Evidence-Based Decision-Making with I-PLACE3S

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Session Objectives

1) Provide a general overview of tools currently available to assess health impacts of planning decisions
2) Describe the PLACE3S model developed by the Sacramento Council of Governments and how it works
3) Convey the methods that have been employed to incorporate health outcomes into the PLACE3S model in King County and – if time permits - Toronto (Region of Peel).

Philosophical Approach

- Bridging knowledge and action
  - Applied Policy Research
- Working across disciplines
  - Connecting Health, Environmental, and Transportation Sectors
- Building evidence base on the impacts of community design on health and environmental outcomes
  - Quantifying the externalities
- Finding strategic opportunities to intervene
  - Evaluating natural experiments

Policy Application – the Premise

- Regional and local land use patterns are both important predictors of walking, physical activity and Body Mass Index (BMI).
- At the local and regional level, land use is an important tool to create active communities.
- Need to consider time/precision tradeoffs when connecting research & policy (the precautionary principle).

HealthScape Impact Assessment Model – the Purpose

Create a tool that can evaluate potential health and climate change impacts of land development actions

- Comprehensive plans
- Changes in development regulations
- Changes in neighborhood plans
- Transit-Oriented Development

HealthScape Impact Assessment Model: the Concept

Use research results on the relationships between

Urban Form Patterns
Residential Density
Land Use Mix
Street Network Connectivity
Retail Floor Area Ratio

and

Outcomes
Physical activity
Obesity / Body Mass Index
CO2 & pollutants from transport
Transportation patterns

Integrate these findings into an existing model structure

HealthScape Impact Assessment Model

Model Platform Selection

4 major requirements:

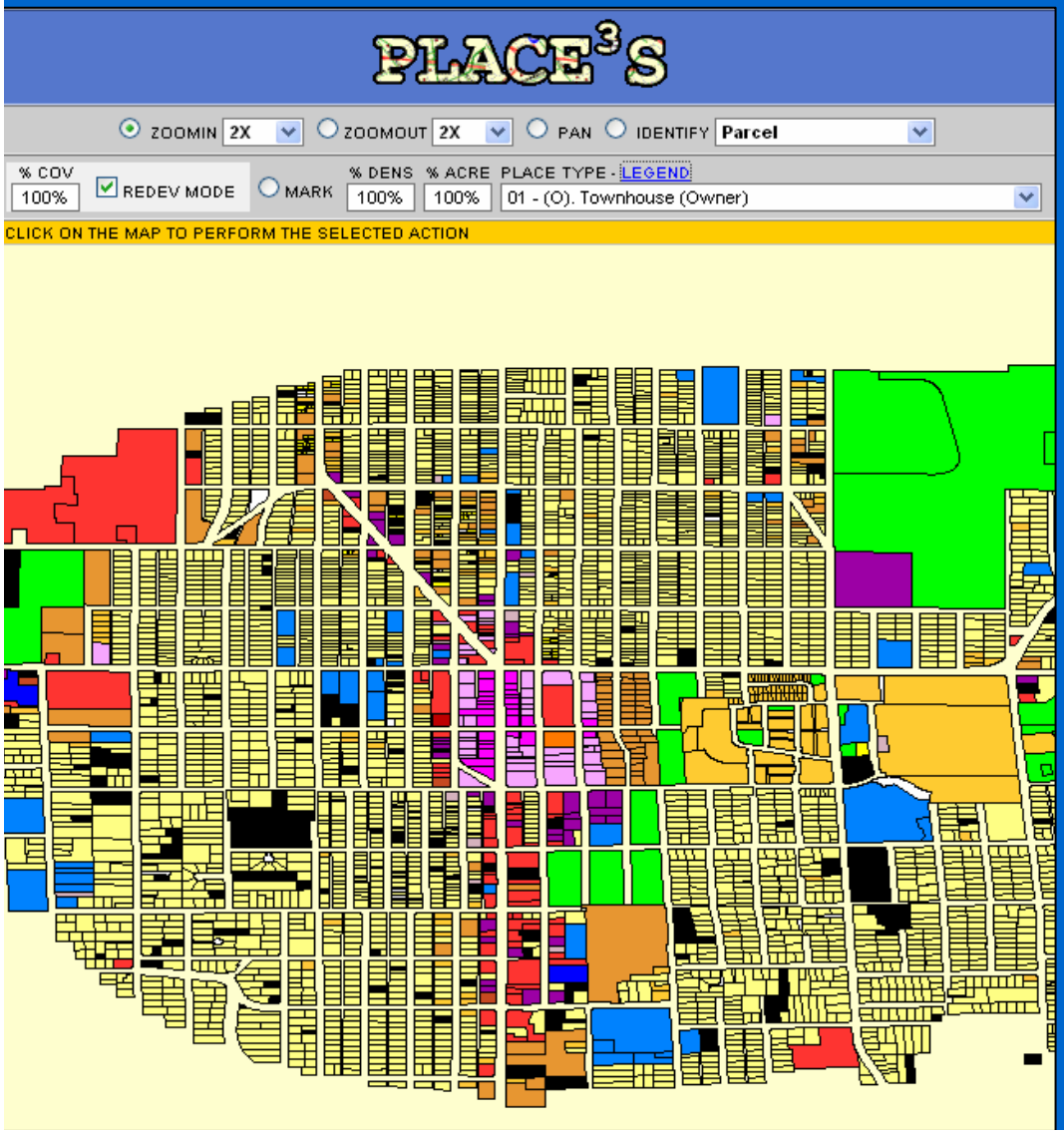
1. Ability to evaluate land development alternatives
2. Ability to evaluate at a relatively small scale (roughly a neighborhood)
3. Flexibility to incorporate land use measures based on research results
4. Ability to incorporate both health and climate change outcomes

