# Carruthers Creek Watershed Plan (CCWP): Developing land use scenarios for impact assessments

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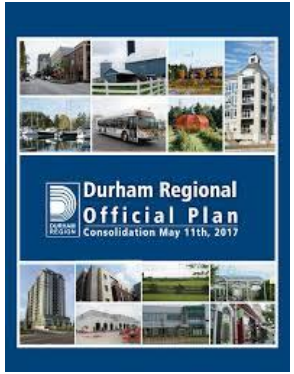
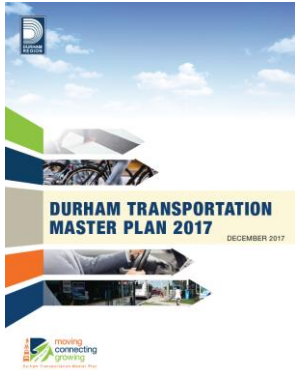
# Presentation Outline

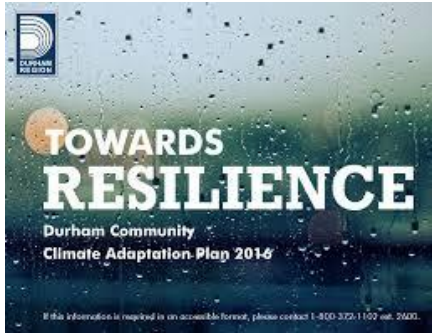
1. Context
2. Approach and Methods
3. Results
4. Moving forward…

# Context

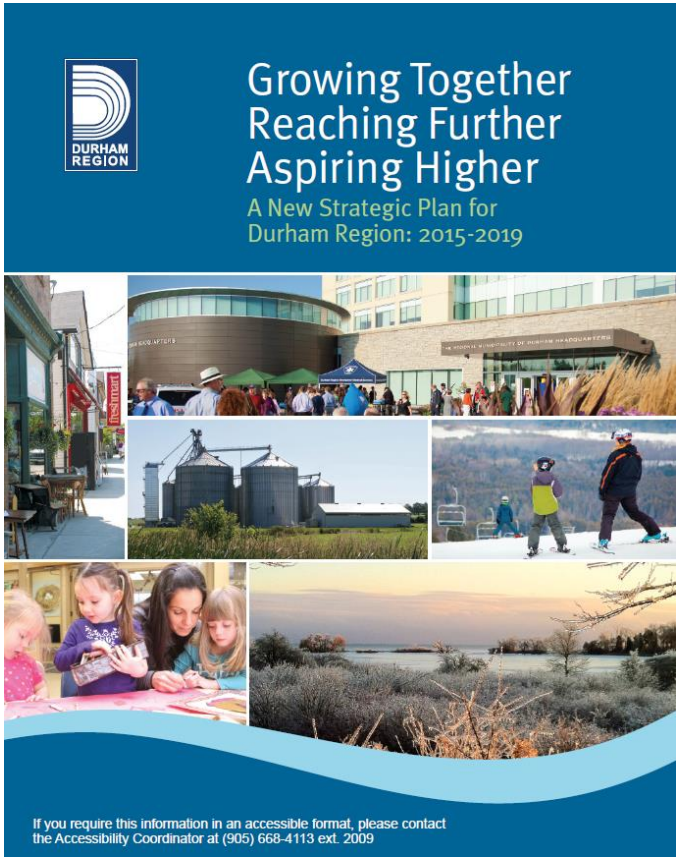
- Urbanization result in natural cover change to land uses
- Inevitable impacts on ecosystem structure, functions, and services
- Climate change exerting increased pressures
- How do we account for the implications while making decisions?








**C.1** Invest in efforts to mitigate and adapt to climate change to build resiliency across the region.

**C.2** Protect, enhance and where appropriate restore significant water resources, agricultural land, natural heritage and environmentally sensitive areas.

**C.3** Ensure that Regional transportation infrastructure is functional, integrated, reliable and barrier-free to support the movement of residents to work, school, and local services.

**C.4** Demonstrate leadership in sustainable asset management and environmentally friendly municipal practices.

**C.5** Work more closely with local municipalities and other partners to manage growth through effective, progressive and integrated long-term planning.

