

## **NEW CITY COURT**

### **Pedestrian Forecast and Landscape Assessment**

Space Syntax

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New City Court GPE (St Thomas Street) Limited

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# Executive summary Introduction and approach

## Introduction

GPE (St Thomas Street) Limited assembled a design team led by Allford Hall Monaghan Morris (or “AHMM”) to carry out a comprehensive redevelopment of the New City Court (or “NCC”) site to include demolition of the 1980s office buildings and erection of a 26-storey building (plus mezzanine and two basement levels), restoration and refurbishment of the listed terrace (nos. 4-16 St Thomas Street), and redevelopment of Keats House (nos. 24-26 St Thomas Street) with removal, relocation and reinstatement of the historic façade on a proposed building, to provide office floorspace, flexible office/retail floorspace, restaurant/café floorspace and a public rooftop garden, associated public realm and highways improvements, provision for a new access to the Borough High Street entrance to the Underground Station, cycling parking, car parking, service, refuse and plant areas, and all ancillary or associated works.

The site is located on St Thomas Street in the London Borough of Southwark, an area that is undergoing significant changes to transport infrastructure and residential and commercial density, including the redevelopment of the London Bridge Station which will continue to have an impact on pedestrian movement patterns.

In 2016 Space Syntax (or “SSx”) was asked to provide evidence-based design advice on pedestrian activity patterns, land use patterns and the public realm character of the development site. The results of the analysis were issued as an Urban Baseline Study in December 2016.

The masterplan’s ground floor layout and distribution of ground floor uses was developed through 2017 and 2018 and revised in 2021 to respond to planning feedback.

This study addresses the following key questions:

- If the site remains unchanged from current condition, what is the likely pedestrian environment in 2031 relative to the surveyed conditions?
- If the site is redeveloped as proposed, what will be the impact on the pedestrian environment in 2031 compared to a ‘do nothing’ option?
- How should the landscape be designed to accommodate expected pedestrian flows in order to maximise the benefit to the pedestrian environment?

## Approach

Space Syntax applies an evidence-based approach to measure the properties of the spatial network and how these relate to the functioning of the site.

This report presents the key findings of the **Pedestrian movement forecast and landscape assessment** in three sections.

1. Space Syntax integrated the datasets from the Urban Baseline Study with information on the building’s trip generation data and agreed committed developments to construct a **Pedestrian Movement Forecast** model for the site for a 2031 scenario. The model has been used to test the impact of changes in the pedestrian movement patterns with and without the New City Court scheme.

2. Space Syntax used TfL’s Pedestrian Comfort Levels (PCL) to measure how the proposal compares to the ‘do nothing’ 2031 scenario and to the 2016 pedestrian baseline.

3. Using the flows from the pedestrian forecast we constructed a Public Space Model to identify the key pedestrian desire lines through the site and to inform the landscape design. The model was also used for the **Landscape Assessment** of the proposed design.

