

the Effect of Area-wide Pedestrianisation linking between Town Centre Attractions

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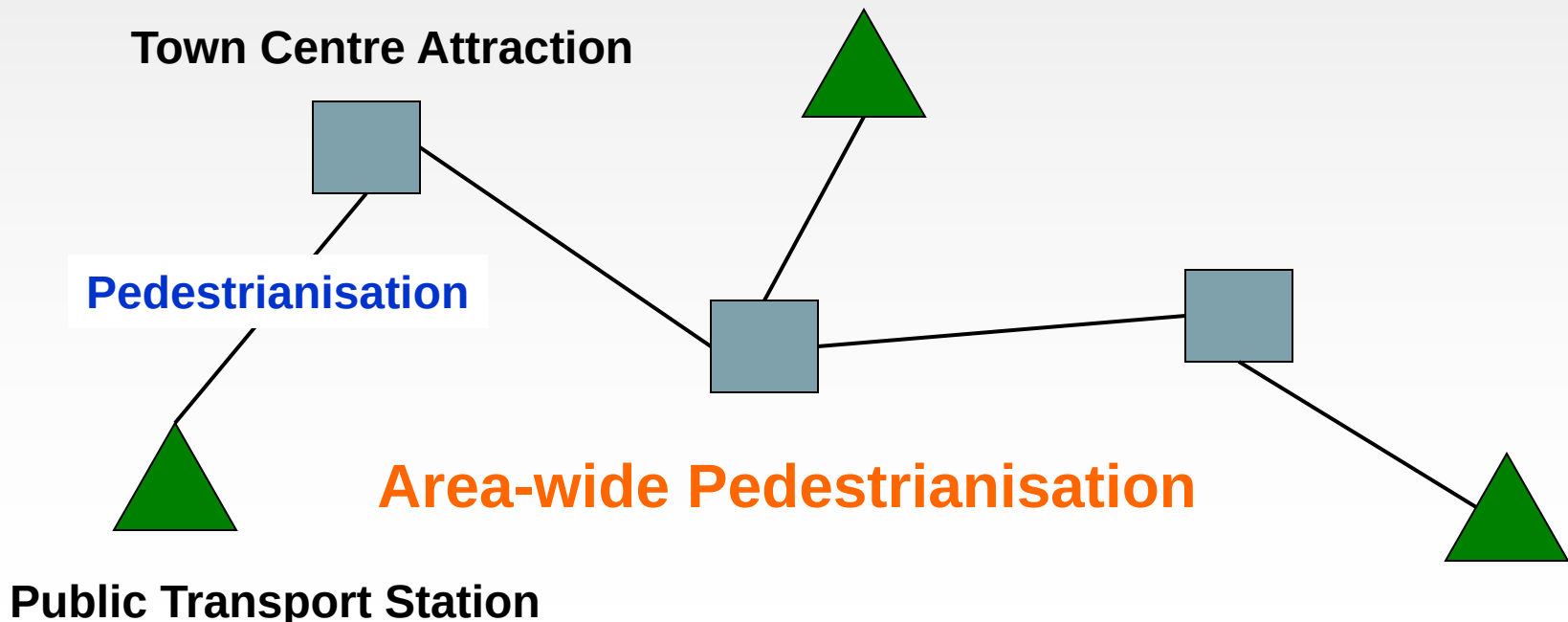
Content

- 1. Introduction**
- 2. Pedestrian Flow Model**
- 3. Commercial Land-use Model**
- 4. Assessment for Area-wide Pedestrianisation**

Research Background

Pedestrian Link Improvement

- The Missing and Potential link between a town centre attraction and a public transport station
- The Missing and Potential Link between town centre attractions



Research Approach

Aim

- Assess the impact of the area-wide pedestrianisation scheme on access and commercial land-use

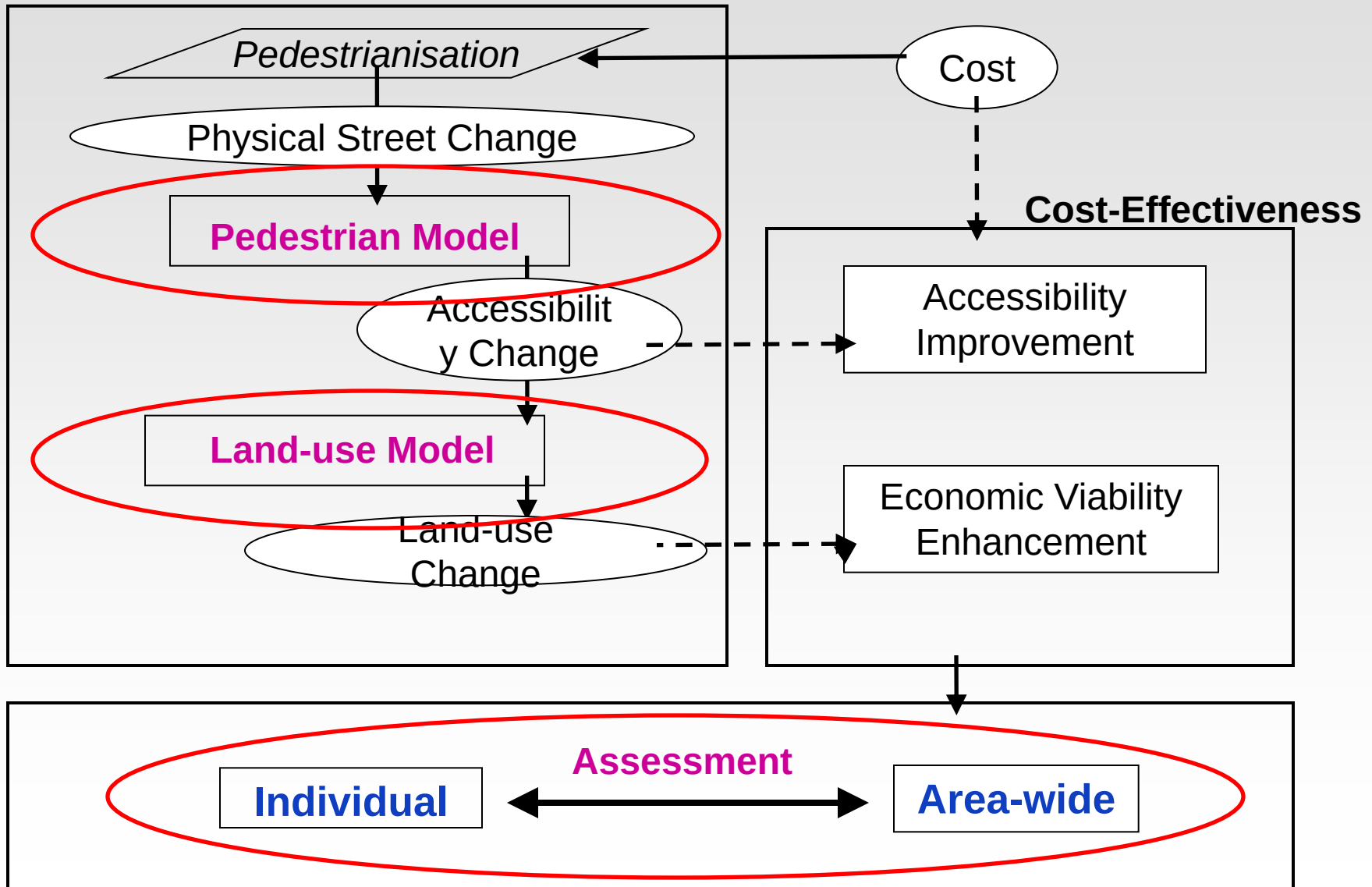
	The Pedestrianisation Impact	
	Positive	Negative
Access	• Better Pedestrian Access	• Damage to Car Access
Land-use	• Increase in Property Value	• Economic Exclusion

