SENSITIVITY OF OBJECTIVE MEASURES OF PEDESTRIAN ACCESS TO THE INCLUSION OF OFF-STREET PEDESTRIAN PATHWAYS:

METHODOLOGICAL AND POLICY IMPLICATIONS

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NEWPATH

Research

Funding and Sponsors

http://health-design.spph.ubc.ca/research/newpath/

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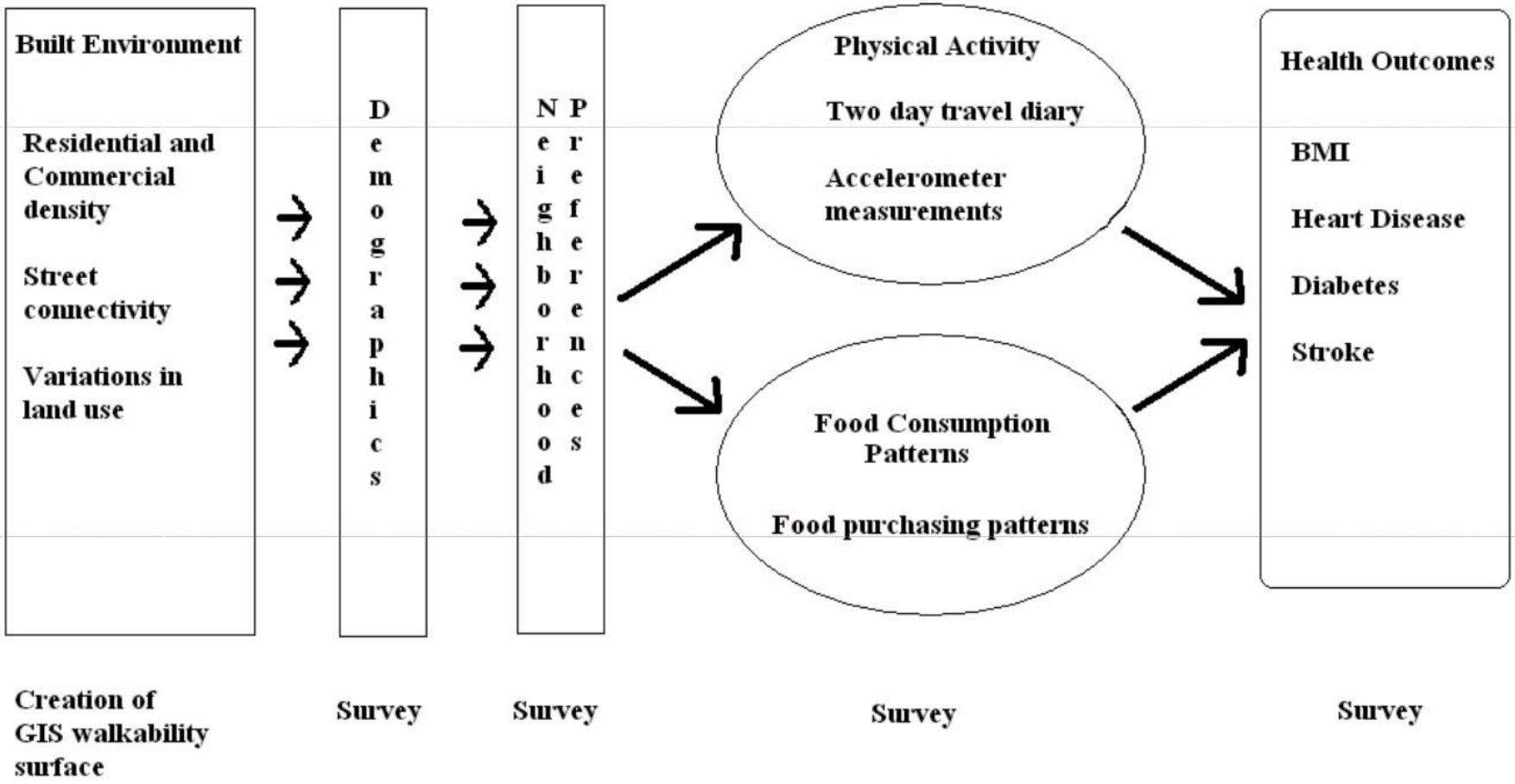
Objectives