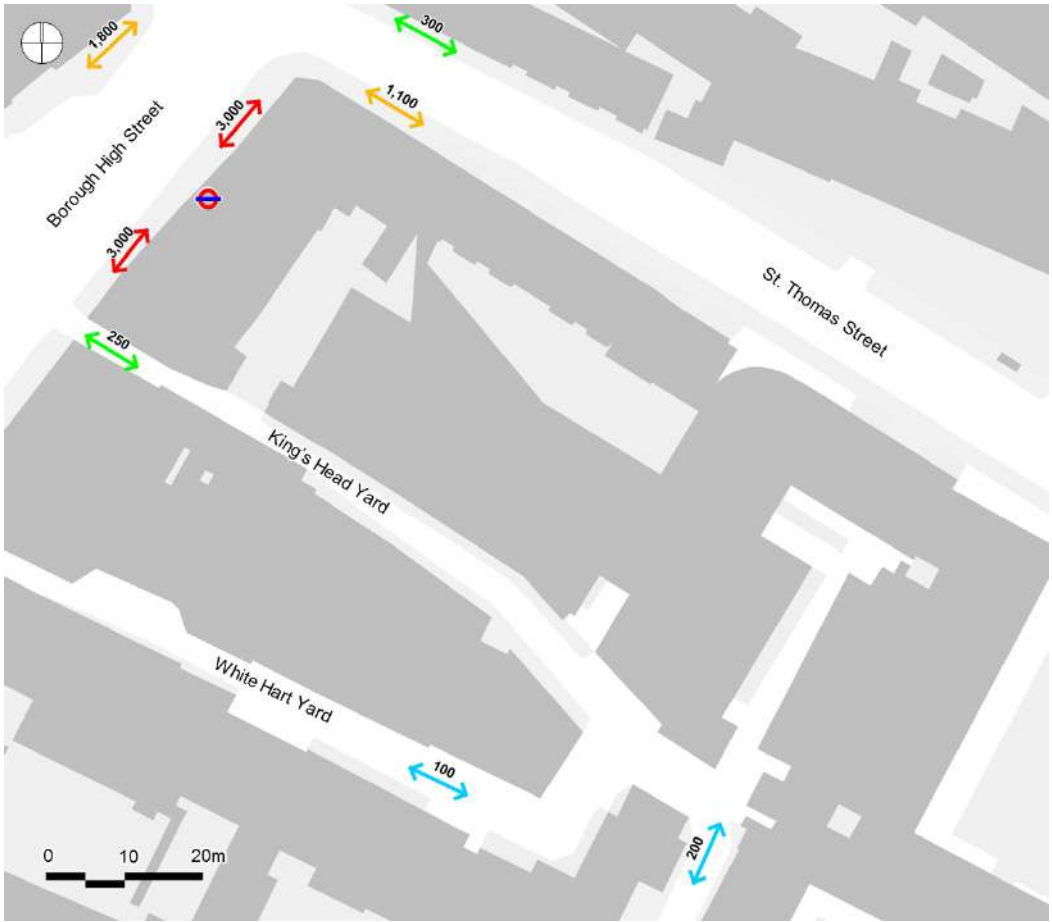
The updated assessment and the pedestrian movement forecast presented in this report uses the 2016 baseline condition and remains valid due to the worst-case approach adopted. The resulting forecast movement levels represent an increase of between 17% and 21% (see pages 28 and 29) which exceed the projected growth for the area. A summary of the Baseline Study is included in Appendix 1.

# Executive summary **Key findings and conclusions** Pedestrian Movement Forecast

## 2031 Future baseline - Do nothing

The pedestrian movement forecast for the “Do nothing” scenario shows that the projected transport growth and committed developments in the area surrounding the site will increase overall movement levels adding pressure on the already congested public realm, particularly at the intersection of Borough High Street with St Thomas Street.

Compared to the 2016 baseline, the forecast flows for this scenario during the AM Peak show an **increase of 17% on the eastern footway of Borough High Street and 21% on the southern footway of St Thomas Street.**



2031 Future baseline - Do nothing  
AM Peak forecast

## 2031 Future baseline with New City Court

In line with the overall improvements to public realm quality, the new routes proposed by the New City Court scheme create more permeability adding circulation choices and alternative routes that help to evenly disseminate movement at this busy junction. The new routes take pressure off Borough High Street and St Thomas Street.

Compared to the 2031 Future baseline “do nothing scenario”, the forecast flows during the AM Peak **decrease by 28% along Borough High Street eastern footway (16% lower than the existing).**

The movement levels along St Thomas Street in both scenarios remain at a similar level, with a minor increase related to NCC trips arriving from the west and an overall increase in background through-movement in the area as a result of the additional connectivity that the proposed scheme creates.