Research Questions

Questions

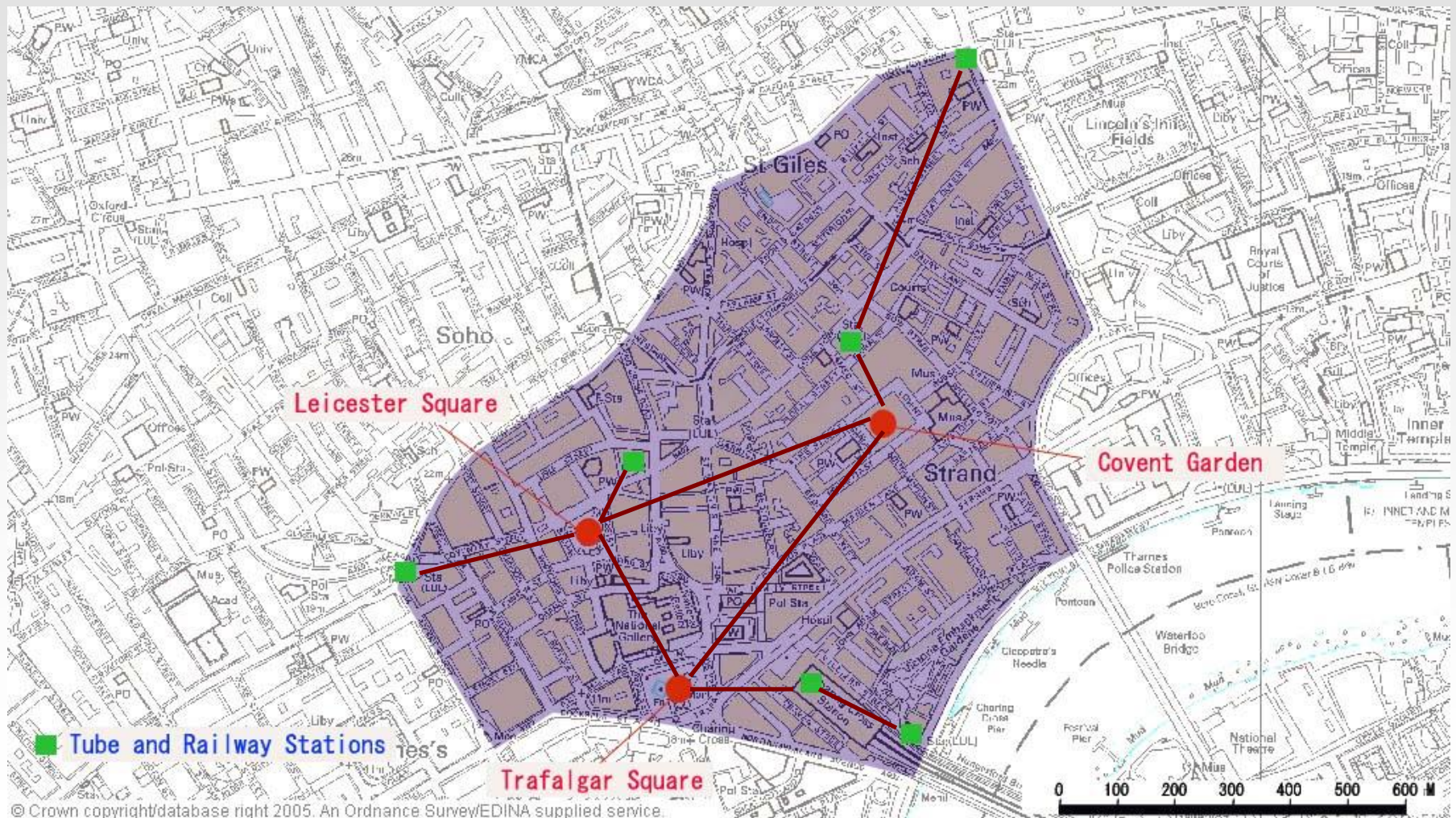
- How much **Accessibility** of pedestrians would be changed from area-wide pedestrianisation?
- How much **Economic viability** would be changed area-wide pedestrianisation through commercial land-use change?
- Could area-wide pedestrianisation be more **Effective** than individual pedestrianisation?

Methodology

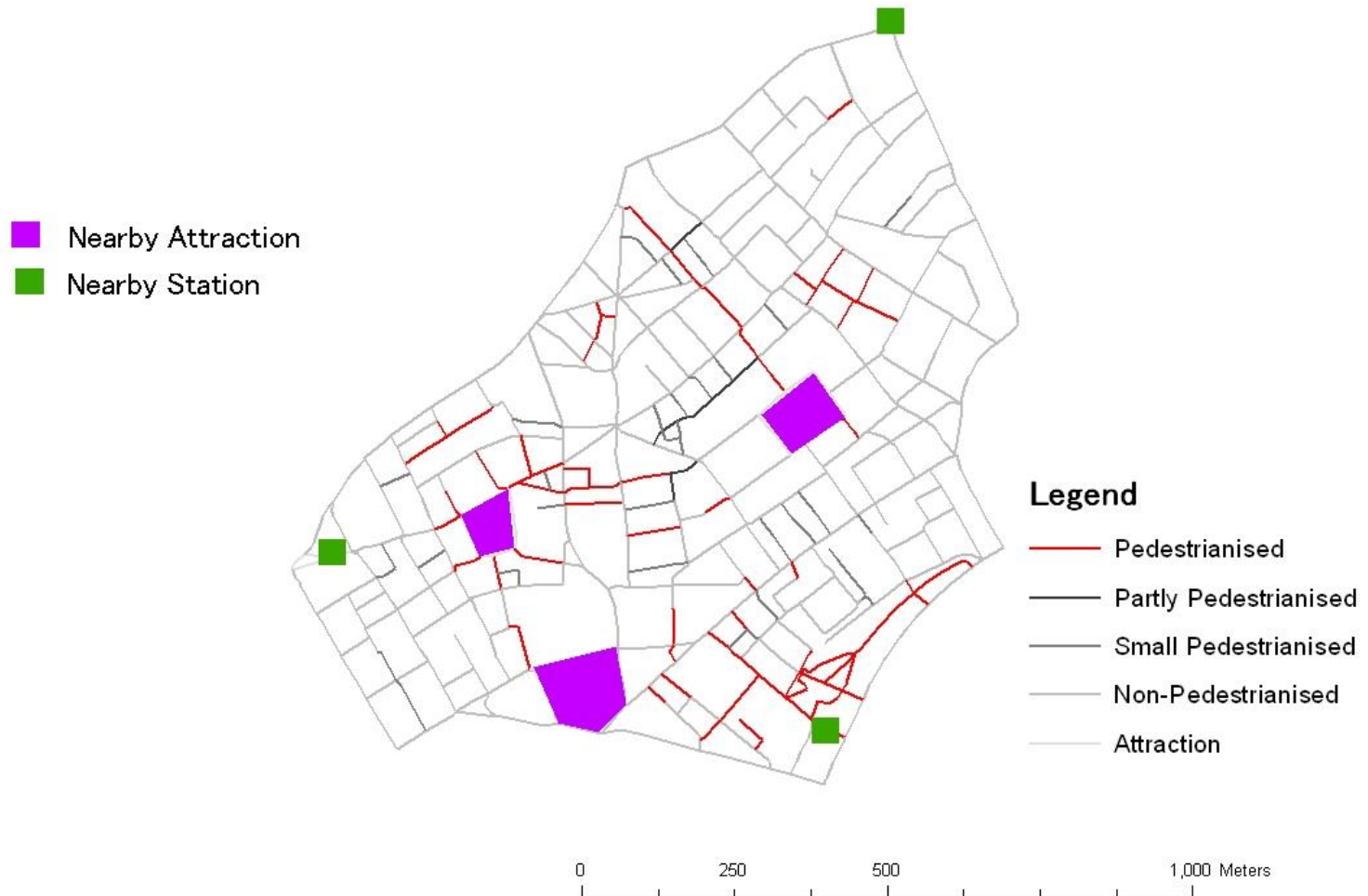


Case Study Area

The West End Area in Central London



Street Network



2. Pedestrian Flow Model

Multiple Regression Analysis

Dependent Variables: Pedestrian Accessibility

- Pedestrian Flow Count in Non-Pedestrianised Street Segment
- Pedestrian Flow Count in Pedestrianised Street Segments

Independent Variables:

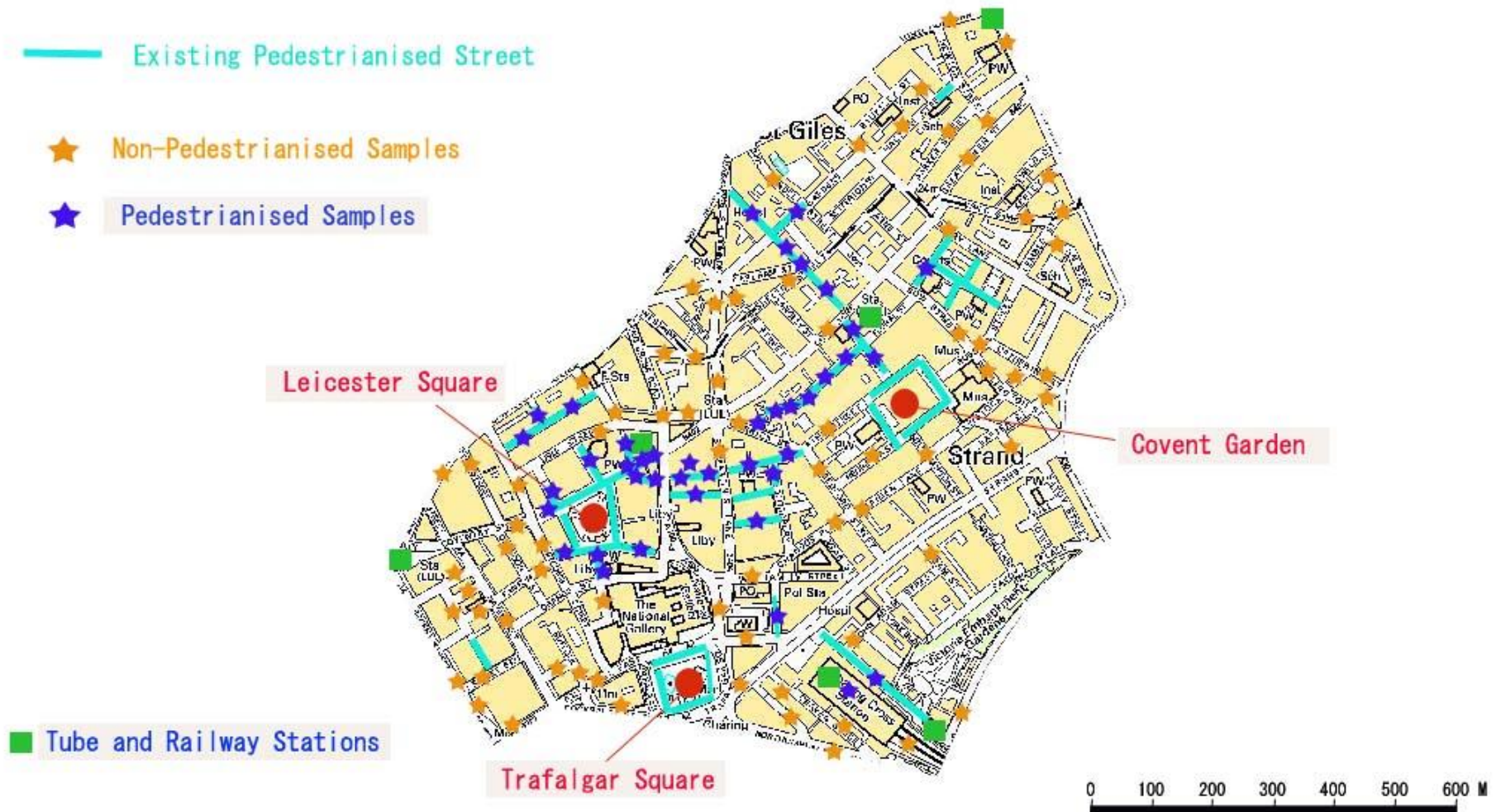
Physical and Spatial Characteristics of Streets as Destinations and as Routes to Town Centre Attractions and Public Transport Stations

- Average Pavement Width
- Shop-front Occupancy and Shop-Type Attraction
- Street Count and Distance
- Crossing Traffic flow (MRA to predict Traffic Flow Count with Street Counts to A-road, B-road and Car-park)
- The Route Characteristics to All Nearby Attractions and Stations

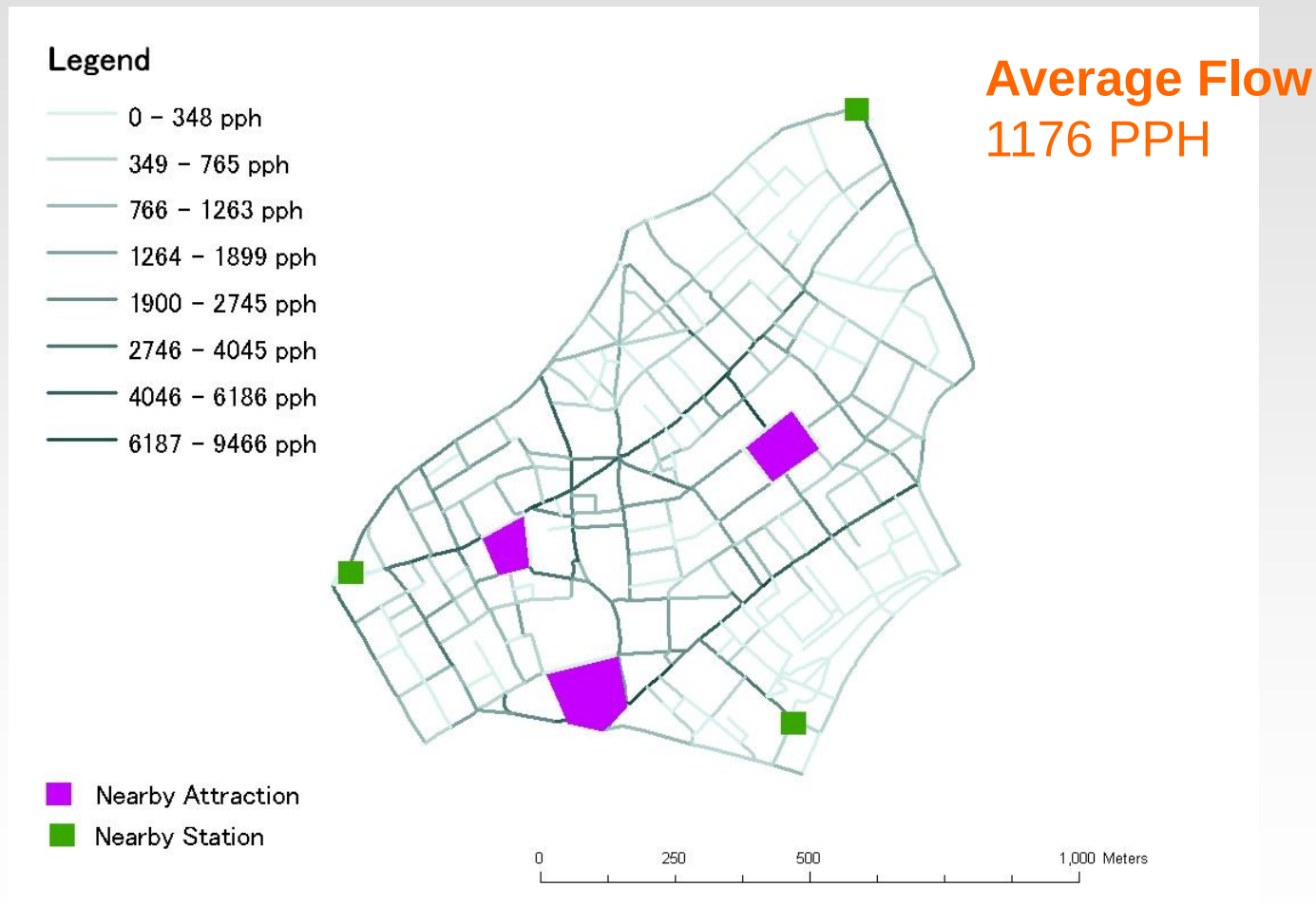
Pedestrian Data Collection

- Set a standing point to count the pedestrian flow on each street segment
- Count the pedestrian flow through a fixed section within the street segment
- Make the count for 5 minutes for each hour, 4 times from 2pm to 6 pm
- Output the count data as Pedestrian Per Hour (PPH)
- Collect the data of traffic flow count at the same time
- Survey Period; October, 2006 - January, 2007 excluding Christmas and New Year period
- Collected Data Size; 75 samples from non-pedestrianised segments, 41 from pedestrianised segments