HealthScape Impact Assessment Model: The Platform

Selected Model Structure: PLACE3S

- Developed by the Sacramento Area Council of Governments (SACOG) / California Energy Commission
- Web-based application
- Parcel-based modeling structure
- Outputs can be fed back into regional travel model
- Works at a number of scales – neighborhood level to regional

HealthScape Impact Assessment Model: The Process



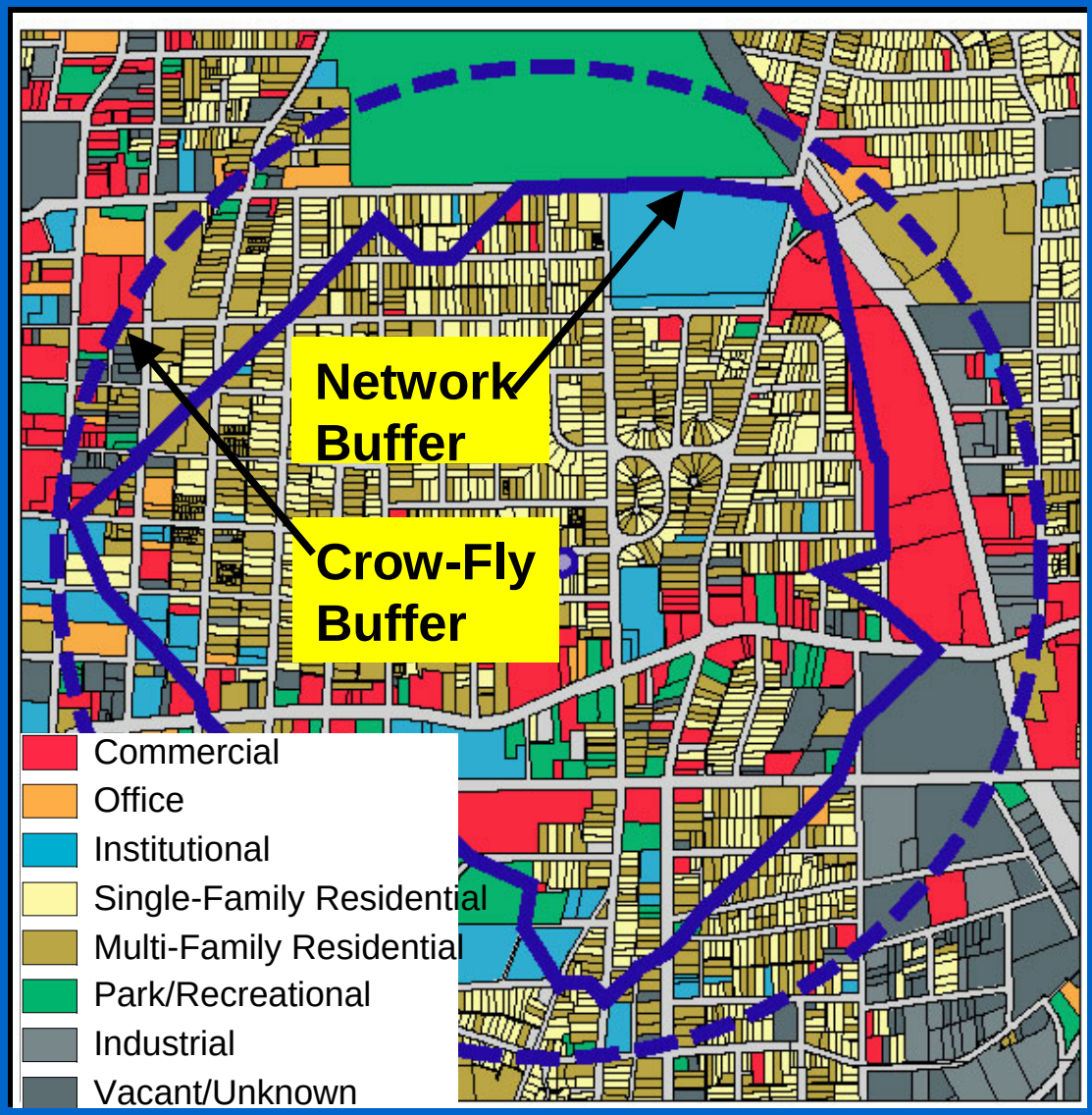
- Use statistical models that express the relationship between urban form measures and the outcomes
- Program those equations into