# Approach and Methods: General

- Land use scenario modeling – “gaming tool”
- Comparison of impacts of alternate scenarios of land cover and land use
- Often used as inputs into models and / or other assessment frameworks
- Allows for broader inference to inform management decisions

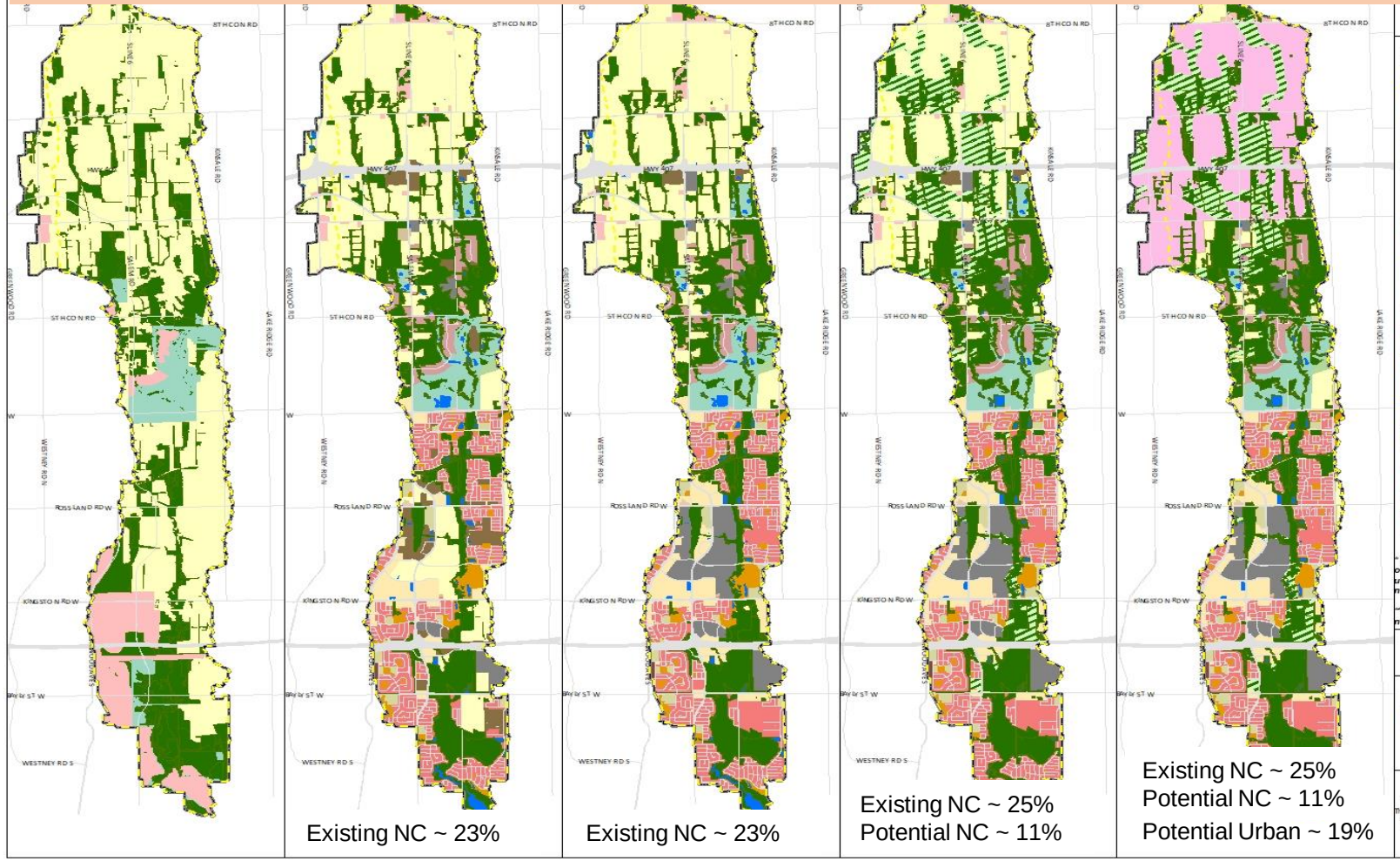
# Approach and Methods: CCWP

- Five land use scenarios was used to assess watershed health
  (Details in CCWP Phase II Impact Assessment Reports – *in progress*)
- Historical, Current, and three future land cover and land use scenarios
- Scenario land use classes are generalized and has no official “planning status”
- Meant to be interpreted for the modeling purpose
  (Example: All built land uses have equal weight for terrestrial habitat purpose)