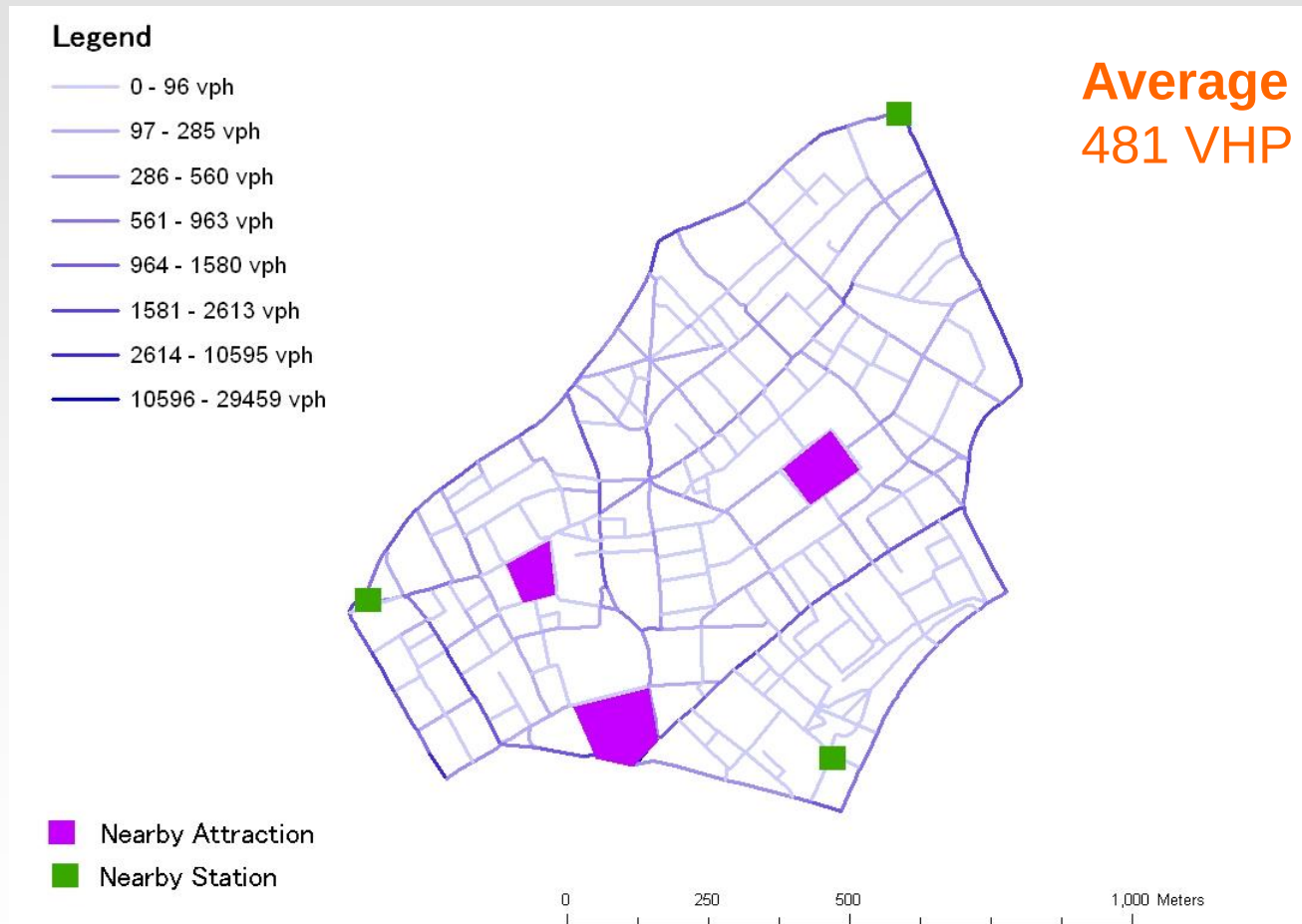
Pedestrian and Traffic Flow Data Collection Point



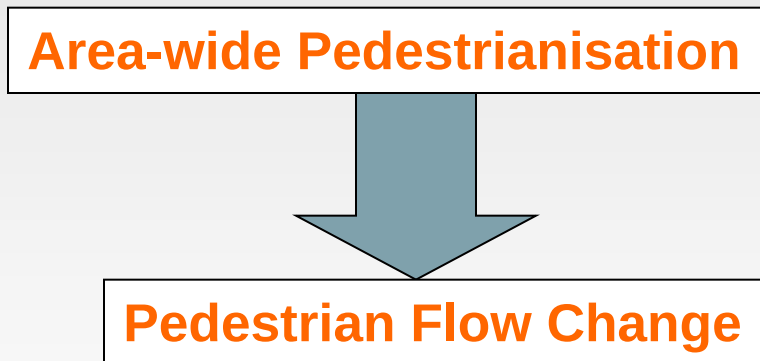
Representation of Pedestrian Flow Counts



Representation of Traffic Flow Counts



Application of Pedestrian Flow Model to Area-wide Pedestrianisation Analysis



The Traffic Change

- Traffic Exclusion from Pedestrianised Streets to the Surrounding Streets

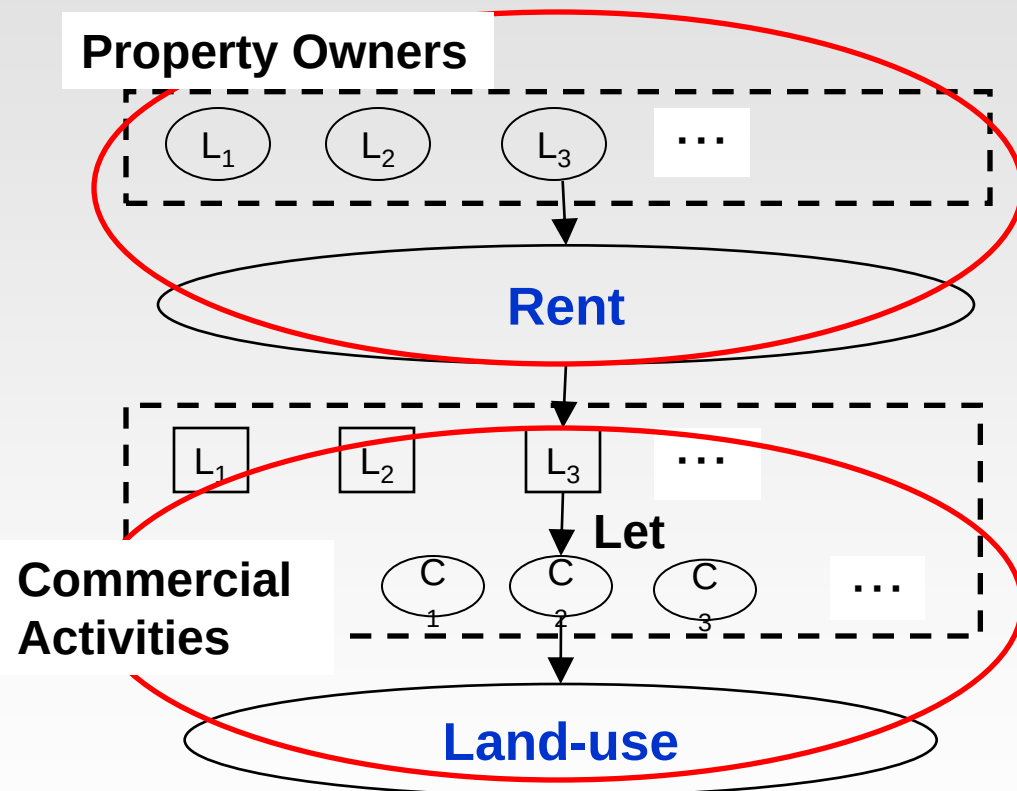
The Pedestrian Change

- Pavement Change
- Crossing Traffic Change

3. Commercial Land-use Model

The Property Market

- Commercial activities rent their properties from the owners
- Property owners decide the rents of their properties depending on accessibility and spatial factors
- Commercial activities have their utility for each property considering rent, accessibility and spatial factors
- Each property is taken by the commercial activity with the highest utility



Multiple Regression Analysis for Commercial Land-use Model

Rent Model

Dependent variables

- Property rent of a shop

Independent variables

- Pedestrian Flow Count, Traffic Flow Count and Floor Space of a property

Commercial Utility Model (Land-use Allocation Model)

Dependent variables

- Distribution of Commercial Activities into each Street Segment for each Shop-type (Aggregate Logit Model)

