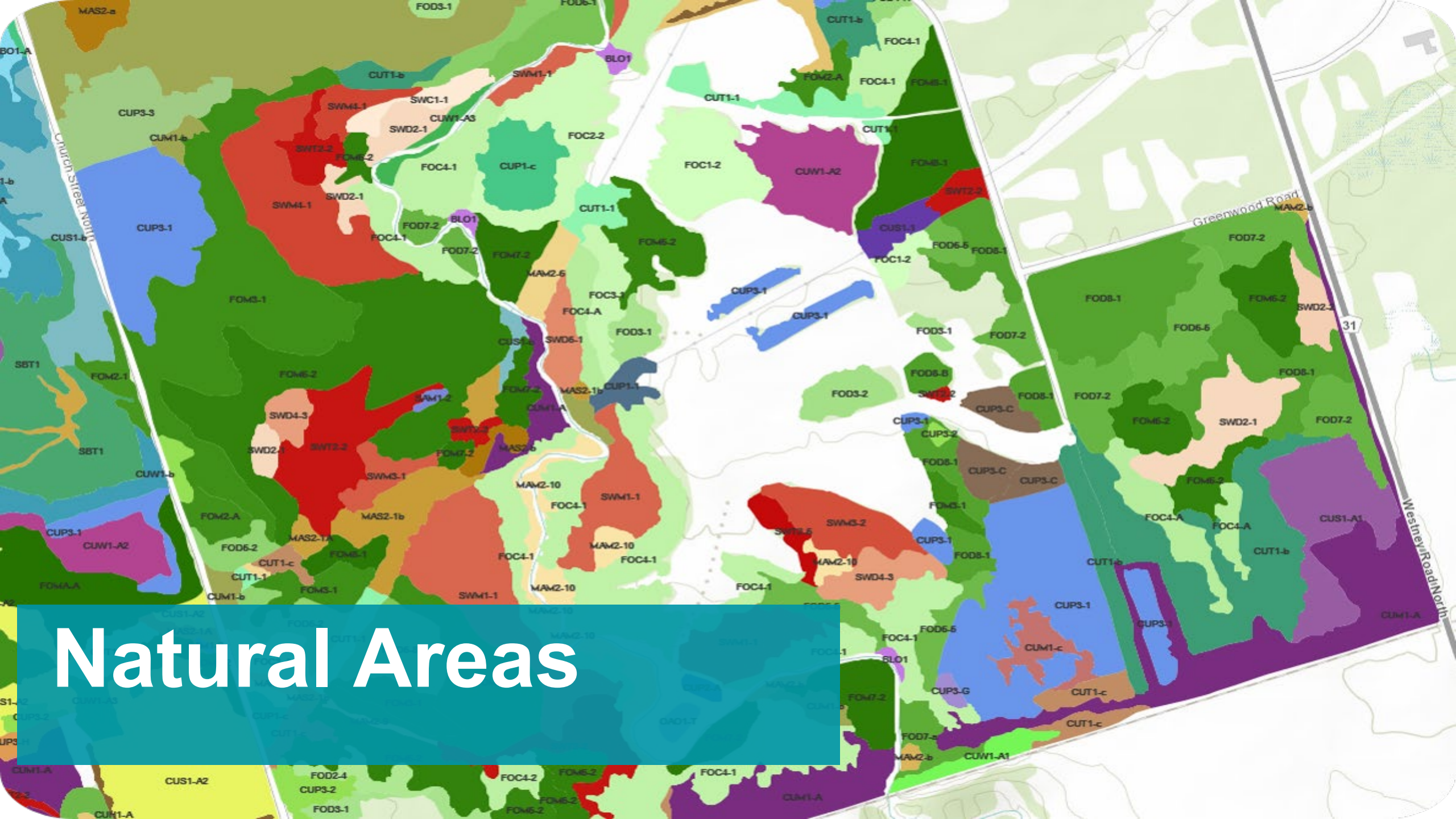
- **1 = drought tolerance**
- **0 = drought intolerant**

Climate Vulnerability Score (Drought Tolerance)



The majority municipal trees have a **low (0 - 0.2) to low-moderate (0.2 - 0.4)** climate vulnerability score.

Climate Vulnerability Score (Tree Grids)