  I-PLACE3S
- Add ability to measure network based buffers
- Add ability to change transit service levels
- Add ability to account for demographics

I-PLACES Scenarios Tested and Research Conducted at Similar Scale

-Neighborhood design measures generated for the area within a 1 km "network buffer"

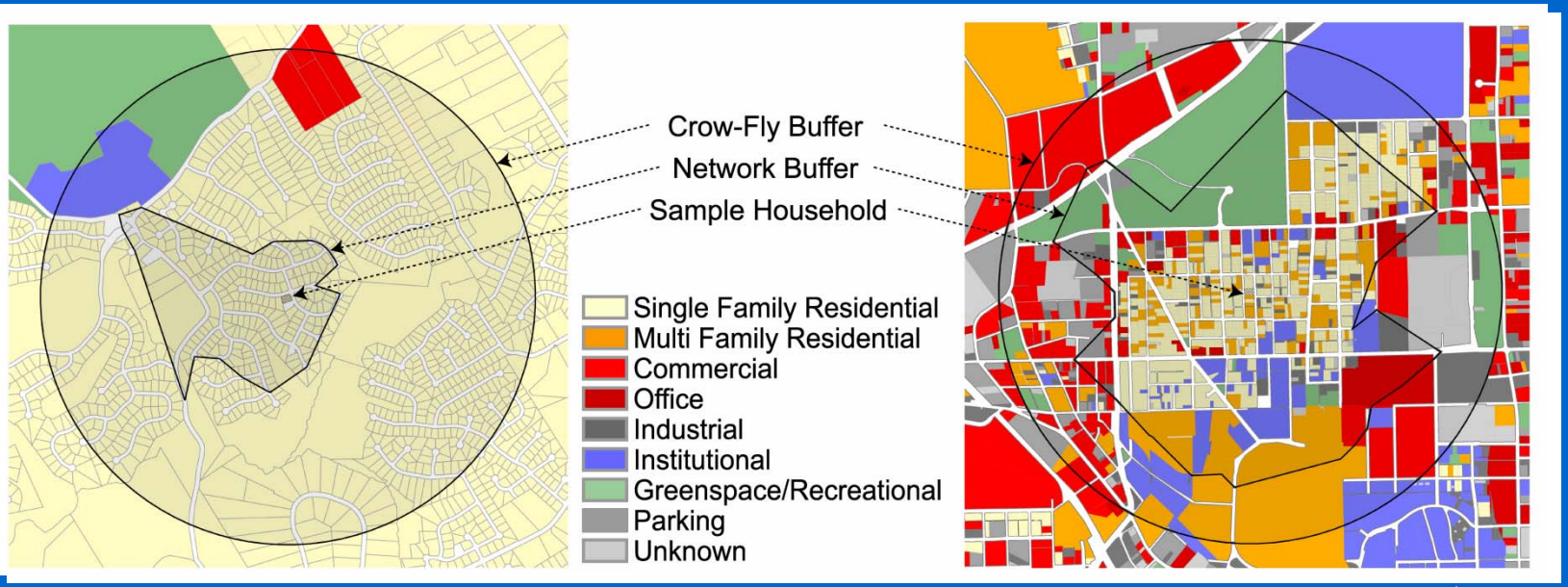
Scenarios built at same (or similar) scale and employ same network based approach