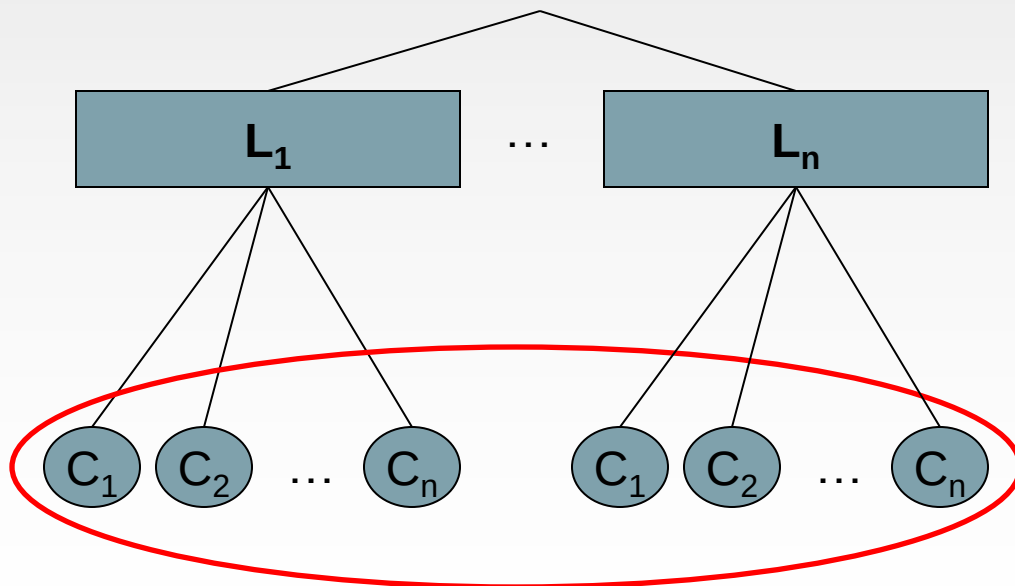
Independent variables

- Pedestrian Flow Count, Traffic Flow Count and Spatial Factors

Disaggregate Logit Model for Commercial Land-use Model

The Demand in the Study Area

- More total demand to locate than the capacity of the properties for every shop-type



Shop-Type Choice

$$P_i = \frac{V_i}{\sum_k \exp(V_k)}$$

$$V_i = \alpha \cdot U_i + \beta \cdot NL_i + \delta$$

P_i : Probability to choose Type i

V_i : Utility for Type i

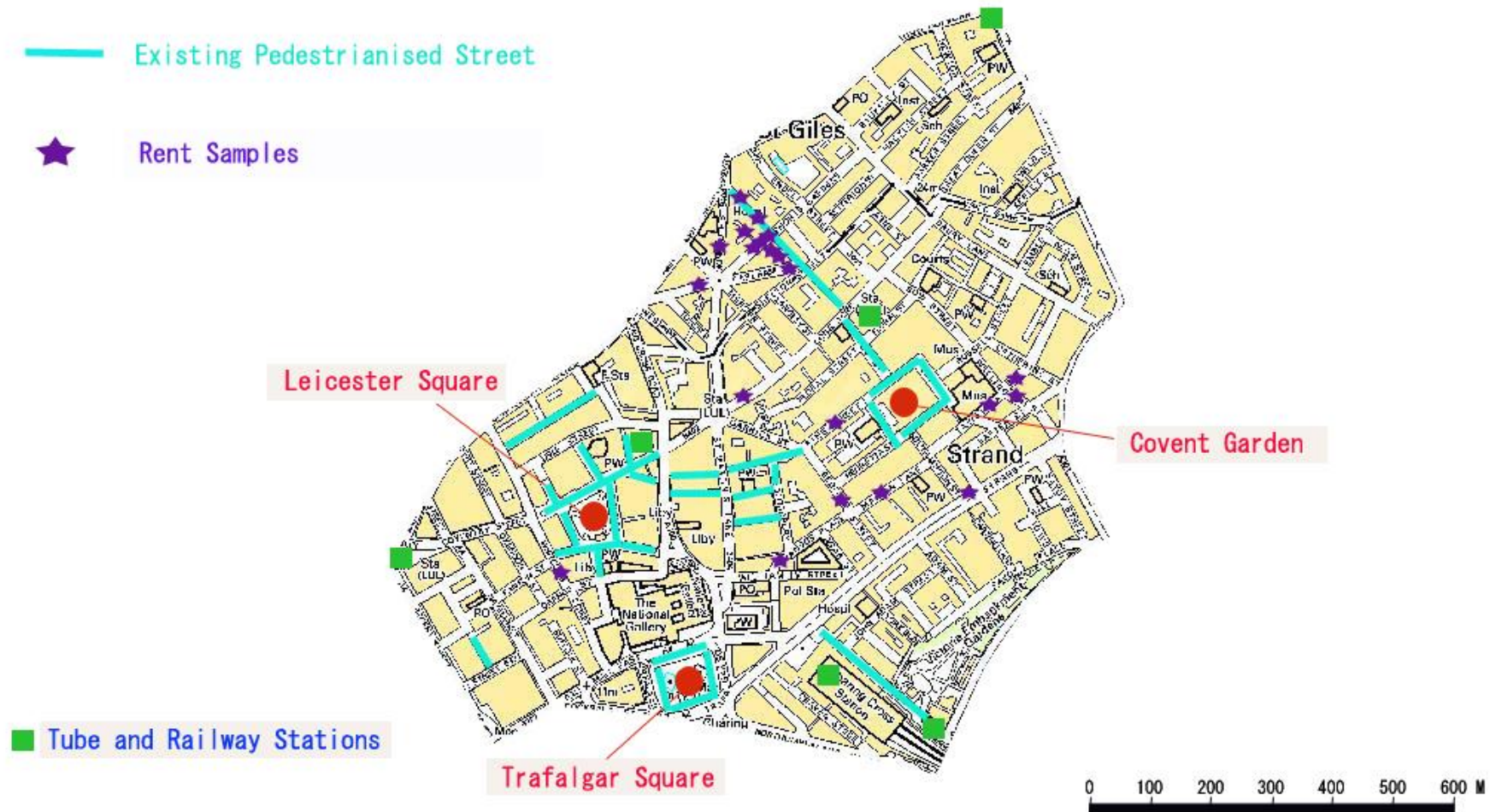
U_i : Utility for Type i from MRA

NL_i : Neighbour Same-type Area

α, β, γ : Parameter

Rent Data Collection

- Collect 21 shop rent data as the asking price in the market from estate agents' advertisements in the study area in February 2007



Commercial Land-use Data Collection

- Collect the data of all ground-floor land-use in the study area by doing survey in December 2006
- Collected Data Size: 2337 properties and 1421 shops for land-use change
- Divide the shop data into high-street and individual activities from web-site survey
- Divide the shop data into 8 types as follows

Shop Type
Fashion & Sports
Home & Work
Health & Beauty
Hobby & Souvenir
Cold Food & Convenient
Financial & Professional
Restaurant & Café
Pub & Bar

Representation of Rent

Legend

- 0 - 18390 BP
- 18391 - 49700 BP
- 49701 - 75755 BP
- 75756 - 110350 BP
- 110351 - 164310 BP
- 164311 - 274909 BP
- 274910 - 442405 BP