# Land use scenarios

| Scenario | Description |
|---|---|
| **Historical (S1)** | Historical land use conditions from 1999 prior to 2003 Carruthers Creek Watershed Plan. |
| **Current (S2)** | Existing land use conditions from 2015 based on aerial photo interpretation. |
| **Current+OP (S3)** | Refines S2 by assuming all lands south of the Greenbelt are now developed as approved up to 2031 in the applicable Official Plans. Only minor changes from 2015 have resulted as most of the urban area was already developed in 2015. |
| **Current+OP+NHS (S4)** | Refines S3 by adding an enhanced Natural Heritage System as per the approved Official Plans and using updated information on terrestrial habitat connectivity, habitat configurations, and climate vulnerabilities. |
| **Current+OP+NHS+ Potential urbanization (S5)** | Illustrates prospective development in the headwaters area outside of the enhanced Natural Heritage System identified in S4. There is no change in the existing urban area south of the Greenbelt. |

# Land use classes are generalizations and is **not** intended for official planning status

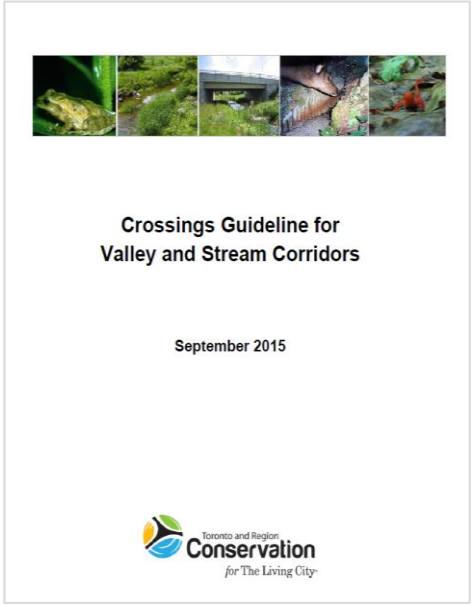


# Scenario 4: Enhanced Natural Heritage

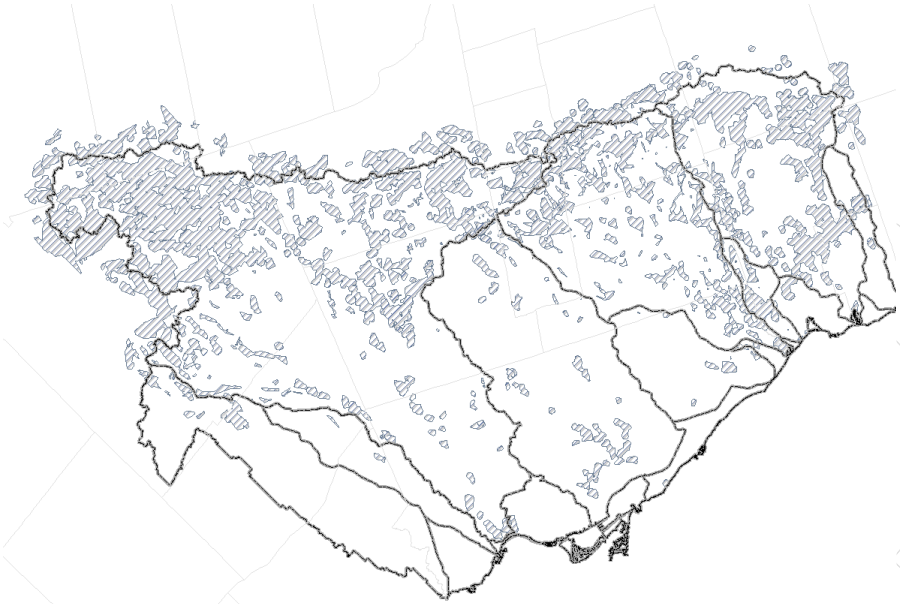
- Supplemented Scenario 3 (Current + OP) with updated information from natural heritage data and science to create Scenario 4.
- Founded on TRCA Terrestrial Natural Heritage System (2007)
- Refined manually to reflect existing natural cover and land use
- Three major priorities guided the process (used scientific methods and expert knowledge)
    - Habitat connectivity
    - Climate change vulnerabilities
    - Habitat quality enhancements