Differences in Neighborhood Design

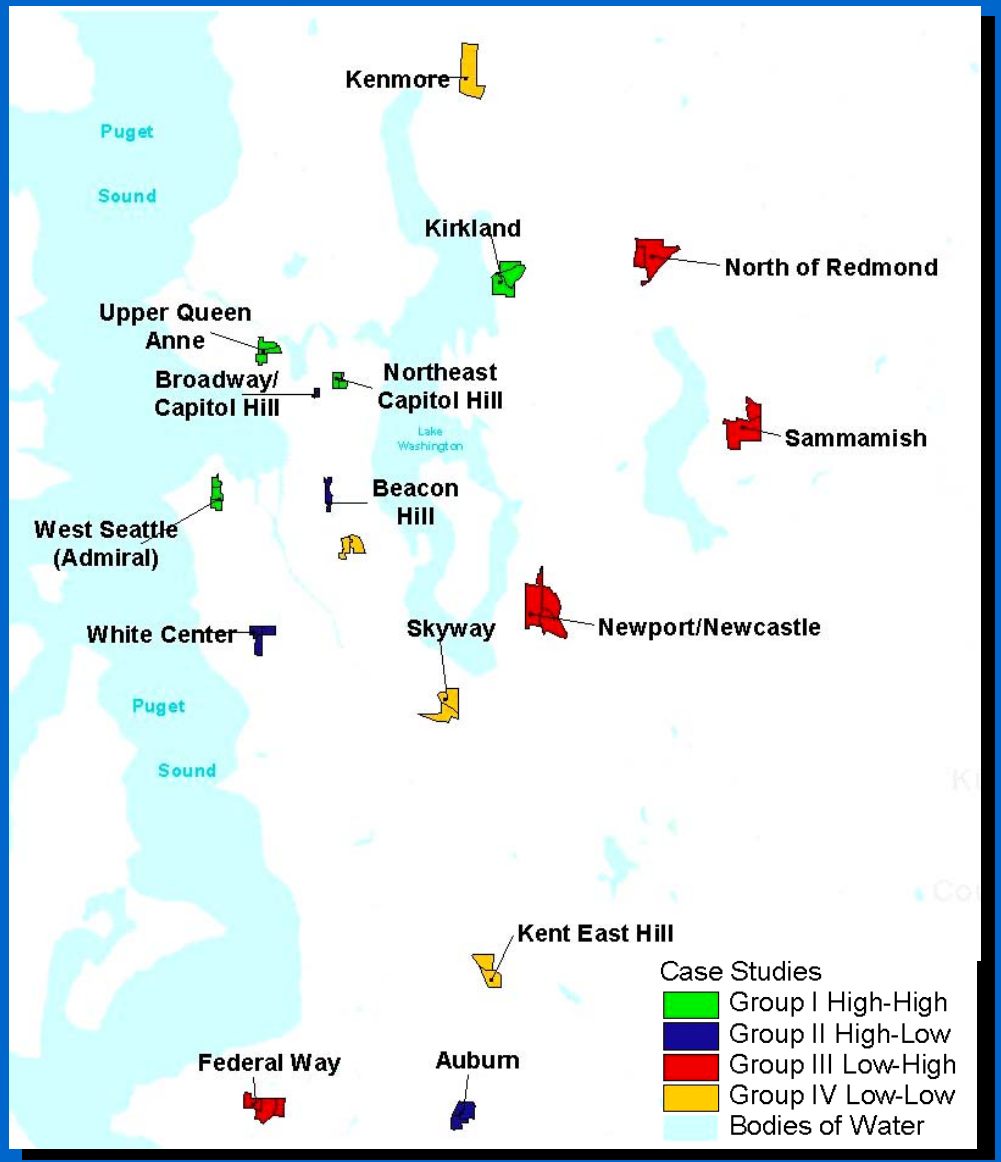
Disconnected (auto-oriented)

Connected (walkable)



Crow fly distance from A to B is about the same (1 KM) - but actual travel distance from A to B twice as long in the disconnected environment

Health Modules – Example of Source Data



Leveraged data from NQLS (Neighborhood Quality of Life) Study

2230 people sampled in King County

Physical Activity

- Minutes of moderate & vigorous activity per day
- Accelerometer data

BMI

- Self reported height & weight

Source Data

- SMARTRAQ Atlanta Database
- Seattle Travel and Urban Form Database (HealthScape)
- Parcel level urban form data and walkability measures built in seven regions
- Four NIH datasets based on specific age groups
- Other National datasets

Walk & Bike Trips - Inputs / Significant Variables

Outcomes: * Number of walk & bike trips
* Walk Trip Distance (miles)

Household level inputs

- Demographics / household characteristics
  - Number of adults in household
  - Employment status
  - Number of children in household
  - Household has fewer cars than adults
  - Household income (low / middle / high)
- Retail Floor Area Ratio (FAR; measures retail density & site design)
- Land Use Mix
- Intersection density
- Number of other retail / food parcels within 1 km buffer

*land use mix did not attain statistical significance after retail and food parcels were included in model

Physical Activity Inputs / Significant Variables

Outcome: Total Daily Minutes of Moderate & Vigorous PA

Household level inputs

- Demographics / household characteristics
  - Number of adults in household
  - Employment status
  - Number of children in household
  - Household has fewer cars than adults
  - Household income (low / middle / high)
- Intersection density*
- Area housing density
- Retail Floor Area Ratio (FAR; measures retail density & site design)
- Park availability within 1 km buffer