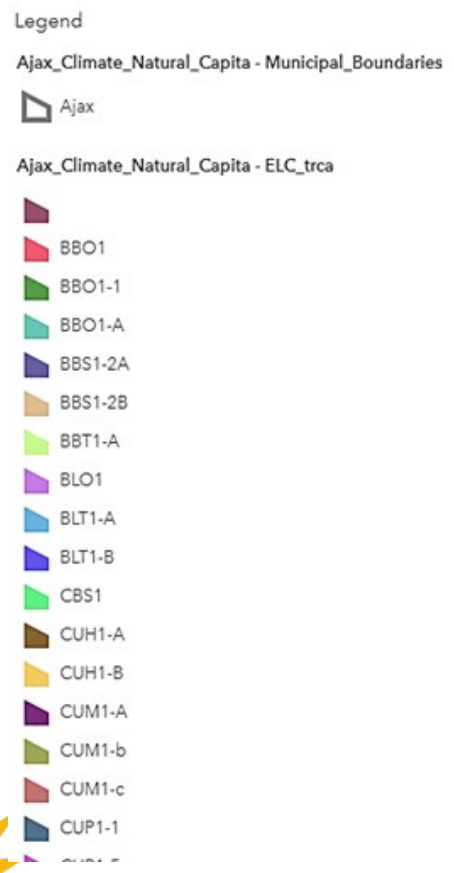


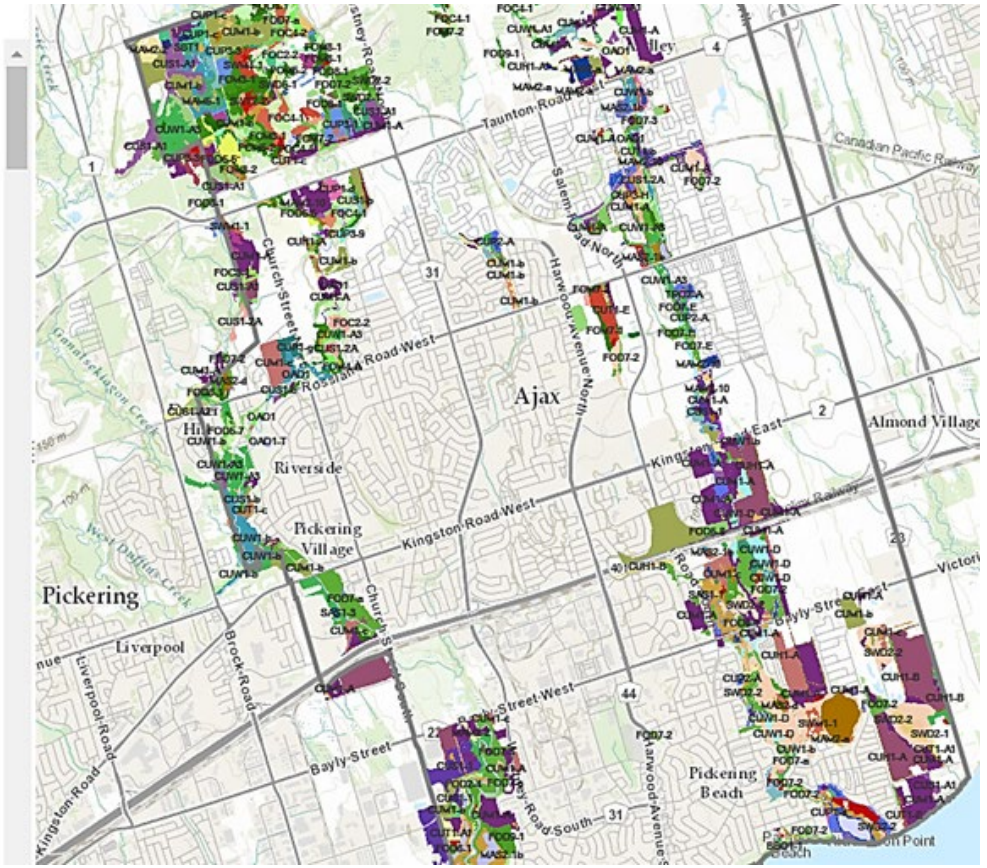
Natural Areas

Climate Vulnerability Score - Natural Areas

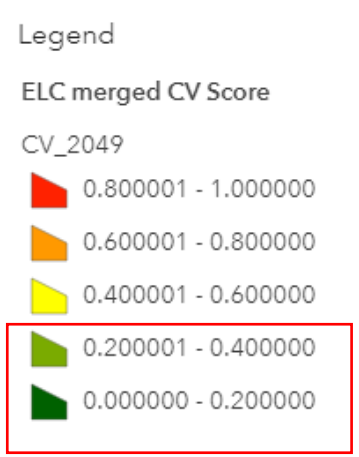
The vulnerability assessment of treed natural areas was based on the average climate vulnerability scores for the dominant tree species within vegetation communities

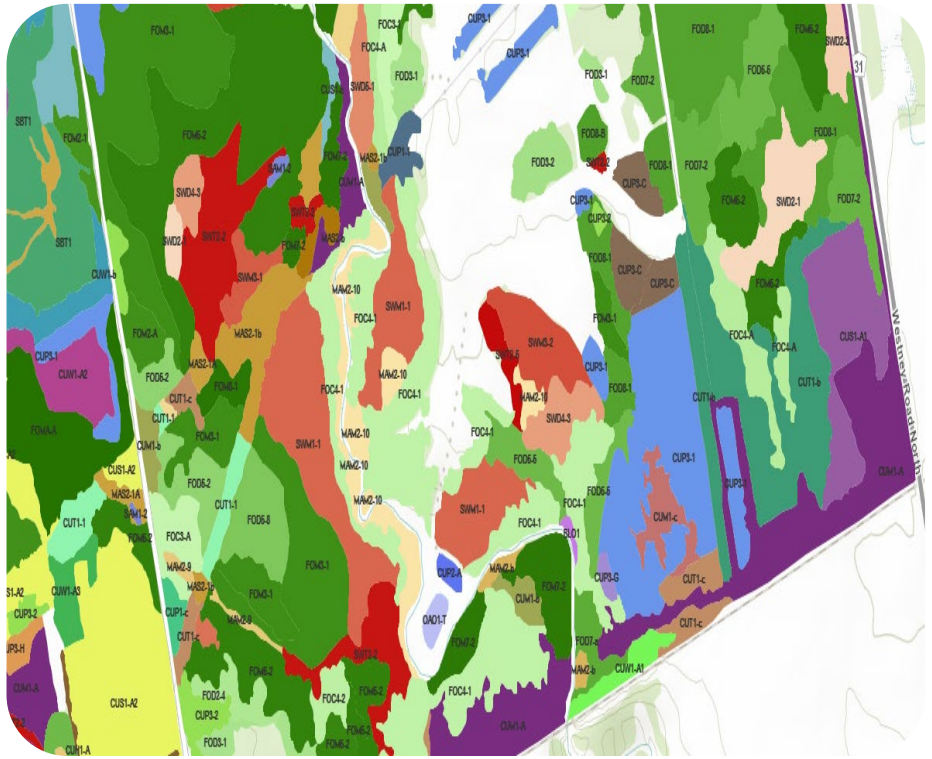
- Existing ELC Data was obtained from TRCA and CLOCA
- Where overlaps in data existed, data information from TRCA was used.