2031 Future baseline with New City Court  
AM Peak forecast

### Pedestrian movement People per hour

- ↔ 2000 and above
- ↔ 1000 – 2000
- ↔ 500 – 1000
- ↔ 250 – 500
- ↔ 100 – 250
- ↔ 0 – 100

Executive summary

Key findings and conclusions

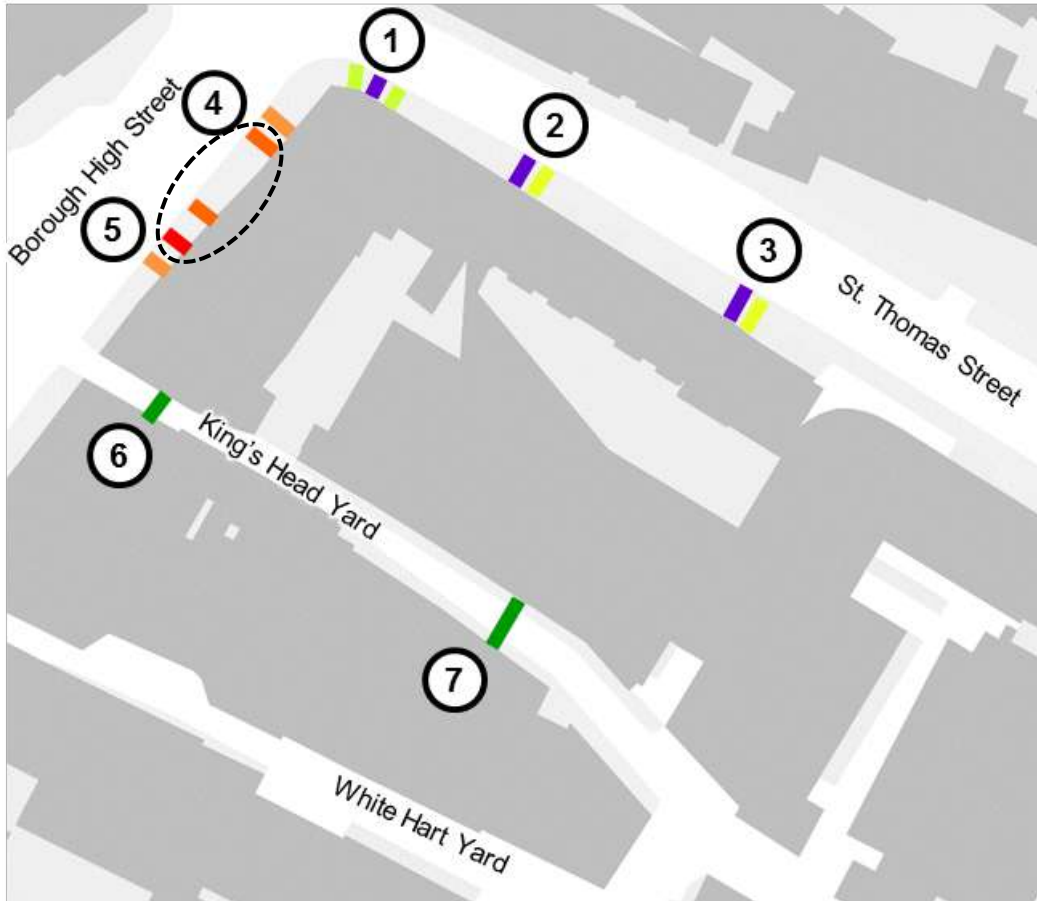
Pedestrian Comfort Level assessment

**2031 Future baseline - Do nothing**

The Pedestrian Comfort Level (“PCL”) assessment for the “do nothing scenario” highlights the increased pressure at the intersection of Borough High Street with St Thomas Street.

Along the eastern footway of Borough High Street, the PCL at three locations - 4b, 5a and 5b (in dashed circle) - is less than the TfL recommended minimum for Office and Retail areas during the two assessed scenarios: all day average and AM peak.