# Habitat Connectivity Information

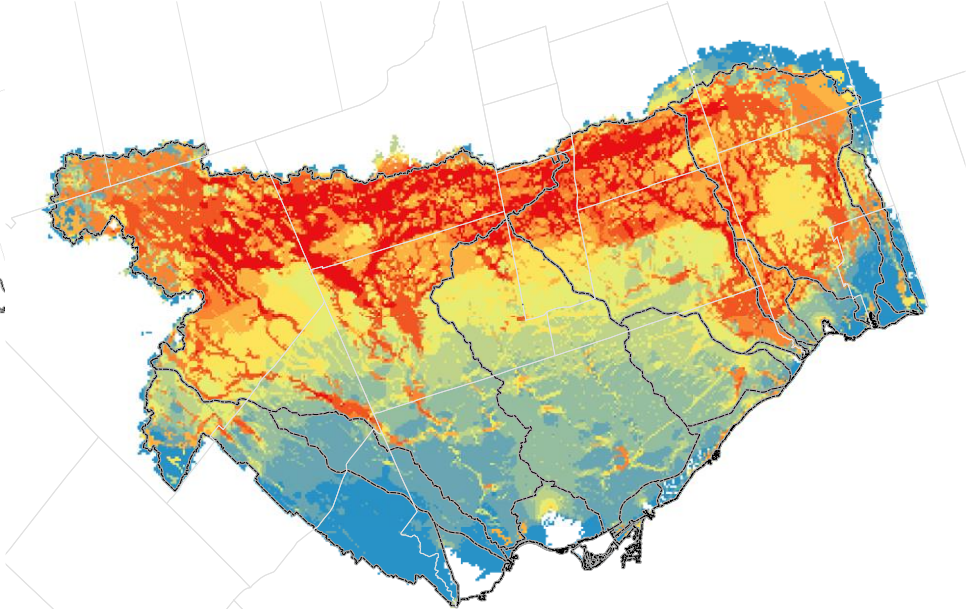
- Based on the region-wide assessment of habitat connectivity completed for development of the TRCA's Crossings Guideline (2015)
- Habitat connectivity priorities are defined at
  - Local connectivity – between specific patches locally
  - Watershed connectivity – among all patches in the watershed
  - Regional connectivity – among all patches in TRCA region



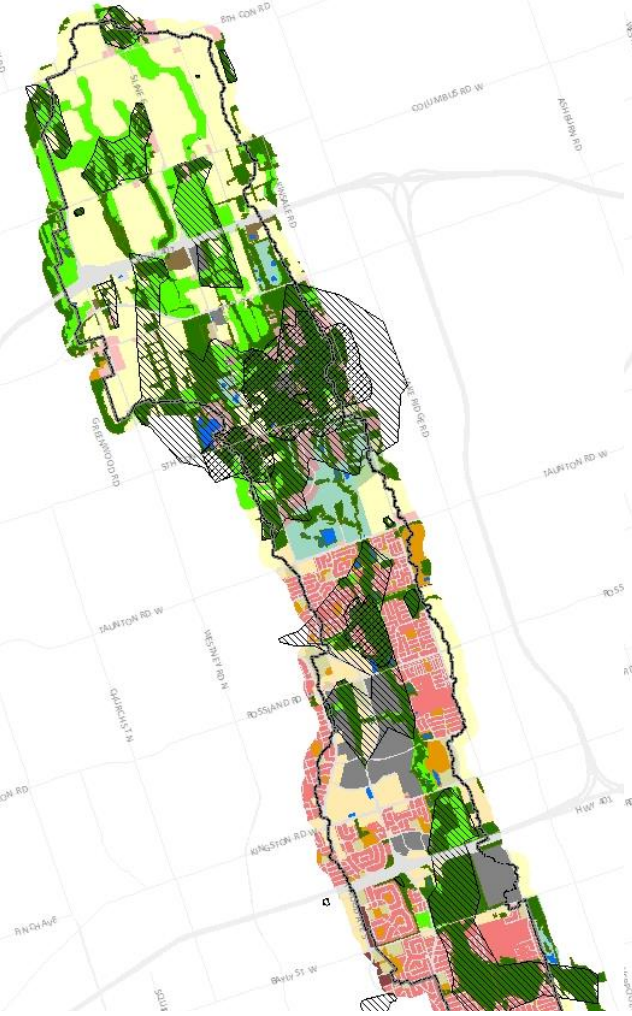
# Habitat Connectivity Priority Information