1. Establish a model to integrate dietary, transportation, physical activity, built environment, and body weight data;

2. Evaluate the impact of dietary behaviour (energy in) versus physical activity levels (energy out) in explaining obesity across a range of income, age, and walkability levels; and

3. Use the model to inform policy development within land use and transportation planning in the Region of Waterloo.

Elements of NEWPATH



4 Components of Walkability Index

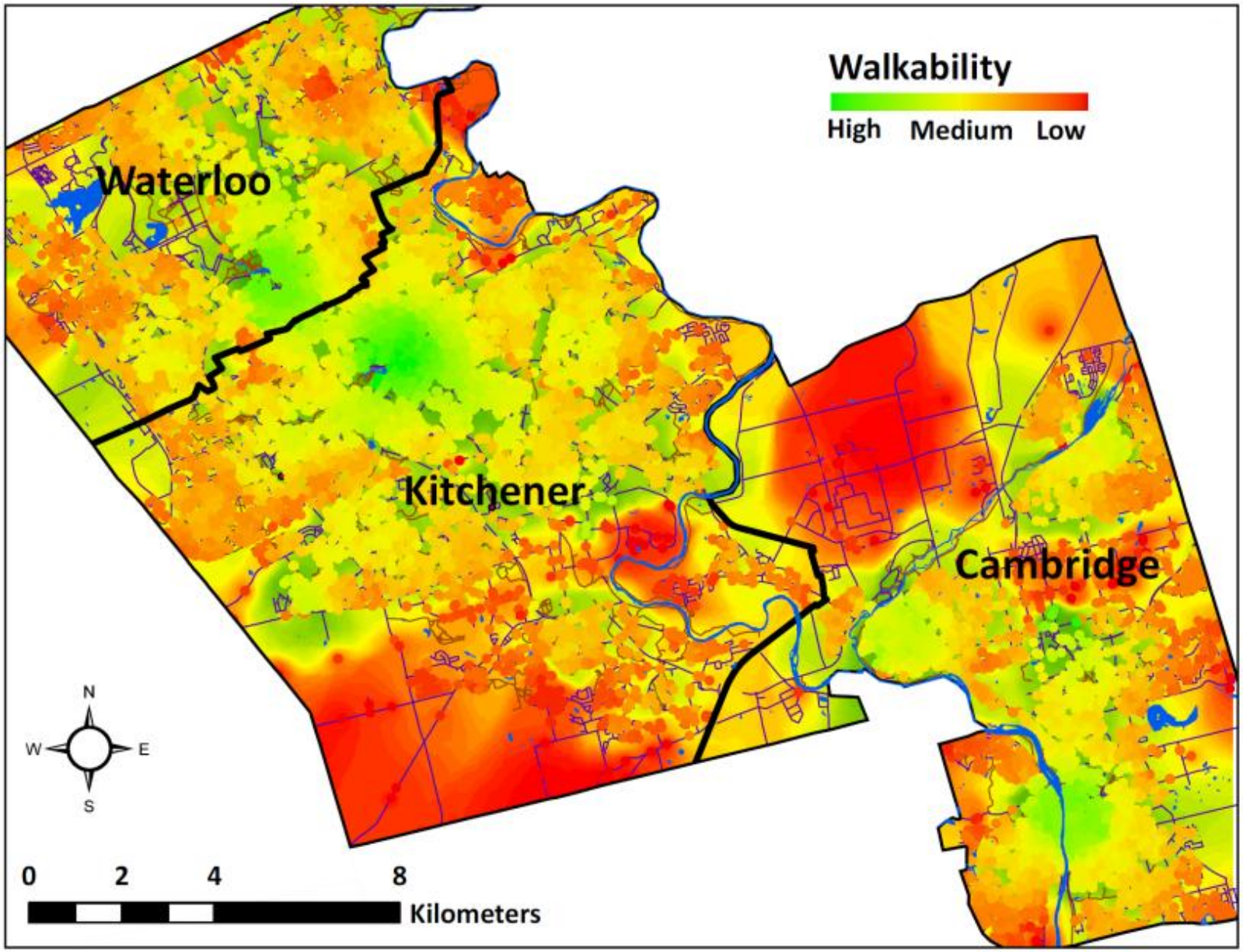
1. Net Residential Density (single & multi)
   dwelling units per residential acre