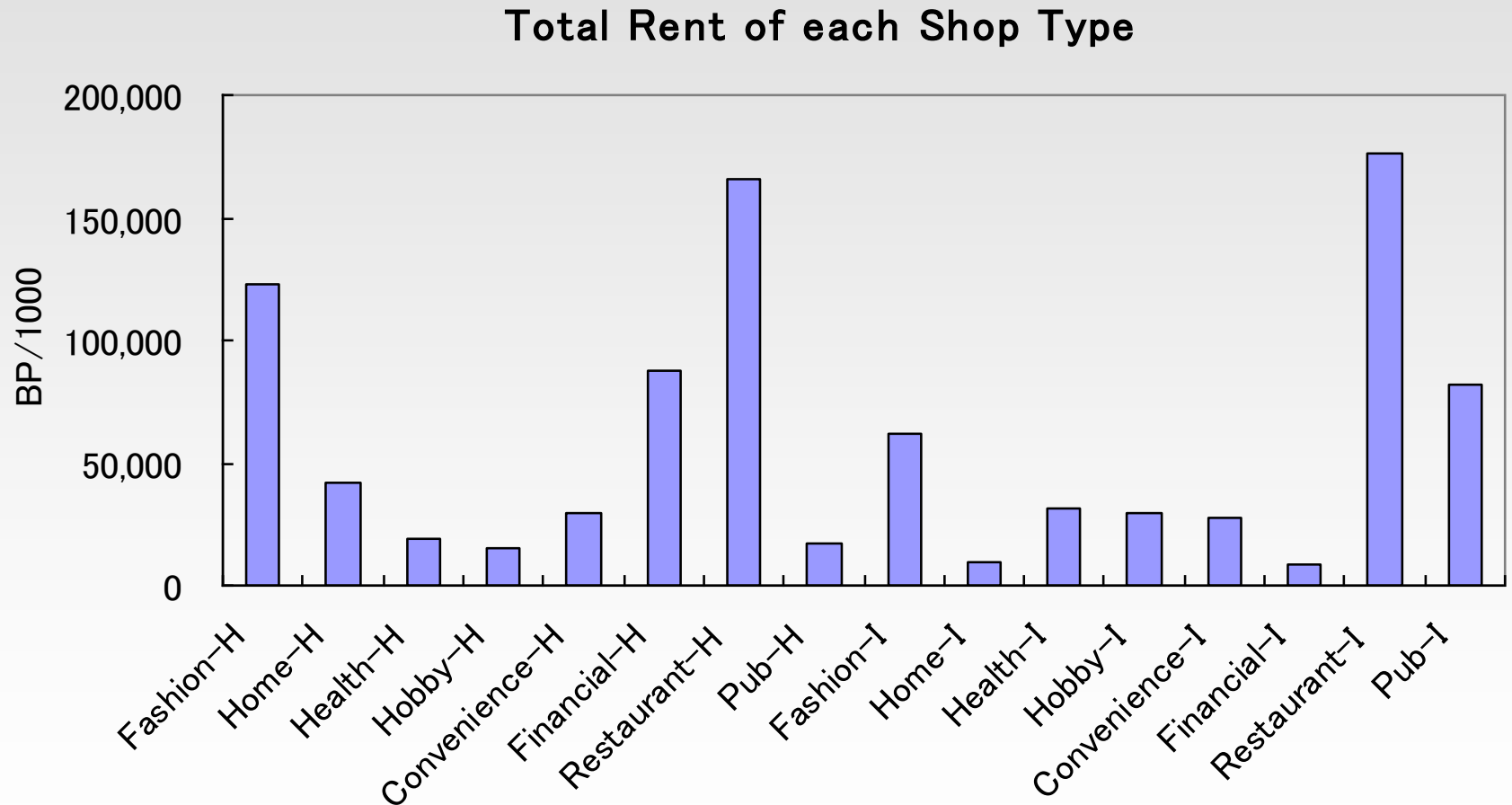
Total Rent
93,390,440 BP

- Nearby Attraction
- Nearby Station



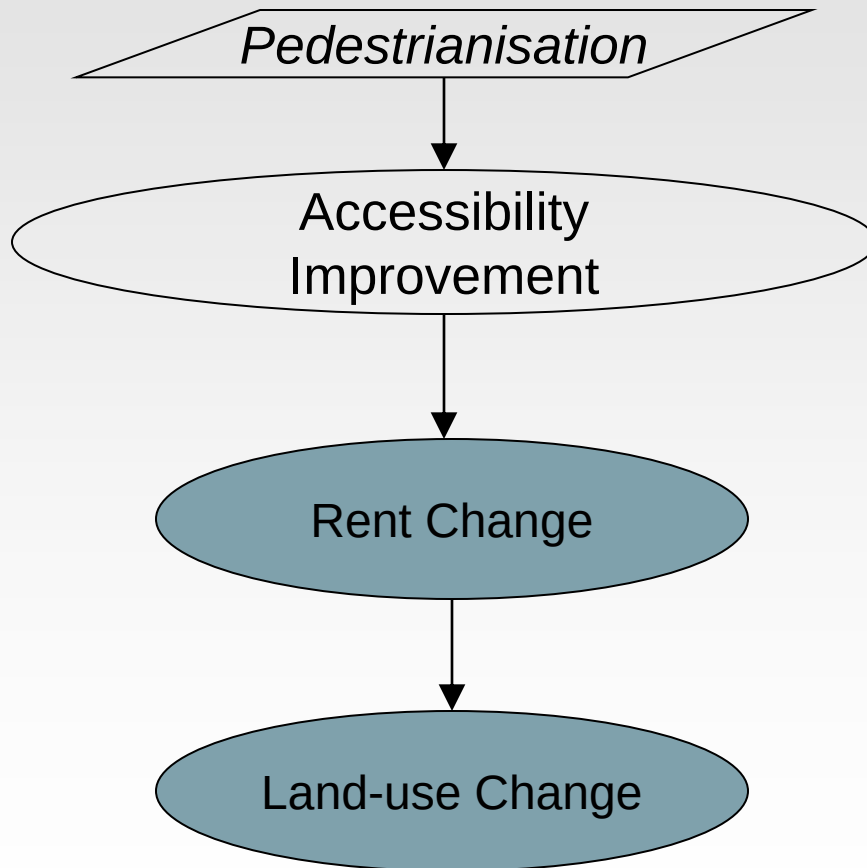
0 250 500 1,000 Meters

Representation of the Total Rent of Each Shop Type



Gini Coefficient
0.46

Application of Commercial Land-use Model to Area-wide Pedestrianisation



The Land-use Change

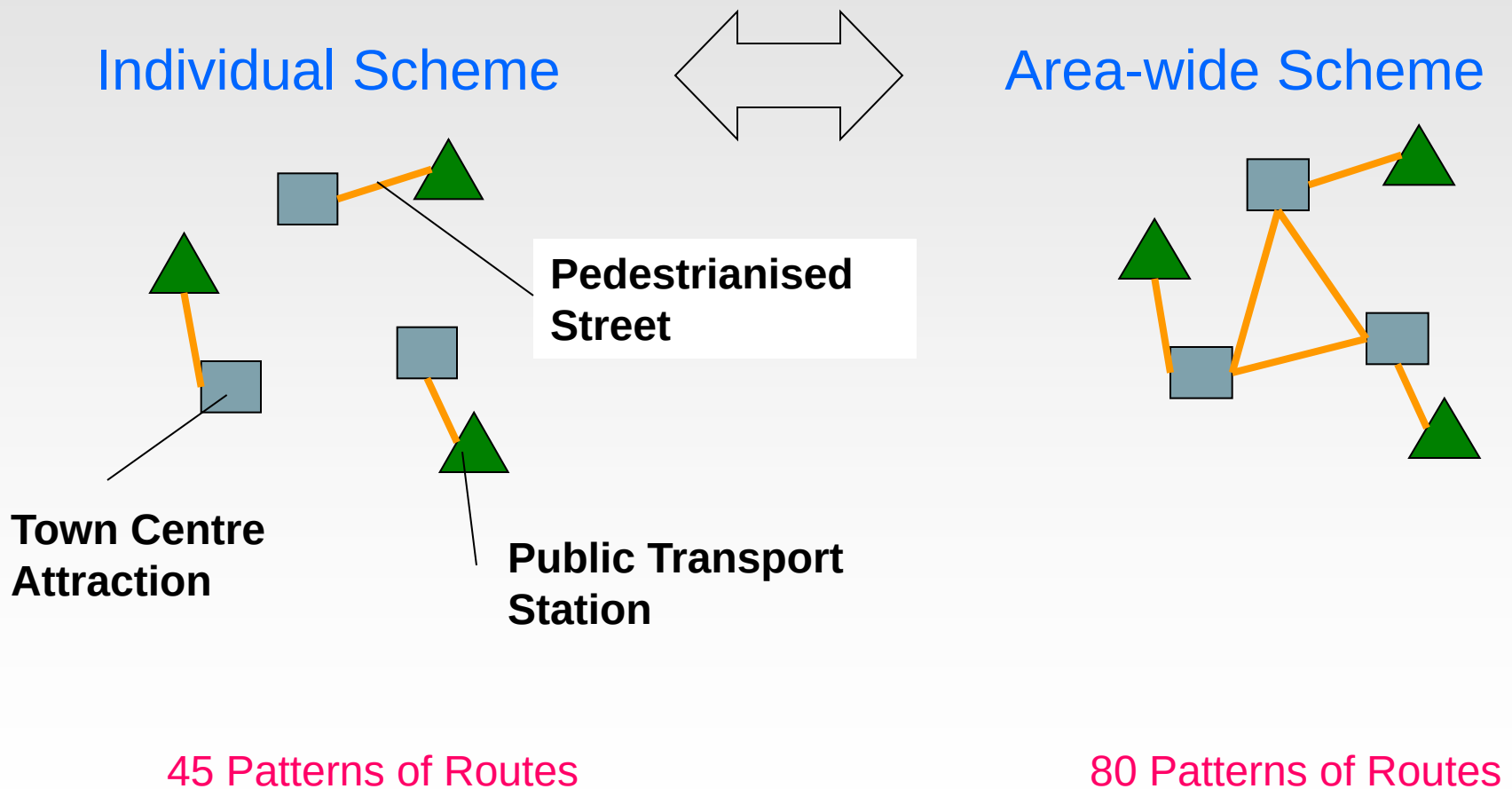
- Properties are taken by shop types with the highest utility after area-wide pedestrianisation