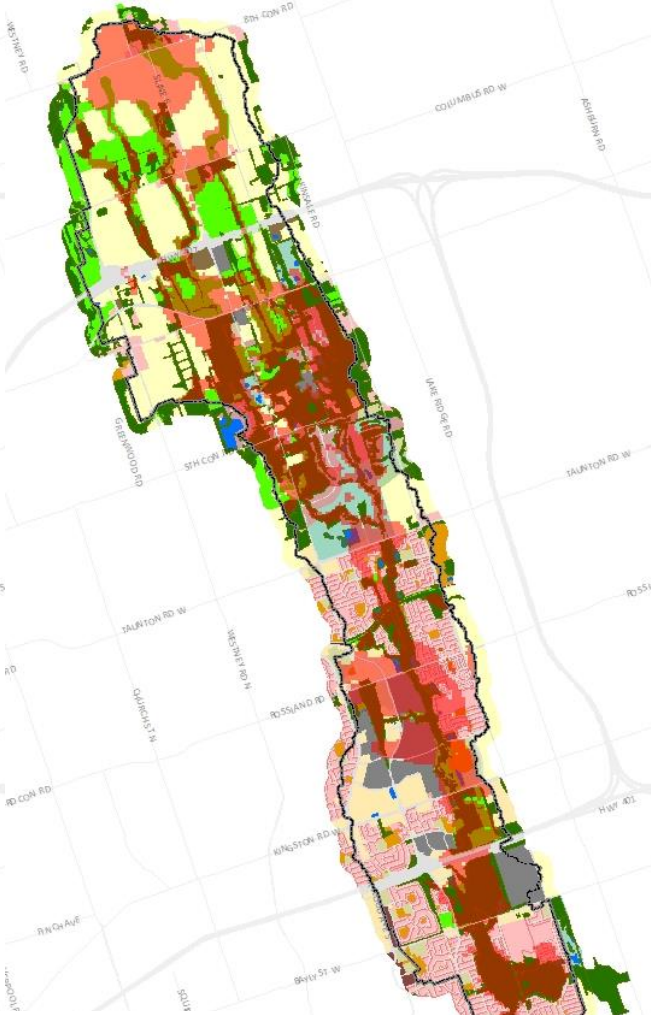
Local connectivity (wetlands-forests)



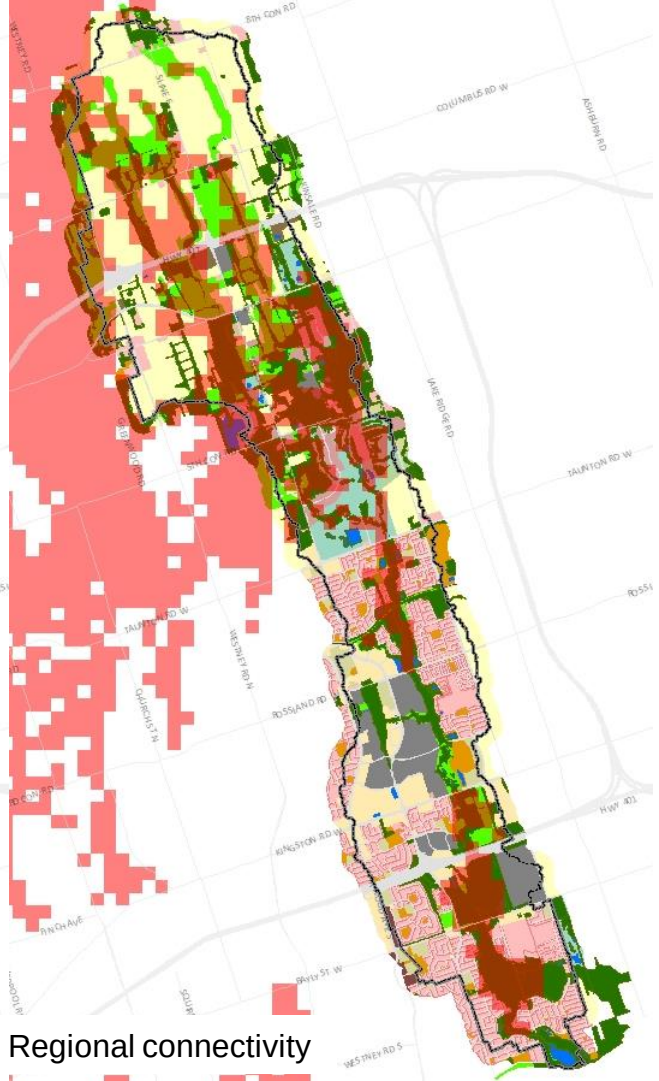
Regional connectivity



Local connectivity (wetland-forest and forest-forest)