2. Land Use Mix
   range 0 – 1

3. Intersection Density
   per square kilometer

4. Retail Floor Area Ratio

Walkability Surface for Region of Waterloo



Connectivity – a Critical Component of Walkability

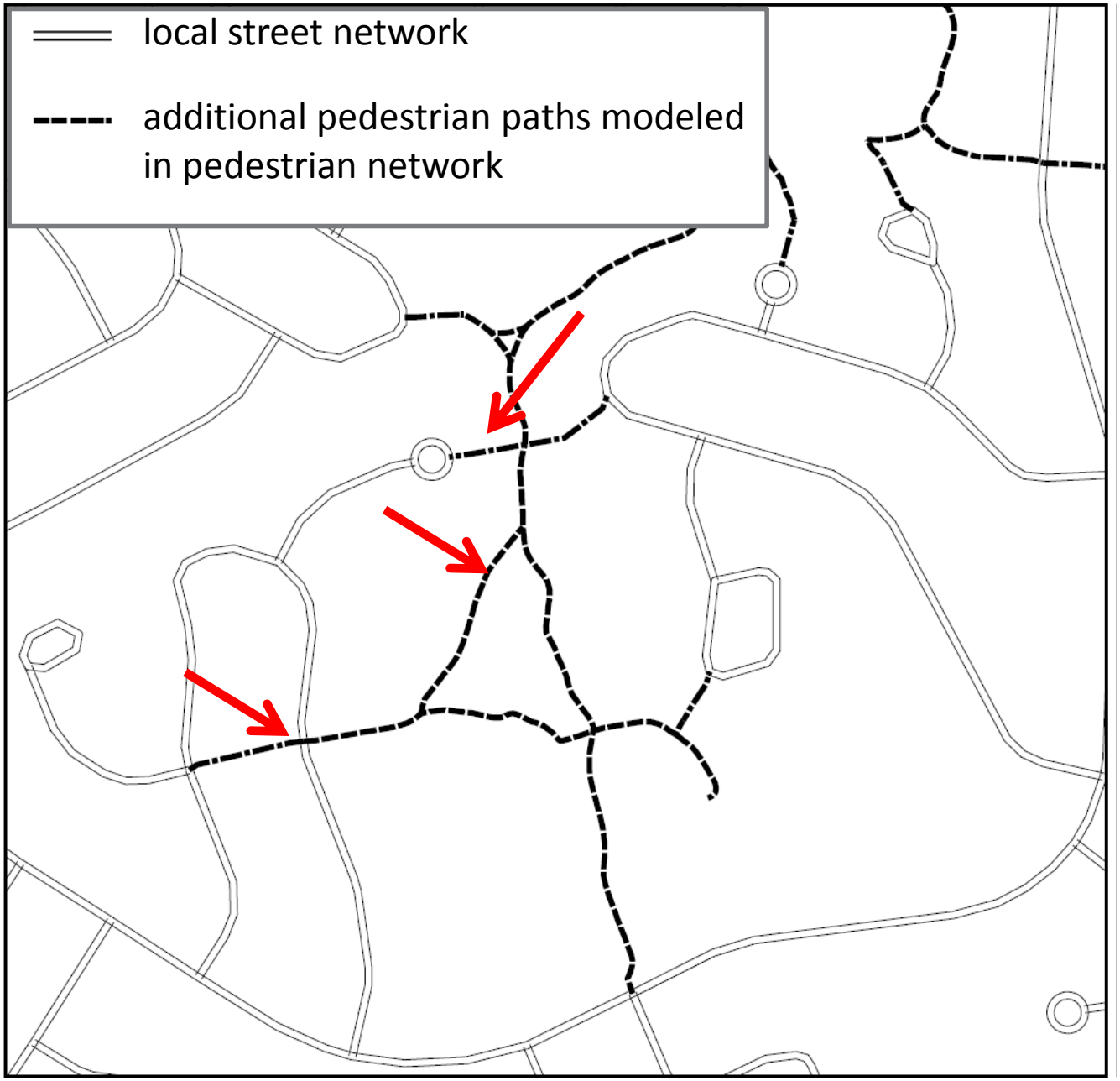
But: most connectivity measures are based on the street network, not pedestrian paths