*intersection density did not attain statistical significance – largely because of correlations with other urban form factors

BMI Inputs / Significant Variables

Outcome: Average Body Mass Index

Person level inputs

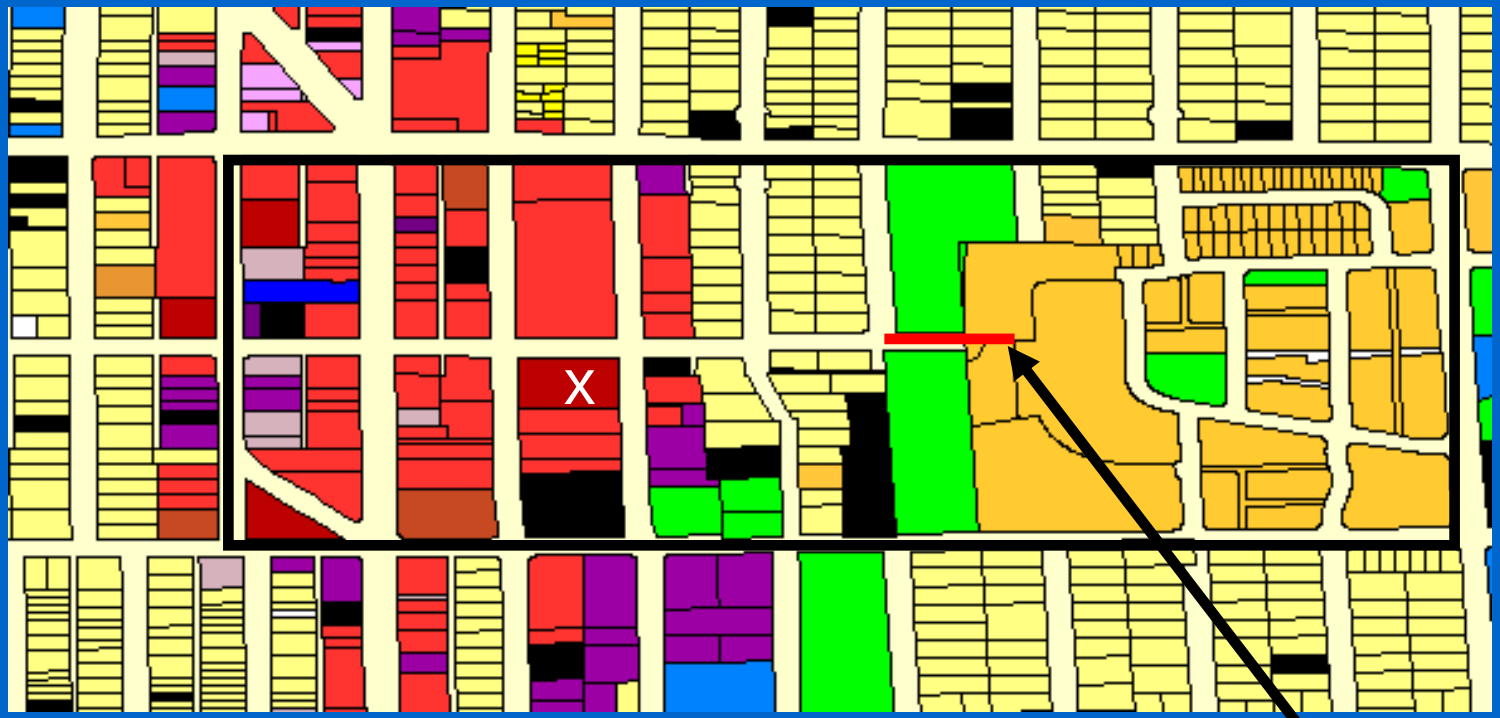
- Demographics / household characteristics
  - Household income (low / middle / high)
- Intersection density
- Area housing density
- Number of fast food parcels within 1 km buffer
- Number of other retail / food parcels within 1 km buffer
- Park availability within 1 km buffer
- Transit accessibility

The White Center / SW 98th St. Case Study

Scenario 1: Existing Conditions

- Existing land use patterns
- Full build-out of Greenbridge public housing
- Approximately 775 dwelling units and 830 employees