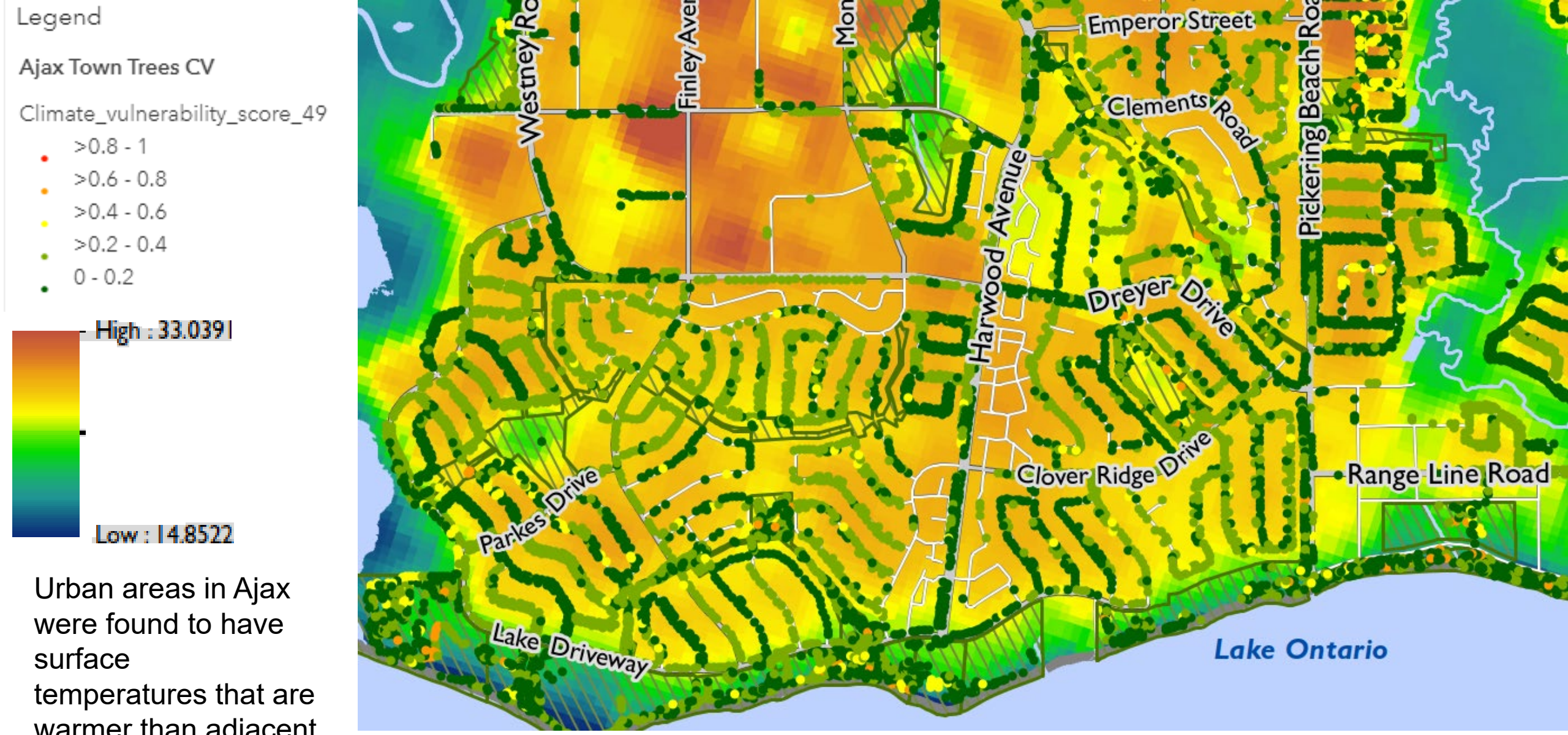
Ecological Land Classification (TRCA)