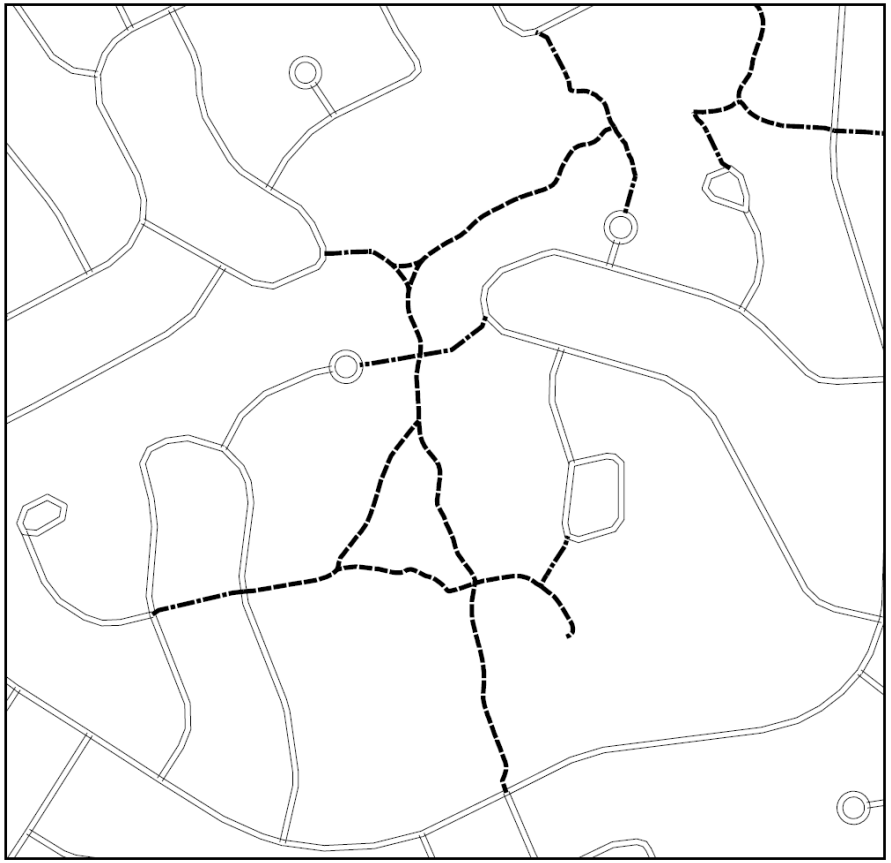
Objectives

Determine how incorporating off-street pedestrian paths into GIS models of the pedestrian environment influences measurement of:

1) street connectivity
2) pedestrian access

Creating a Pedestrian Network





local street network

additional pedestrian paths modeled in pedestrian network

Results – Street Connectivity

Inclusion of off-street pedestrian linkages increases intersection density on average by:

- **23%** across the study area

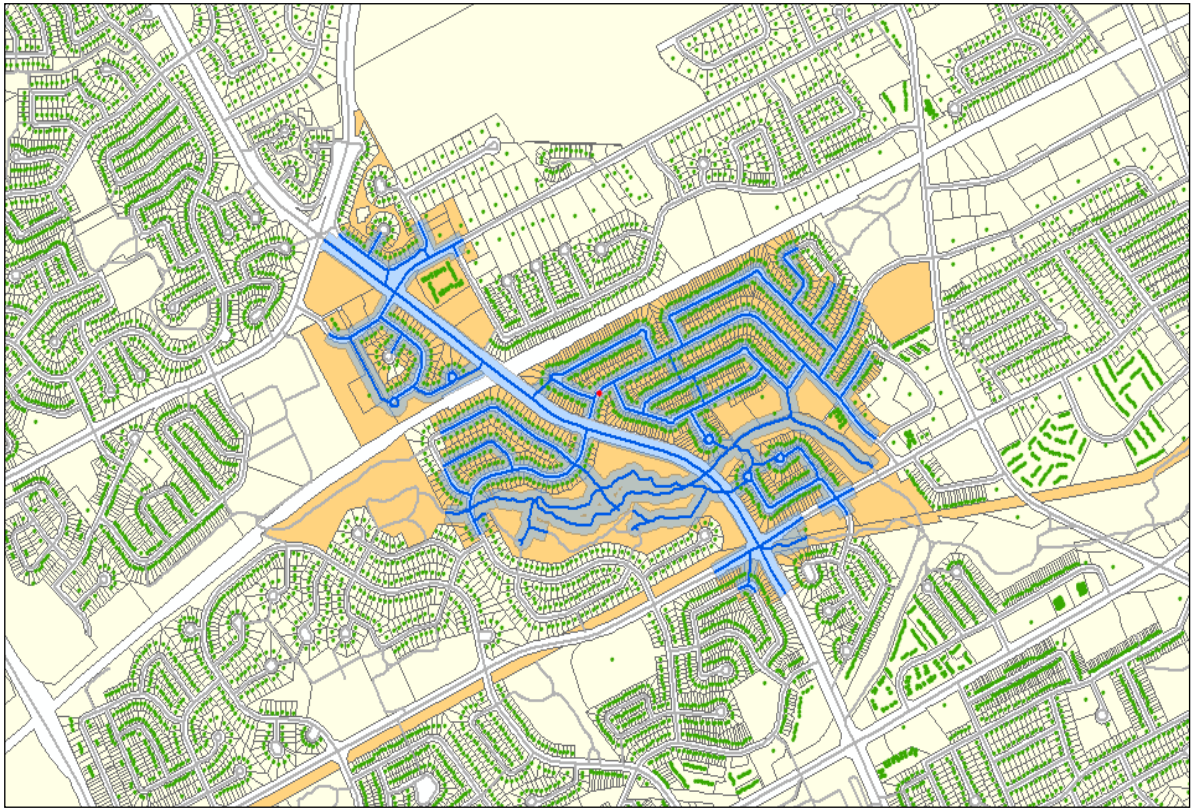
These increases vary across walkability:

- **19%** in high walkability (i.e. town centre) areas
- **24%** in low walkability (i.e. suburban) areas