3. Assessment for Area-wide Pedestrianisation

The Cost-Effectiveness of the Scheme

- Size of newly Pedestrianised Area as Cost
- Pedestrian Increase per size of newly-Pedestrianised area as the effectiveness of accessibility improvement
- Traffic Decrease as negative effect of accessibility damage
- Rent Increase per size of newly-Pedestrianised area as the effectiveness of economic viability enhancement
- Increase in the Gini coefficient for the gap among total shop-type rents as negative effect of economic exclusion

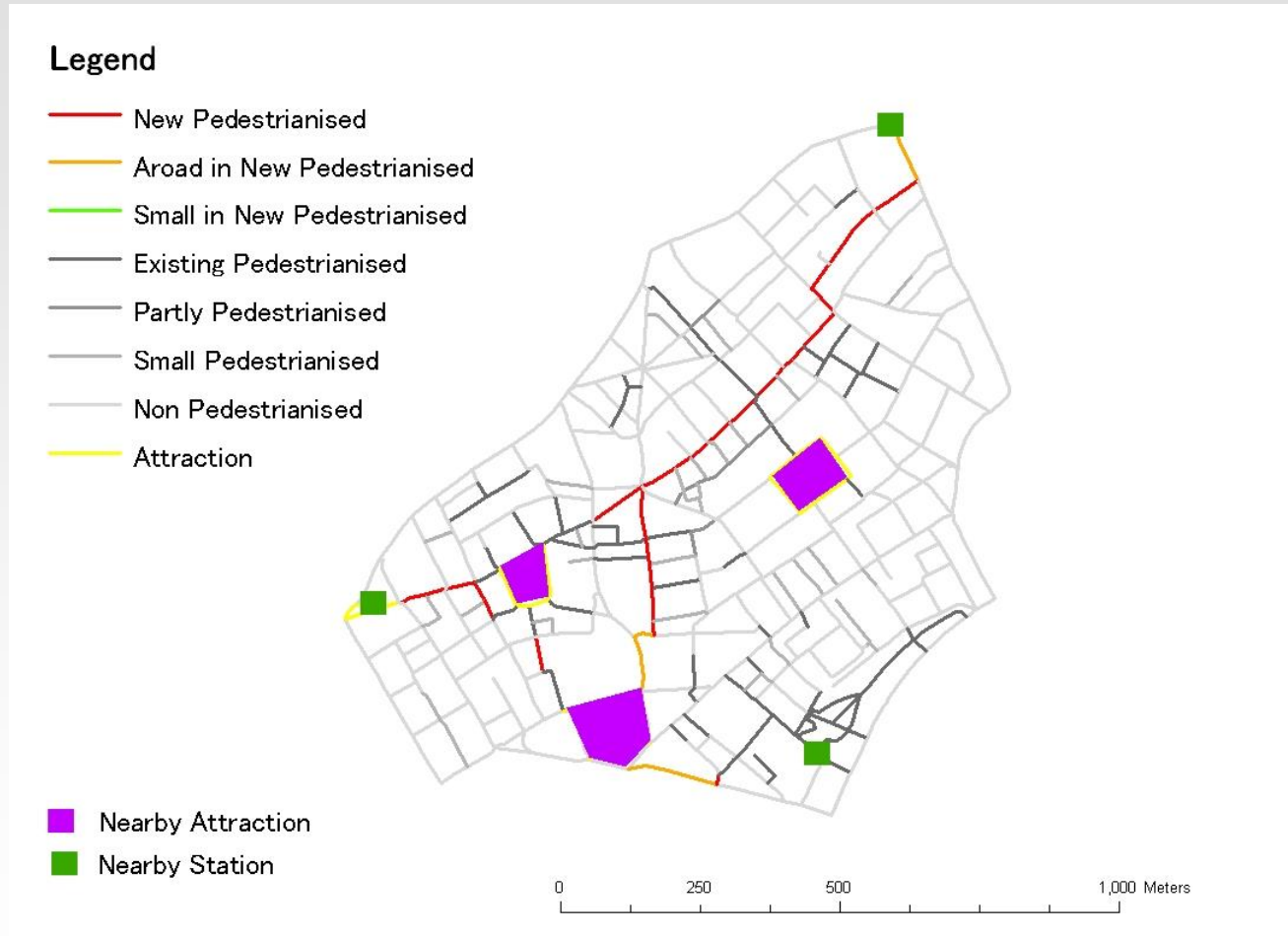
Area-wide and Individual Pedestrianisation Schemes



Individual Pedestrianisation



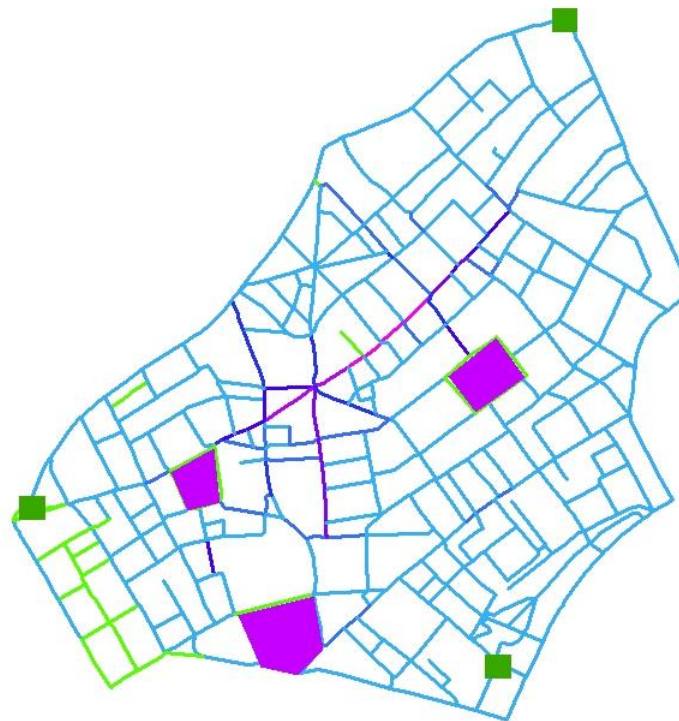
Area-wide Pedestrianisation



Change in Pedestrian Flows from Area-wide Pedestrianisation compared with Individual one

Legend

- -15 - 0 pph
- 1 - 134 pph
- 135 - 300 pph
- 301 - 639 pph
- 640 - 1448 pph
- 1449 - 3929 pph
- 3930 - 6344 pph
- 6345 - 10321 pph