Climate Vulnerability Score – Natural Areas

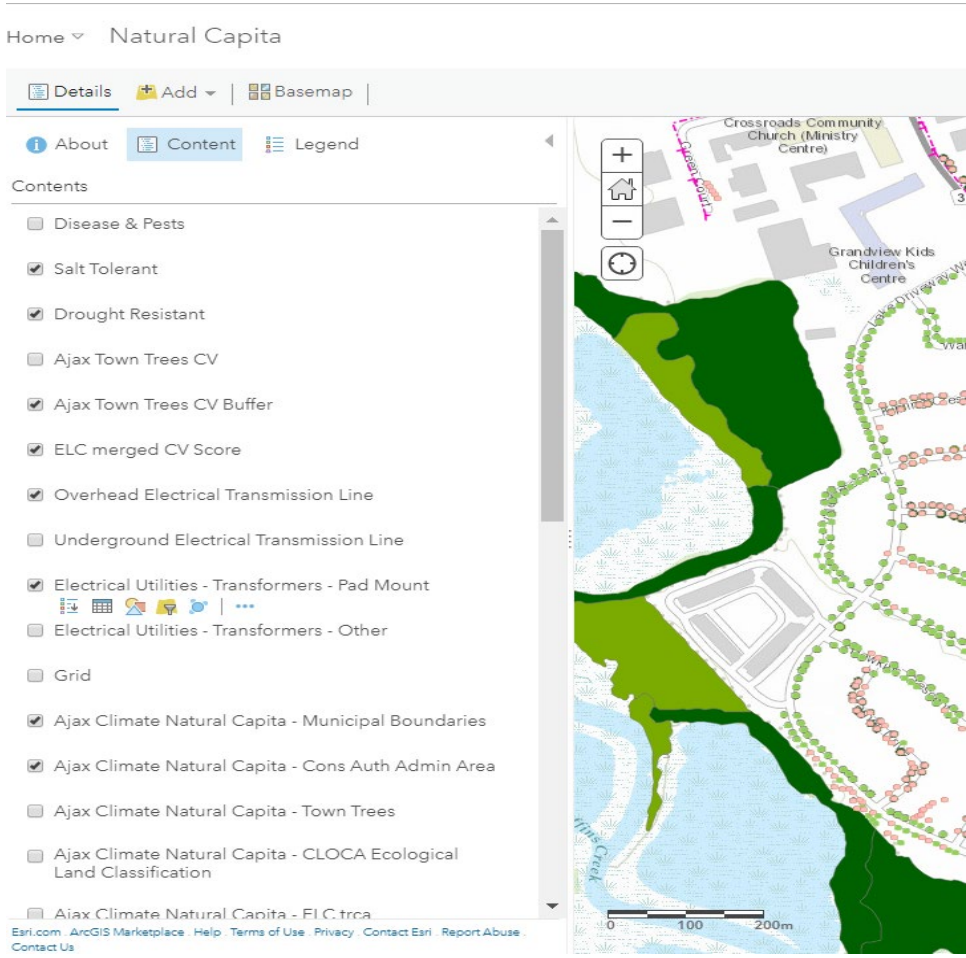
There were no treed natural areas with moderate to high climate vulnerability scores as the individual scores for dominant trees within these vegetation communities are ranged from low-moderate to low.



Urban areas in Ajax were found to have surface temperatures that are warmer than adjacent areas with vegetative cover.

Climate Vulnerability Score – Surface Air Temperature (Heat Island)

- The Climate Model will integrated into the Town's GIS system for use as an urban forest asset management tool
- Allows for improved maintenance and monitoring of urban trees and treed natural areas whilst considering climate change:
  - Examine operational programming and scheduling of hazard risk monitoring activities
  - Review tree planting specifications to determine appropriate tree selection, proper installation and maintenance.
  - Review natural feature monitoring and adaptive management programs within the natural heritage system to track risk factors (in conjunction with Conservation Authorities)



Application and Town Use

Emergency Management & Response

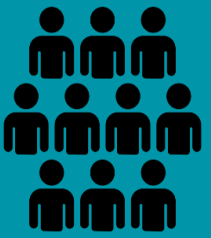
Emergency Response and Preparedness

- The Emergency Response and Preparedness report included a vulnerability assessment to identify threats and risks faced by the Town of Ajax as a result of a changing climate.
- The vulnerability assessment was conducted around four key topics:

DEMOGRAPHICS

LOCAL PARTNERS AND RESOURCES

VULNERABLE BUILDINGS



POPULATION DENSITY

Emergency Preparedness and Response

Demographics

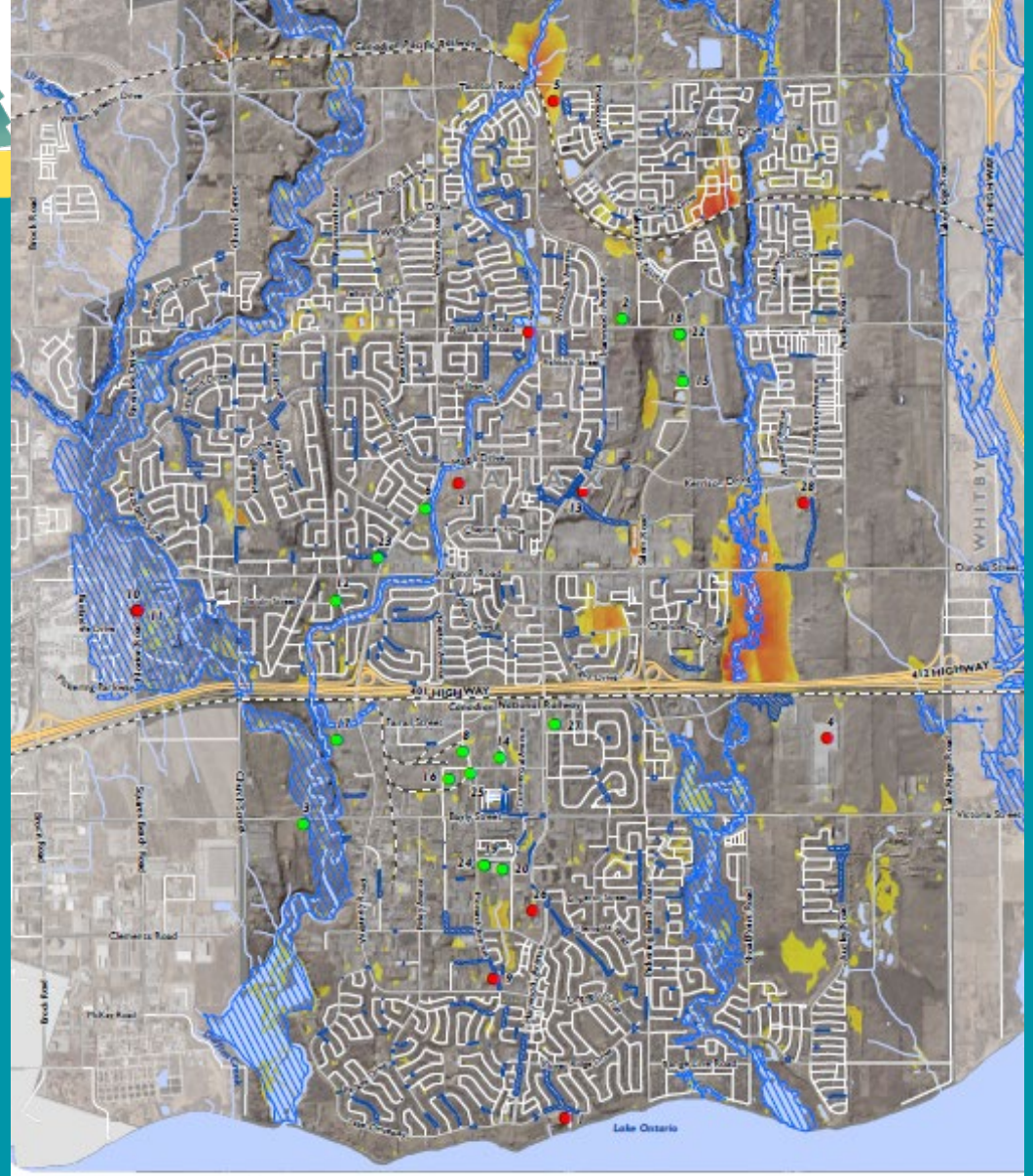
- Low Income Individuals
- Seniors
- Children
- Pregnant Women
- Individuals with Pre-existing Medical Conditions
- Individuals Living in Certain Locations
- Immigrants
- Occupational Groups
- Individuals with Disabilities

Local Partners and Resources

- Red Cross
- St. John's Ambulance
- Salvation Army
- Durham Catholic District School Board
- Durham District School Board
- Durham Region Health Department
- Central Lake Ontario Conservation Authority
- Toronto and Region Conservation Authority
- Local service clubs (e.g., Optimist, Rotary, etc.).

Vulnerable Buildings

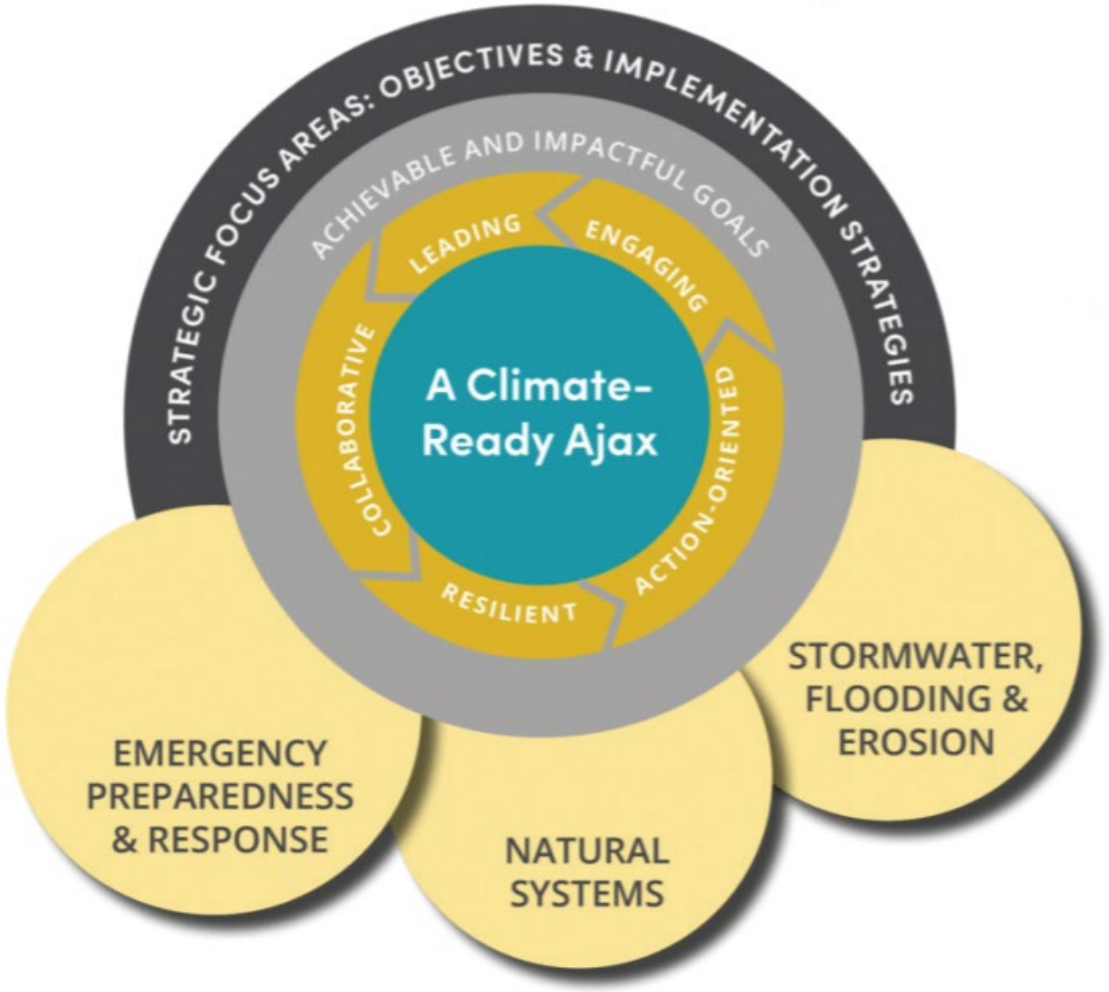
- licenced child care facilities
- retirement homes
- schools
- long term care facilities
- emergency shelters
- housing outreach services
- social housing
- group homes
- detention centres