Results – Influence of Connectivity on Walking Trips

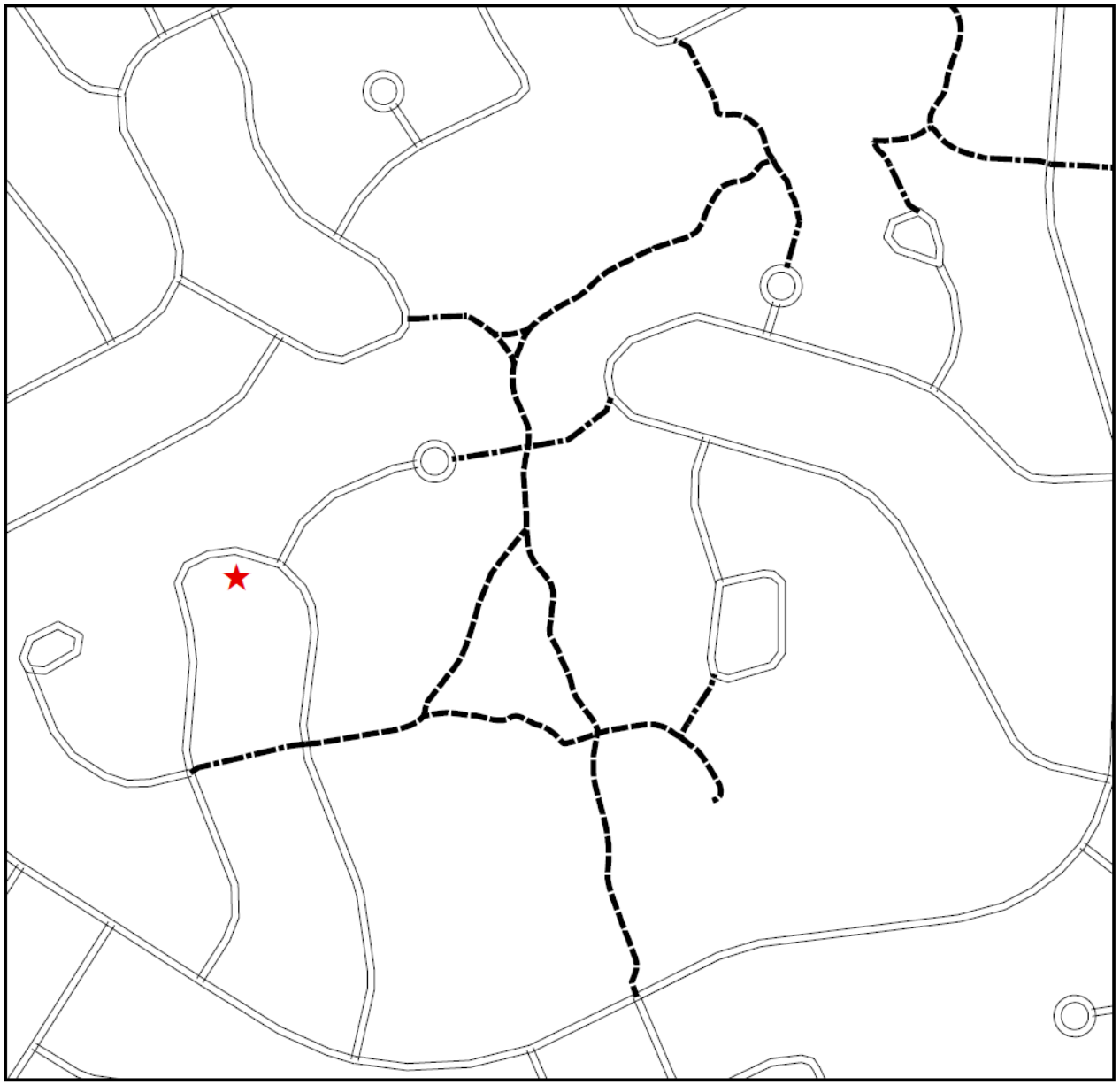
- Performed sensitivity analysis to compare how well alternate connectivity measures predict walking behaviour (dependent variable – walking at least once over a two day period)
- In both models, intersection density has a highly significant predictor of walking ($p < 0.05$) when controlling for age, gender, household income and car ownership

Connectivity Specification Influences Definition of Pedestrian Accessible Areas (i.e. buffers)