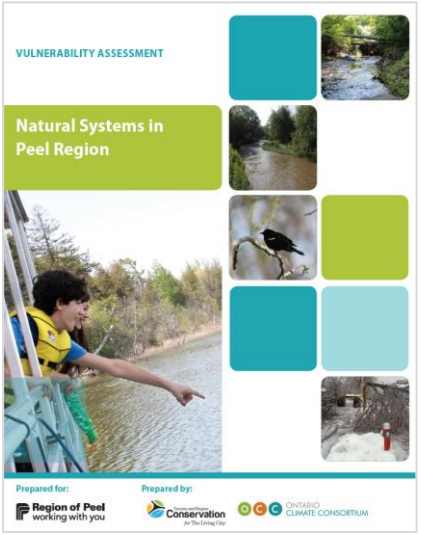
Watershed connectivity



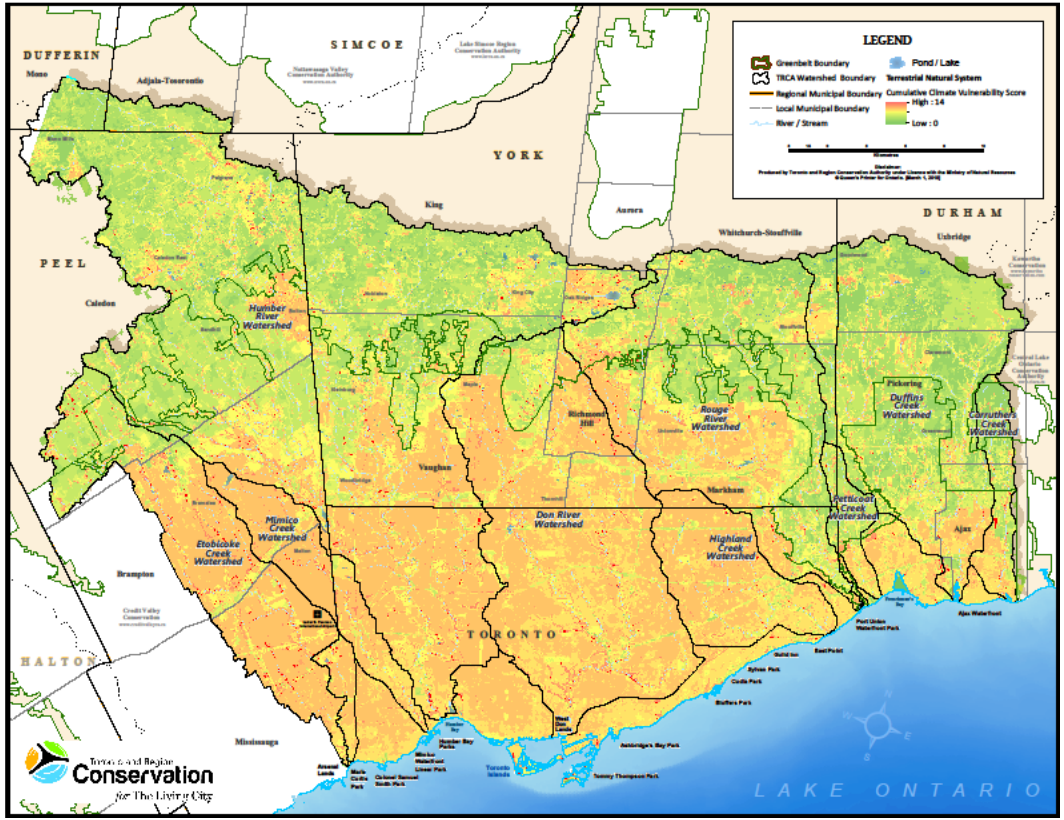
Regional connectivity

# Climate Change Vulnerability Priority Information

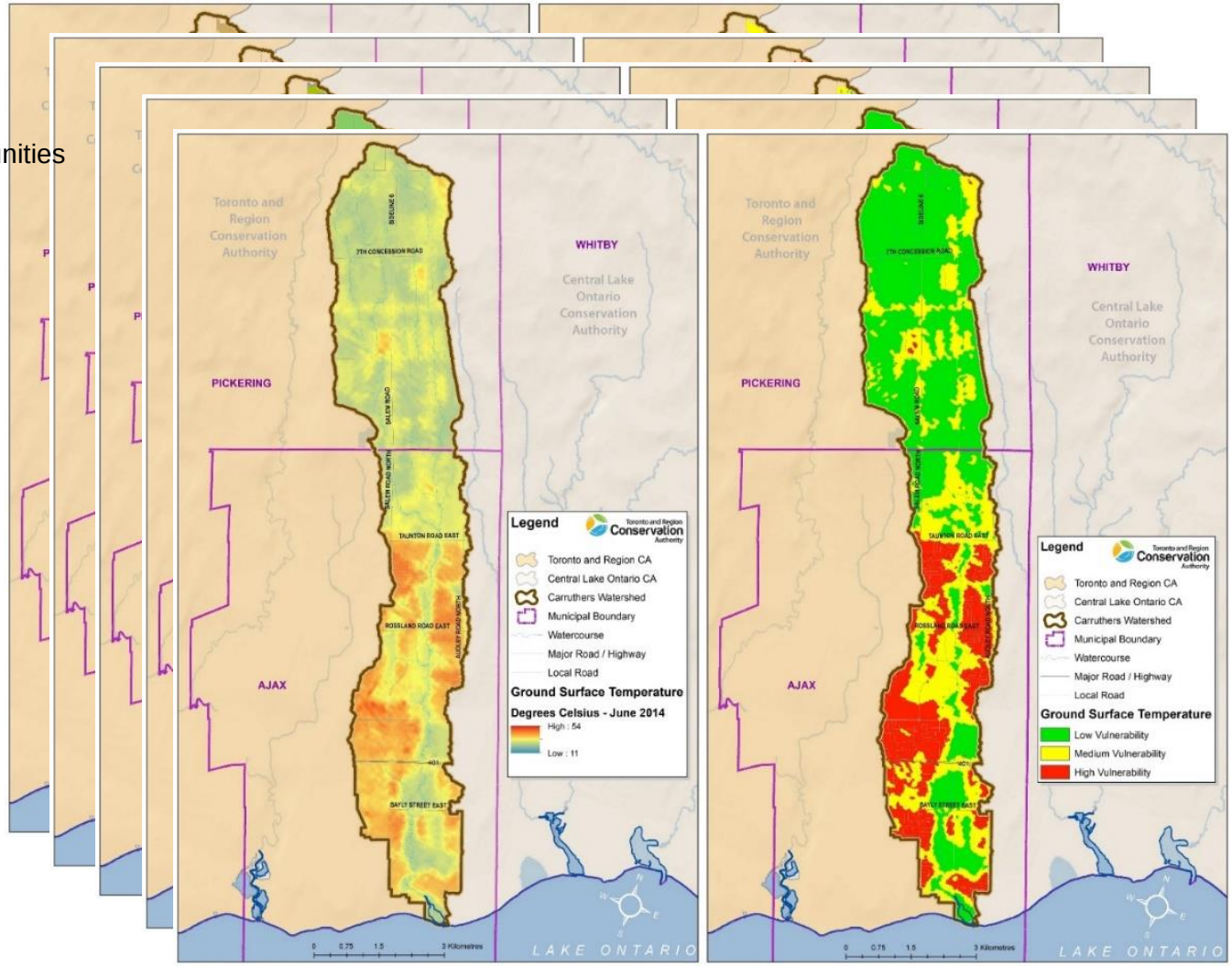
- Based on framework developed for Peel Natural Systems Climate Change Vulnerability Assessment (TRCA 2017)
- Vulnerability indicators
  - Habitat patch quality
  - Wetland vulnerability
  - Climate sensitive vegetation communities
  - Soil drainage
  - Ground surface temperature
- High vulnerability to be considered for inclusion in enhanced NHS