401 HIGHWAY
412 HIGHWAY
WHITBY
Lake Ontario
Clements Road
Brock Road
Canadian National Railway
Critical Infrastructure (Assigned Risk Level)
High
Low
100Year Climate Change Overland Flooding Scenario
100Year Climate Change Riverine Flooding
Railway
Depression (m)
High : 0
Low : -0.87717
TOWN OF AJAX
COMMUNITY CLIMATE STUDY
CRITICAL INFRASTRUCTURE
DILLON CONSULTING

CLIMATE RISK & RESILIENCY PLAN

- Approved in June 2019 to provide a strategic framework to address current and future climate change risks.
- 10-year Implementation Strategy was approved at the same time

Framework for the Ajax Climate Risk and Resiliency Plan



- The plan is organized in to 8 objectives that flow across all three main strategic focus areas

OBJECTIVE #5: Naturalized urban areas and green infrastructure within the Town are enhanced to be resilient and supportive of biodiversity, to help protect critical and social infrastructure from climate change impacts, and are planned and maintained to limit conflicts with critical infrastructure.

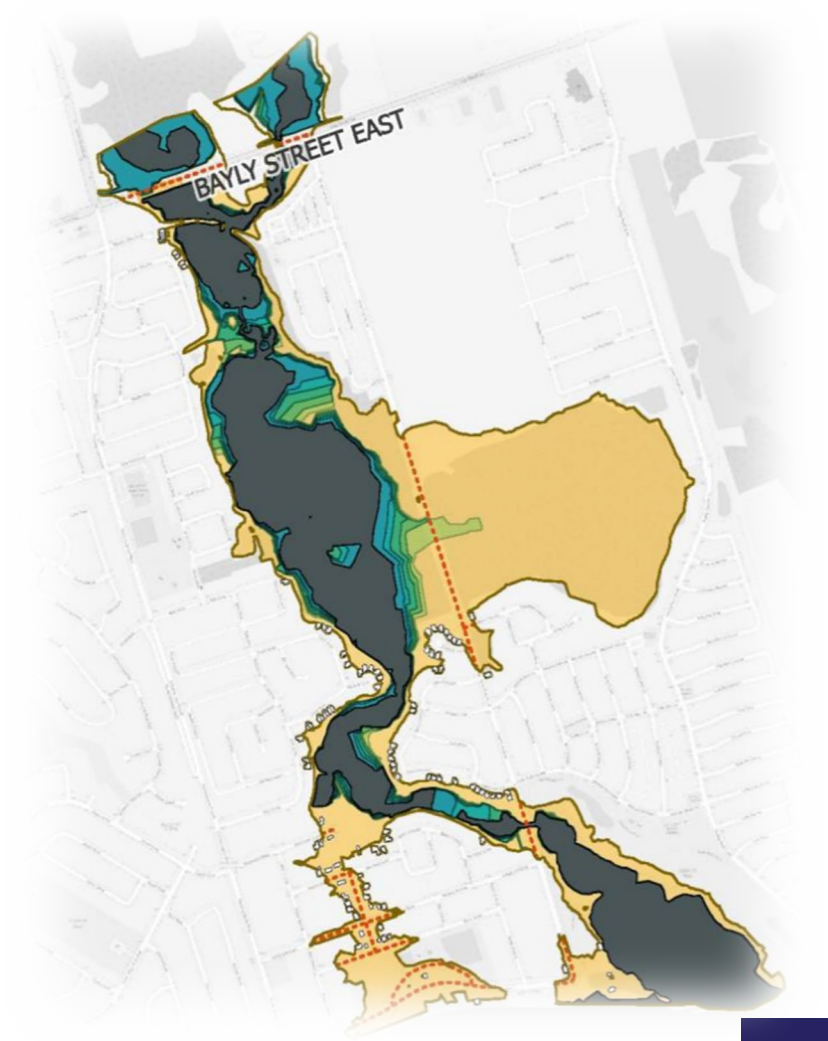
Action		Category	Cost	Timeline	Lead Department(s)	Community Partners	Funding
5.1	Create Green Development and Environmental Design Guidelines that encourage the incorporation of Low Impact Development, naturalized areas, and other types of green infrastructure such as green roofs in new development to help reduce the urban heat island effect and improve energy efficiency.	Regulations, Policies, Guidelines & Standards	$	●●○	Planning & Development Services **Champion(s):** Supervisor of Planning Policy & Research	Conservation Authorities	Internal
5.2	Develop a dataset on public trees and update on an ongoing basis to track growth, canopy cover and tree vulnerability.	Data & Technology	$	Ongoing	Geographic Information Systems; Operations & Environmental Services **Champion(s):** Manager of IT; Supervisor of Forestry	Conservation Authorities	Internal
5.3	Update the Town's Urban Forest Management Plan, incorporating available surface temperature mapping from external agencies, to target planting in areas with limited canopy cover to help reduce surface temperature.	Plans & Studies	$	●●○	Operations & Environmental Services **Champion(s):** Supervisor of Forestry	Conservation Authorities, Natural Resources Canada, Durham Region Health, Durham School Boards	Internal