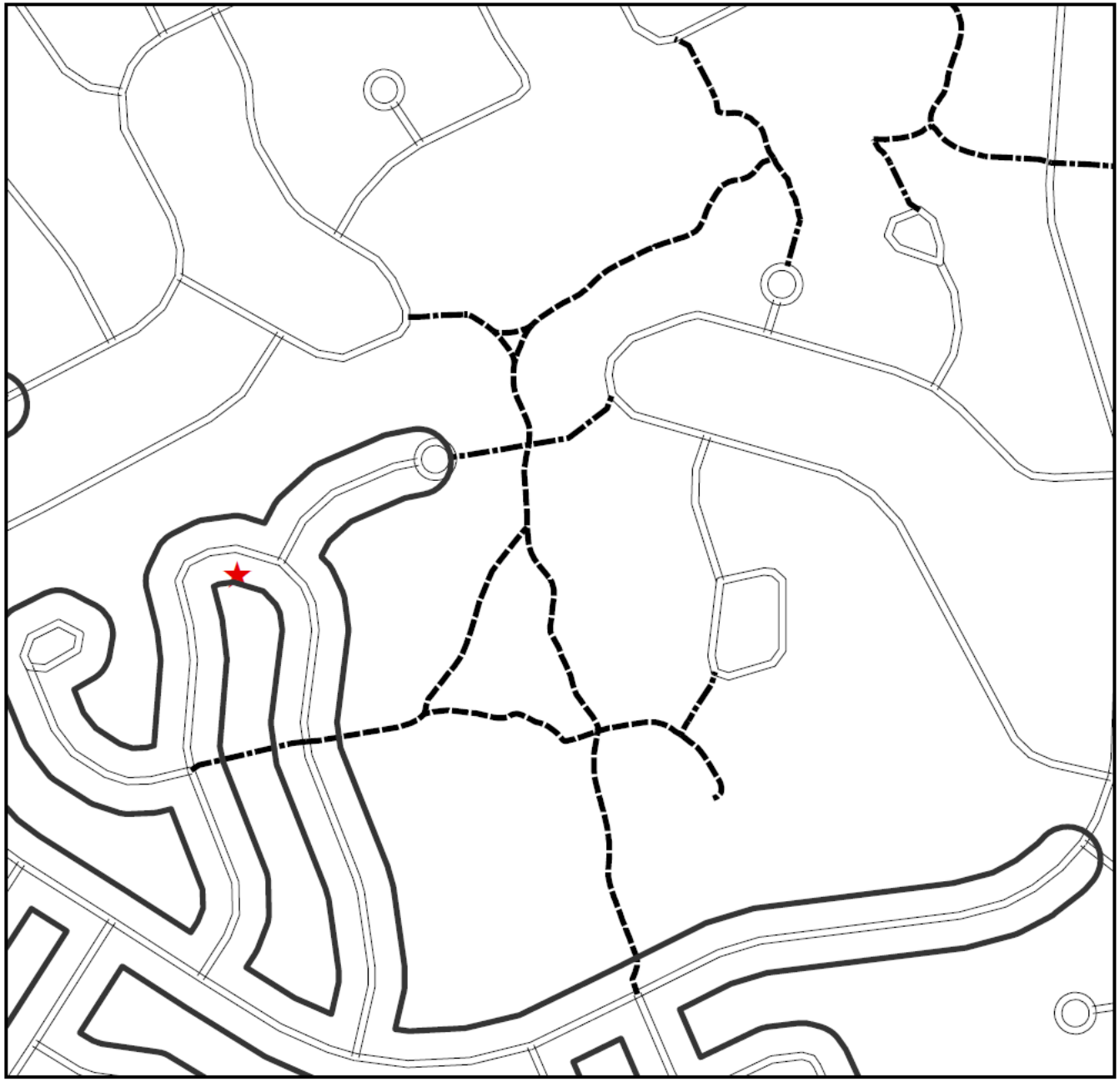


The density of residential units within each area is calculated using "Residential Points" data, built on assessment, building permits, census, and orthophotography data sources