Scenario 2: TOD Only



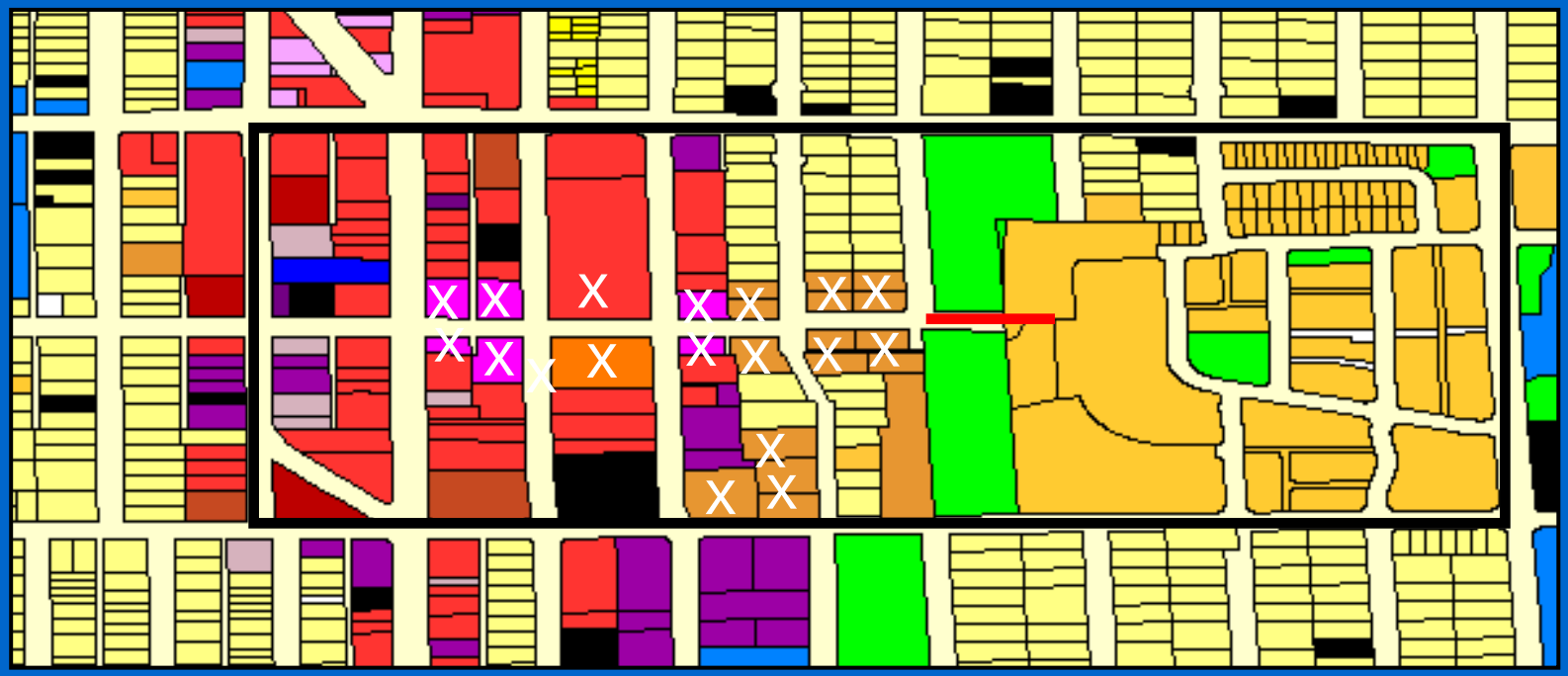
Changes only one parcel to mixed use, transit-oriented development (see white x)