INVASIVE SPECIES AWARENESS

- Objective: Restore natural heritage systems and manage human health impacts associated with climate change
- Invasive species can have impacts on:
  - Economy (i.e. Emerald Ash Borer)
  - Environment (i.e. loss of biodiversity)
  - Human health (i.e. loss of tree canopy increases heat islands)

INVASIVE SPECIES AWARENESS

- Join Invasive Species Centre's Municipal Community of Practice
- Develop new website and social media content
- Host virtual workshop to raise awareness of invasive species and promote the use of native plants
- Improve health and safety training for staff
  - Identification
  - Associated health risks
  - Management



EMERGENCY PREPAREDNESS AND RESPONSE

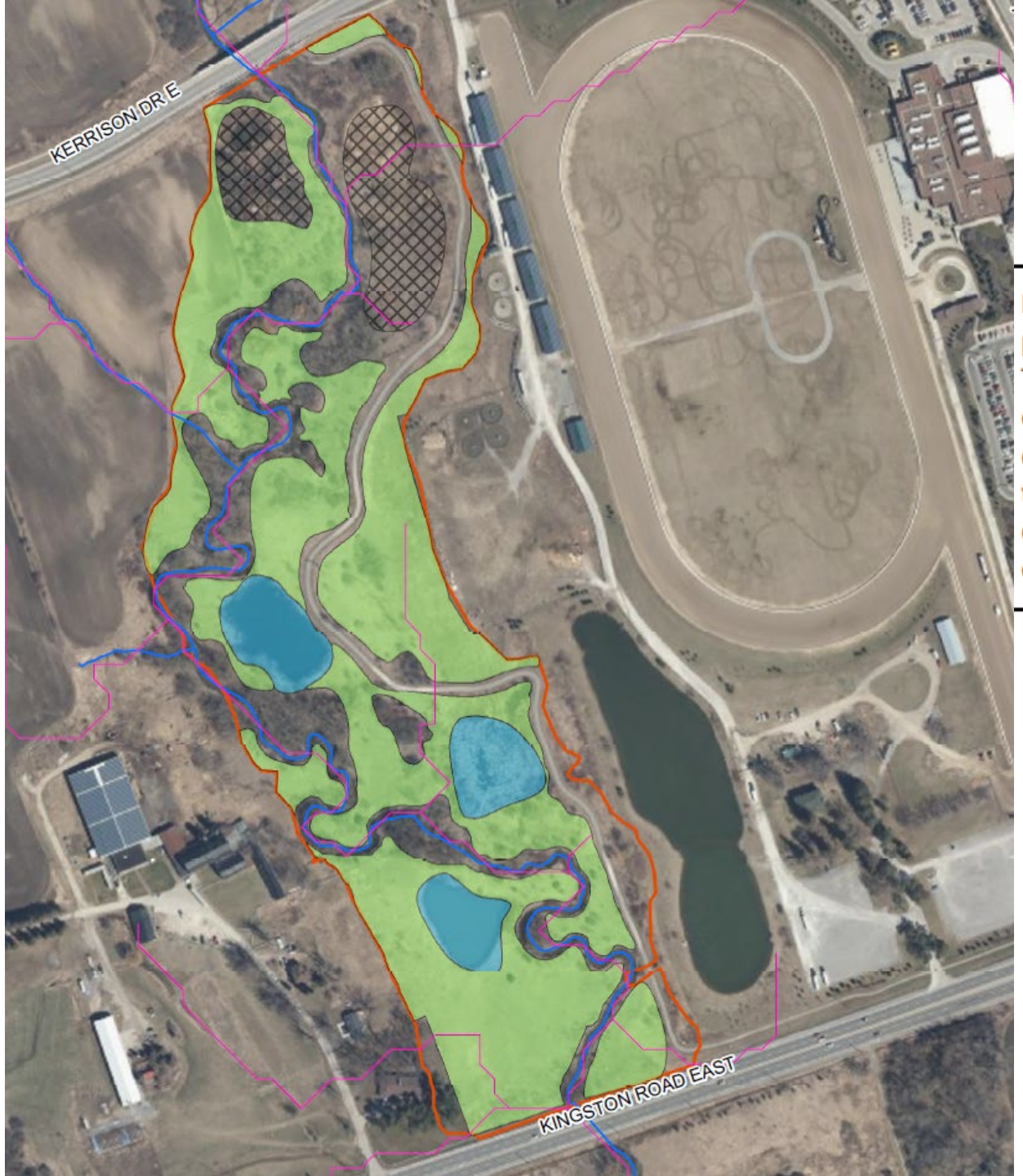
- Communicate to residents, priority populations, and businesses about emergency preparedness
- Complete Emergency Response Plan for Lower Carruthers FVA
- Collaborate and partner to develop and distribute emergency preparedness materials
  - Durham Region *At the Ready*
  - Unflood Ontario initiative
  - Conservation Authorities

WETLAND CREATION & RESTORATION

- **Action 6.3:** Identify appropriate locations for the creation of wetland habitat to support biodiversity and stormwater storage in partnership with Conservation Authorities
  - Completed in November 2020 with Wetland Selection Prioritization report and mapping
  - The report identified four opportunities on publicly-owned land including the Kerrison Wetland opportunity