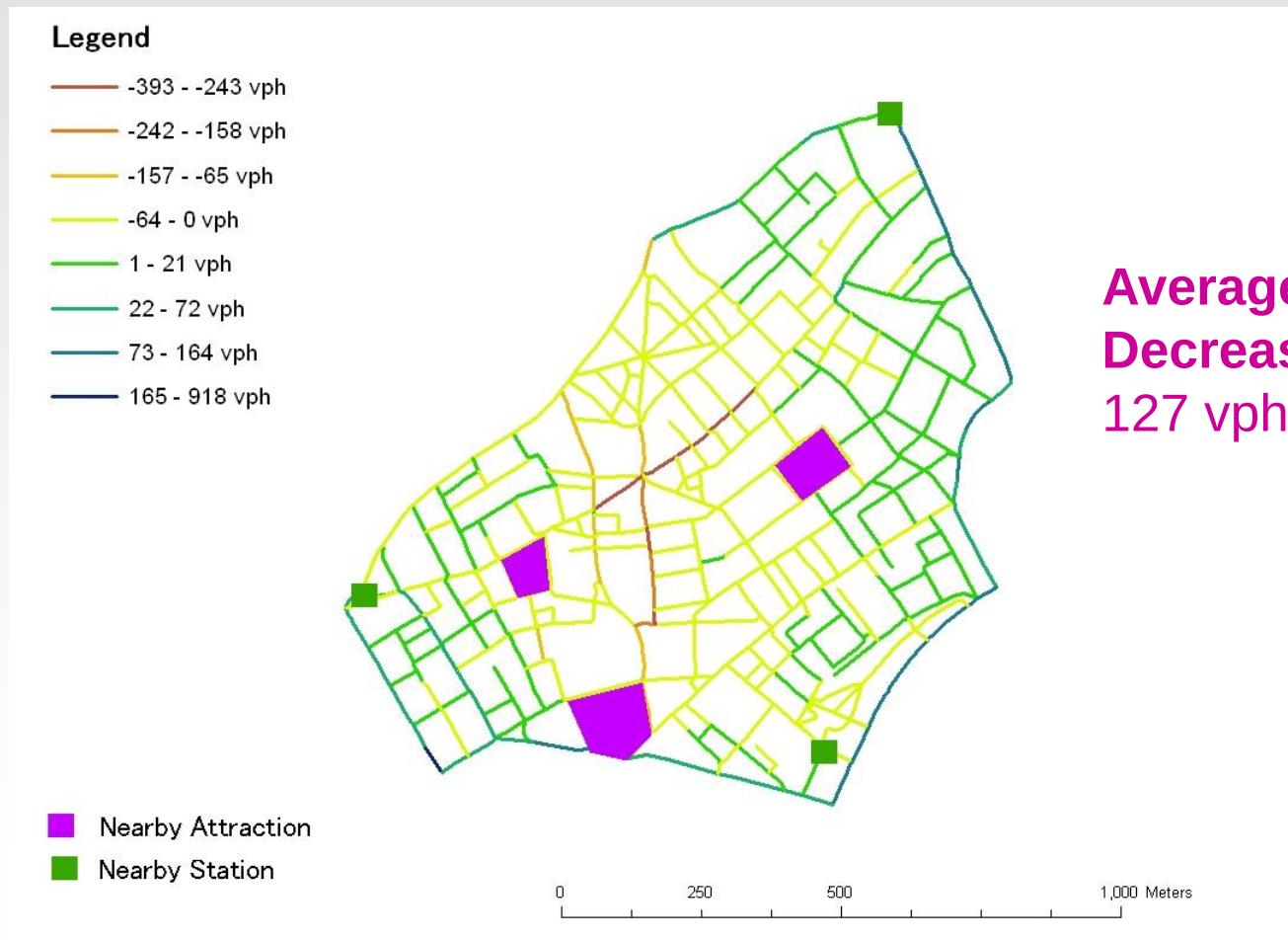


- Nearby Attraction
- Nearby Station

0 250 500 1,000 Meters

The Effectiveness Increase
0.0089 pph/m² (+33%)

Change in Traffic Flows from Area-wide Pedestrianisation compared with Individual one

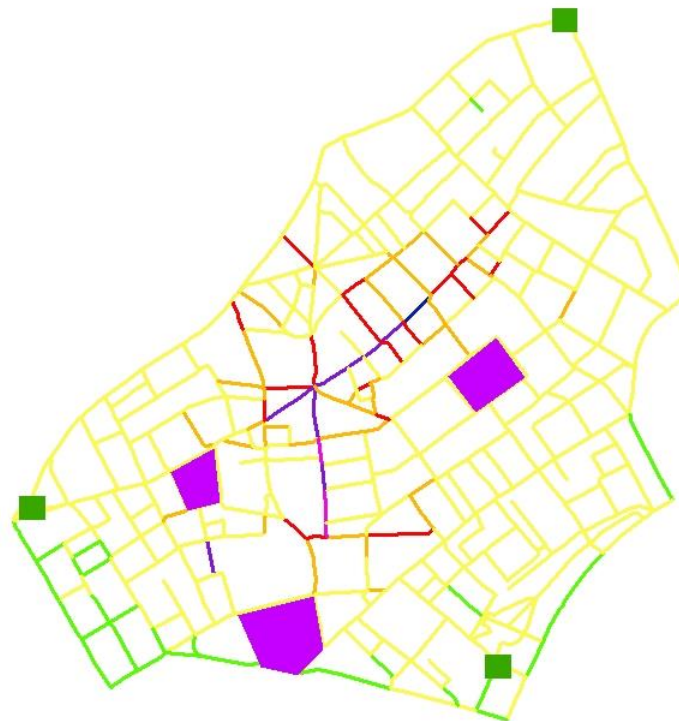


**Average Accessibility
Decrease
127 vph (-37%)**

Change in Rent from Area-wide Pedestrianisation compared with Individual one

Legend

- 508 - -1 BP
- 0 - 751 BP
- 778 - 1849 BP
- 1990 - 5940 BP
- 8040 - 14730 BP
- 19461 - 30373 BP
- 60168 BP



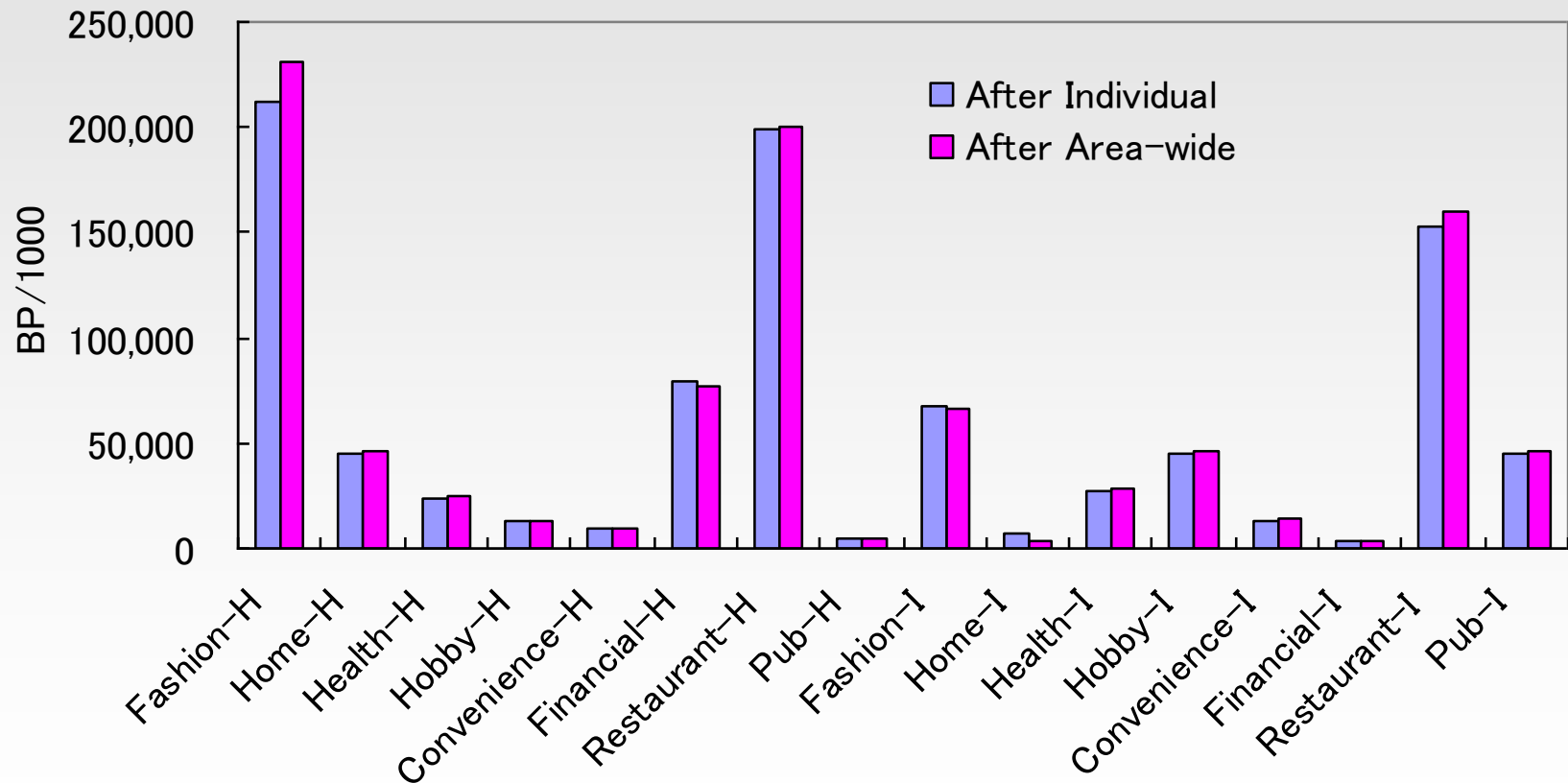
- Nearby Attraction
- Nearby Station

0 250 500 1,000 Meters

The Effectiveness Increase
46 BP/m² (+9%)

Change in Shop-Type Rent from Area-wide Pedestrianisation compared with Individual one

Total Rent Change of each Shop Type



Gini Increase
0.01 (+2%)

Conclusion

- By developing the pedestrian flow model and commercial land-use model, it enables to quantify the effects of area-wide pedestrianisation on access and commercial land-use.
- In terms of the effects of the pedestrian and rent increases, it proves that area-wide pedestrianisation is more effective than individual pedestrianisation.
- Although area-wide pedestrianisation has more damage to car access than individual pedestrianisation, the negative effect of economic exclusion is almost same.