Full buildout of Greenbridge public housing

Pedestrian connection links Greenbridge & 98th St. Corridor

Adds approx. 4 employees and 50 residents

Scenario 3: Interim Buildout



Full buildout of Greenbridge public housing

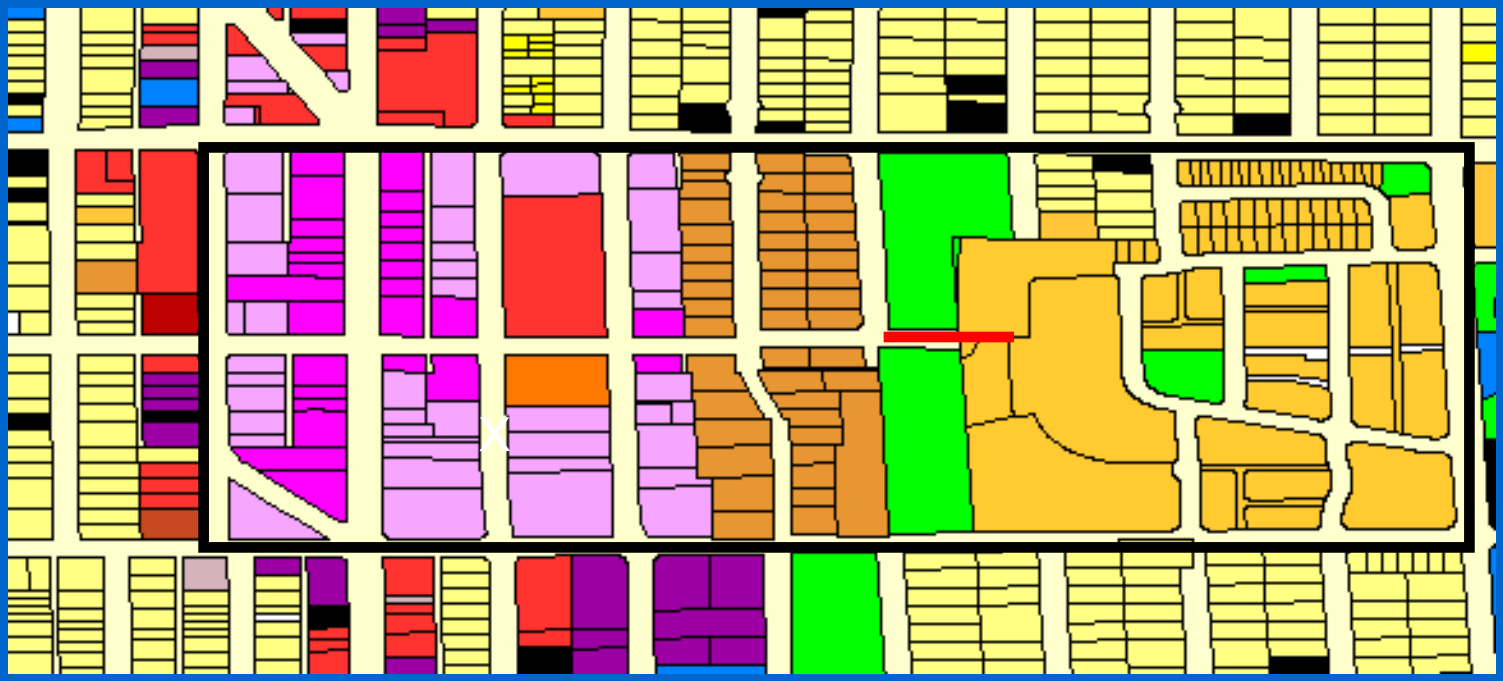
Pedestrian connection links Greenbridge & 98th St. Corridor

Near-term (5-10 year), or less than maximum buildout

Redevelopment of parcels facing 98th St. at max. density

Redevelopment of 4 single family parcels

Scenario 4: Full Buildout



Full buildout of Greenbridge public housing

Pedestrian connection links Greenbridge & 98th St. Corridor

Full buildout at maximum density

High density mixed use development (pink)

Mid-rise residential development (dark orange)

Approx. 2500 households, 1800 employees

Preliminary Physical Activity and BMI Results

	BMI / Adult	Daily Minutes of PA / Adult	Daily Walk & Bike Trips / DU
Existing Conditions	24.74	37.06	3.25
TOD-Only	24.72	37.11	3.23
Interim Buildout	24.5	38.24	3.23
Full Buildout	24.1	41.94	3.37

We will separate out walk and bike, distance models forthcoming, Work will evolve towards compliance with established targets and / or dose – response metrics

Emissions & Car Travel - Results

Daily Totals Per Dwelling Unit						
	CO2 (kg)	NOX (grams)	HC (grams)	CO (grams)	Car Vehicle Trips	Car Vehicle Miles
Existing Conditions	14.17	47.62	51.69	580	9.29	48.82
TOD Only	14.17	47.61	51.68	579.71	9.29	48.82
Interim Buildout	14.04	47.1	51.12	573.64	9.21	48.31
Buildout	13.94	46.7	50.61	569.82	9.08	47.85

Not much reduction in vehicle use and emissions were observed.

Scenario did not include changes in regional accessibility and Somewhat modest changes in study area itself

Results Reasonable -- No reason to expect much change

Lessons Learned From White Center Case Study

- Small study area & little change in TOD and Interim Buildout scenarios
- Full build out scenario resulted in reasonable (for health) yet modest differences between scenarios
- Testing more aggressive buildout scenarios with different transit and roadway travel time assumptions
- Isolating most impacted areas – new housing development
- Add sedentary time as outcome
- Test different roadway design characteristics
- Test other study areas
- Test the impact of changes in transit service levels

******Use model as a tool to create scenarios******

NEXT STEPS

Next Steps for I-PLACE3S

- Expand geographic applicability
  - Test model in other regions
  - Test model at a range of geographic scales
  - Incorporate additional outcomes:
    - pedestrian safety, air pollution exposure,
    - sedentary minutes
- Test a wide range of other urban form metrics
- Test other programmatic strategies
- Adjust for preferences and predisposition
- Work towards a dose | response metric
- Begin the process of including health costs

Application of Research Results to a Tool for the Region of Peel

LFC, Inc.
Nov 17, 2008

Purpose and Context

- Peel Council directed Peel Health staff to comment on development applications and planning decisions
- **Purpose of this project:** Develop an evidence-based, prototype health assessment tool using local data
- **Goal:** provide greater opportunities for active living in the Peel Region.
- **Priorities:** can be used at the site level (development review) or to evaluate broader scale planning / development alternatives