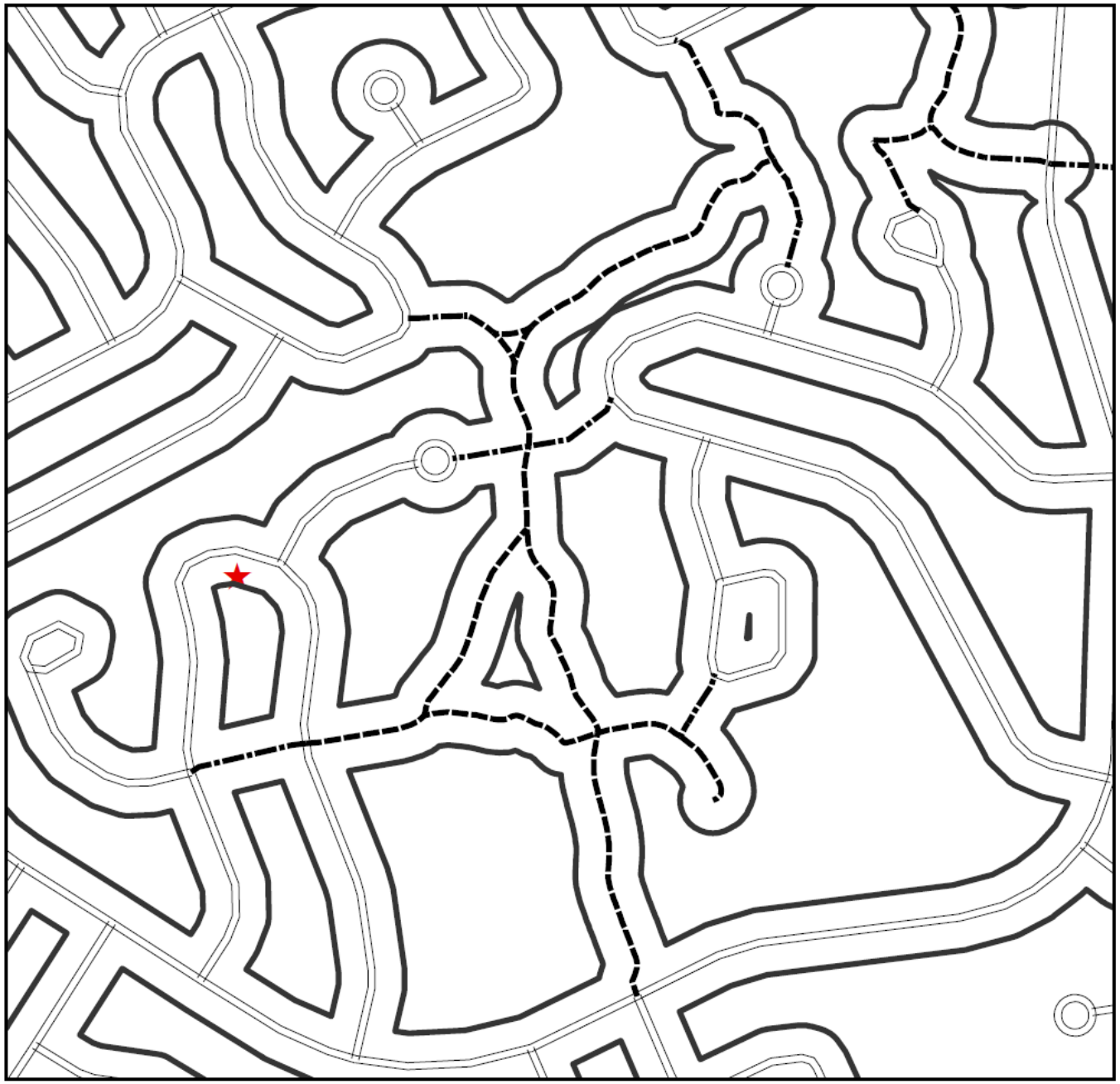
Buffer Creation Using Alternate Pedestrian Networks



Buffer #1 – Street Network



Buffer #2 – Pedestrian Network Including Off-Street Linkages



Buffer #2 – Pedestrian Network Including Off-Street Linkages

Buffer #1 – Street Network

Results – Pedestrian Access

Inclusion of off-street pedestrian linkages increases buffer sizes on average by:

- **31%** across the study area

These increases vary across walkability:

- 18% in high walkability areas
- >40% in low walkability areas

Variation across walkability primarily reflects presence of cul-de-sac connectors in low walkability suburban areas.

Conclusions and Future Directions

- Failing to account for off-street pedestrian paths can result in underestimation of pedestrian connectivity and misspecification of buffer based measures.
- Accounting for off-street paths:
  - Enables refinement of models linking the built environment and walking
  - Can support identification and prioritization of areas requiring pedestrian connectivity improvements

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