KERRISON WETLAND PROJECT

- Priority wetland creation and restoration project in Carruthers Creek watershed
- Will create and enhance 2ha of wetland and 6ha of riparian plantings
- Funded using COVID-19 Infrastructure Resilience Fund
  - $250,000 from Town of Ajax
  - $500,000 from Region of Durham



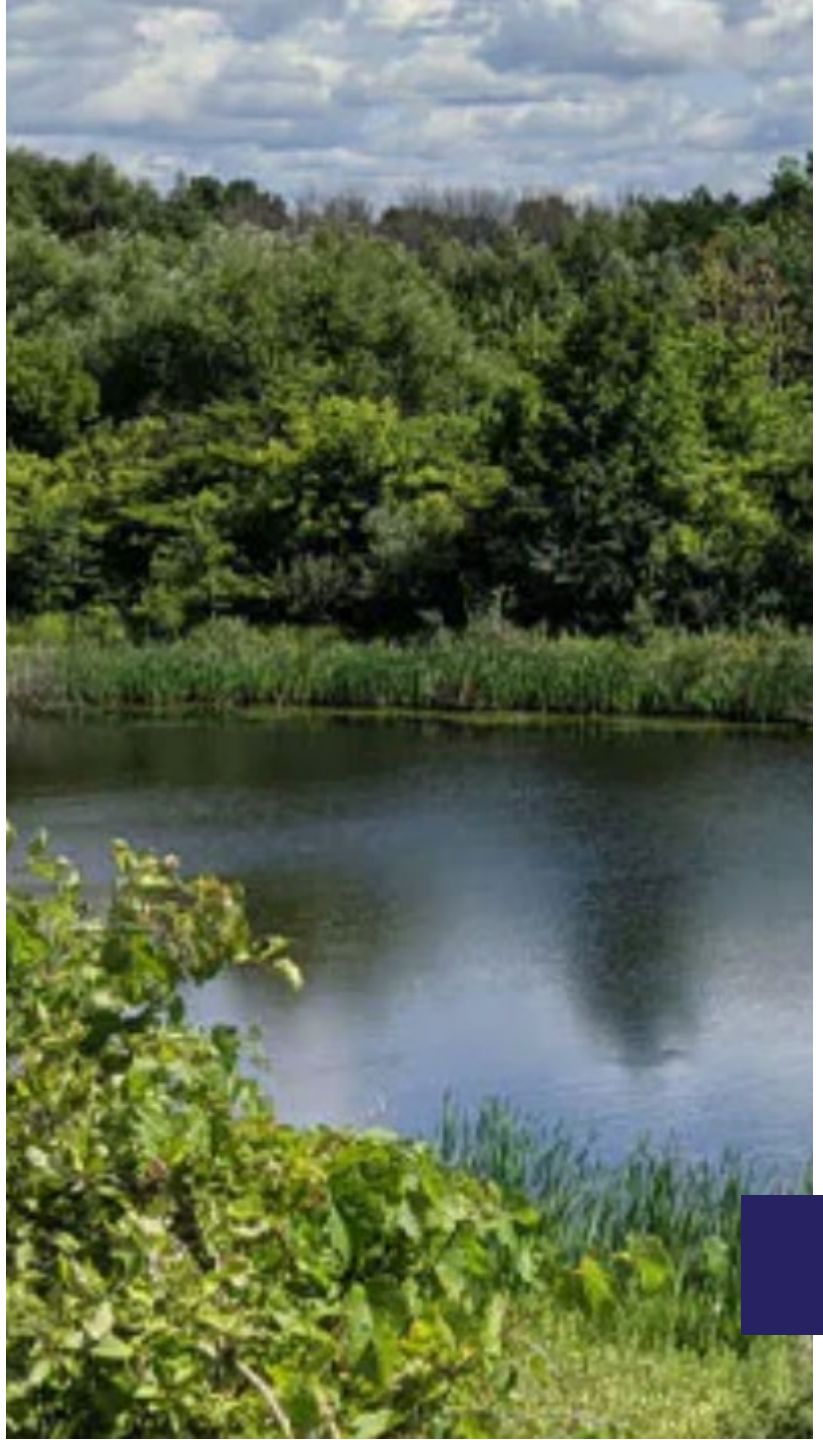
Carruther's Creek Watershed Restoration

Kingston Rd E and Audley Rd N (Ajax, ON)

Priority area in the Carruther's watershed plan. This area is publicly owned by the Town of Ajax and there is 1 new wetland opportunity and 4 opportunities to enhance existing wetlands and ponds in the floodplain. Riparian plantings could be extensive and will help with connectivity of the TNHS.

Legend

- Drainline
- Watercourse
- Wetland Enhancements
- Riparian Plantings
- Invasive Management/Wetland Enhancements
- Public Property



STORMWATER FUNDING FEASIBILITY STUDY

- Town is conducting a study to review and recommend a sustainable and reliable funding source to support stormwater management program
- Town currently spends an average of $1.6million on stormwater program
- Currently depends heavily on third party grants

SHORELINE HAZARD RISK ASSESSMENT

- Completed for CLOCA jurisdiction in early 2021
- Undertaking remainder of shoreline with TRCA starting this year
- Focus on resiliency of Town-owned infrastructure and private property

MONITORING AND REPORTING

- Internal ACRRP Review Team meets twice per year
  - Representation from every department
- Update provided to Council every 2 years
- Implementation priorities have to be actionable and measurable!

THANK YOU/ QUESTIONS?

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