Potential Tool Applications - Examples

- BramEast Subarea 2 Block Plan

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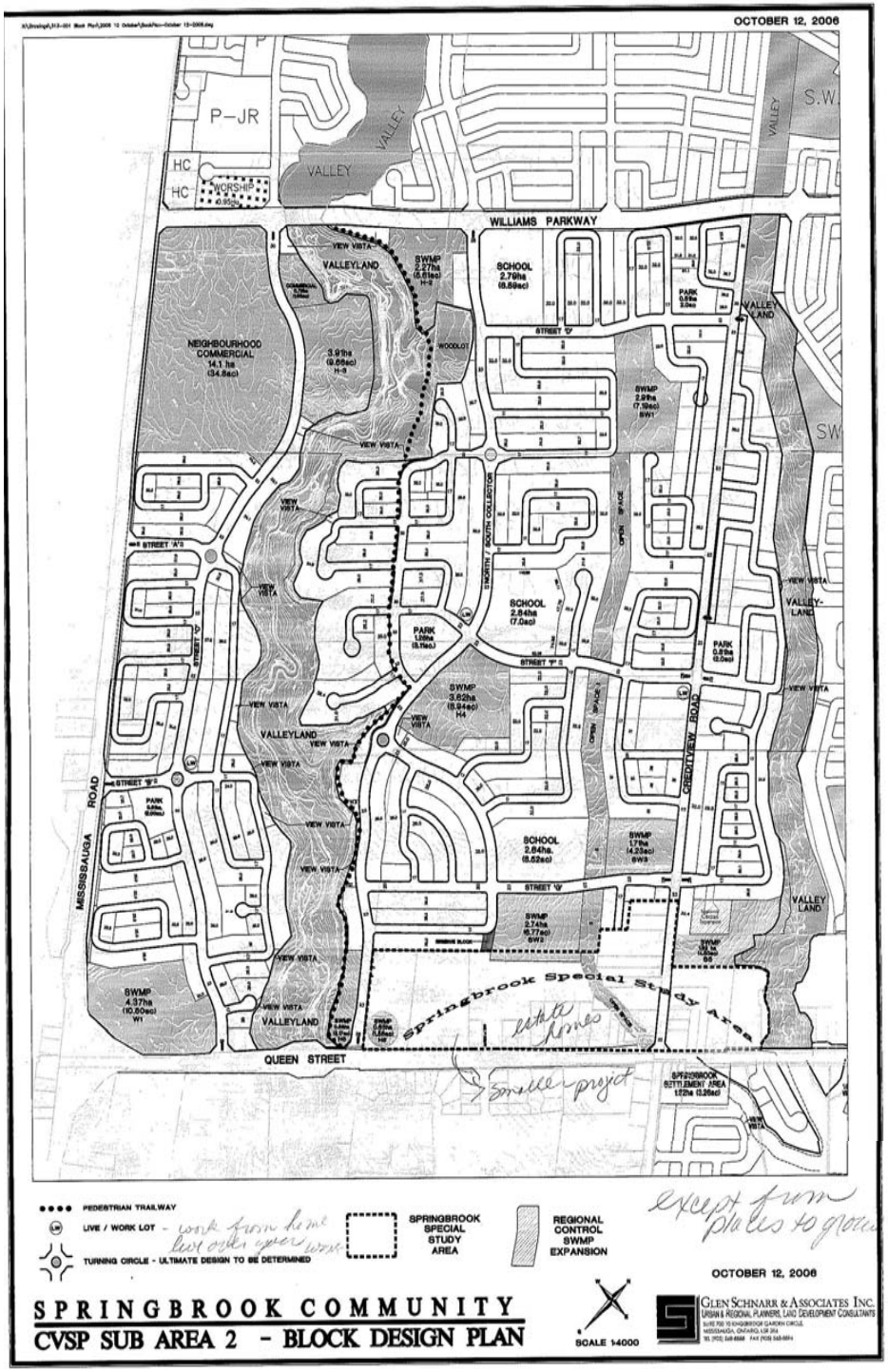

Springbrook Community Subarea 2 Block Plan

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Peel Health Outcome Data

Primary Data Source:

Canadian Community Health Survey (CCHS)

Sampled over 2,000 Peel Region residents

Relevant topics/questions include:

- Height / weight / BMI / obese or overweight status
- Physical activity / walking and bicycling / sedentary activities
- Chronic conditions associated with obesity – diabetes, high blood pressure, heart disease
- Mental health
- Respiratory Illness

Could use regional travel surveys as secondary data source to estimate walk/bike/transit trips and other transportation patterns