# Climate Change Vulnerability Priority Information



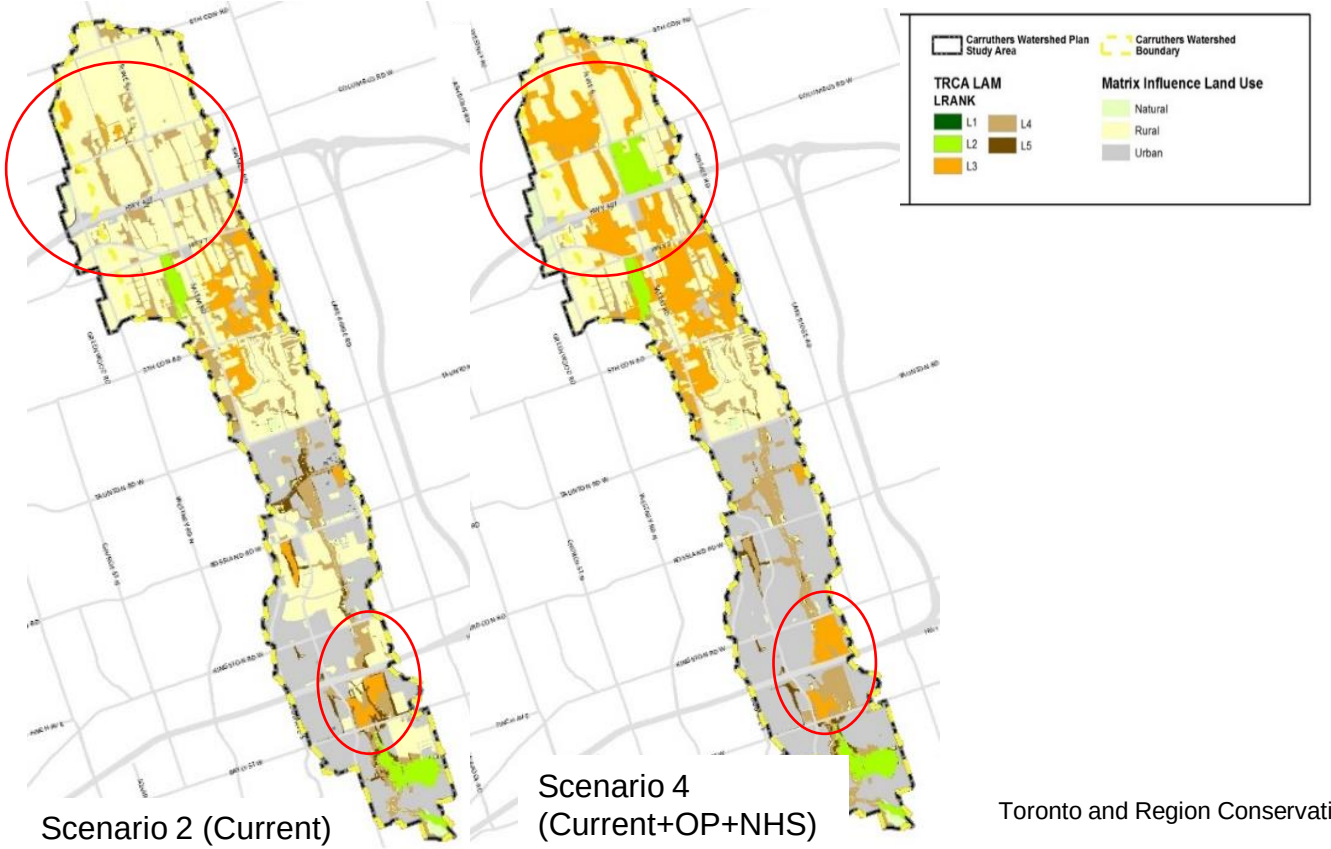
1. Habitat patch quality
2. Wetland vulnerability
3. Climate sensitive vegetation communities
4. Soil drainage
5. Ground surface temperature



# Habitat Quality

- TRCA TNHS (2007) framework of assessing habitat quality
- Using a Landscape Analysis Model (LAM)
- Based on habitat patch size, shape, and matrix influence
- Each patch is ranked as excellent (L1) to very poor (L5)
- Areas that can contribute to enhancing these parameters are considered for enhanced NHS.

# Habitat Quality




Scenario 2 (Current)

Scenario 4 (Current+OP+NHS)

# Moving forward…

- Complete impact analysis under each scenario (Phase II)
- Integrate all impacts analysis results to provide consolidated guidance
- Complete deep dives to illustrate success stories & challenges
- Update CCWP specific objectives, indicators, measures, and targets
- Identify strategic actions that will assist Durham Region to achieve greater sustainability and resiliency

# THANK YOU!

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