Locations 1b, 2a and 3a (highlighted in purple) have an effective footway width of less than 1.50m, the minimum acceptable to allow wheelchair users and a walking person to pass each other<sup>1</sup>.

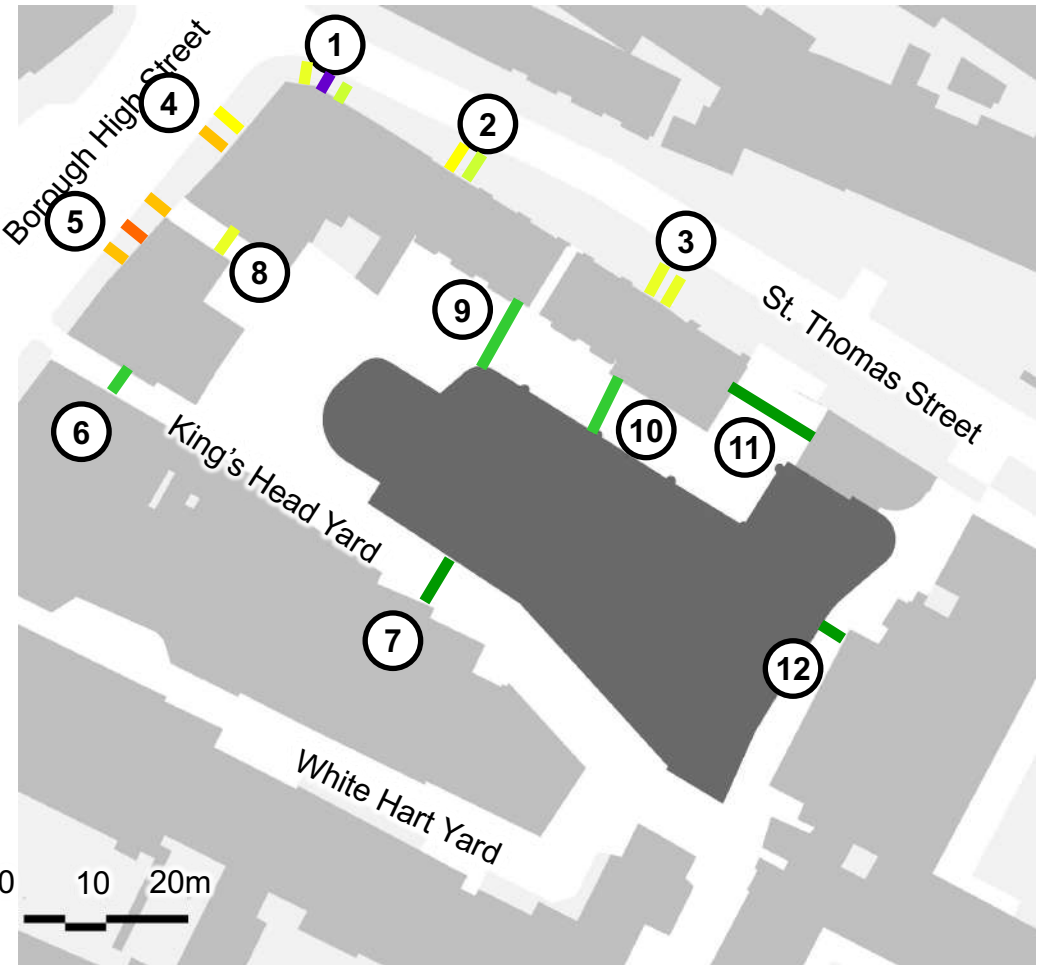


2031 Future baseline - Do nothing  
Level of Service assessment (AM Peak)

**2031 Future baseline with New City Court**

The additional permeability and the improved public realm of the proposed scheme results in a significant improvement of pedestrian comfort levels around the site. The footway width at locations 2 and 3 has increased and the overall permeability and new routes reduces pressure on Borough High Street.

All locations within the development are comfortable and well above the minimum recommended.



2031 Future baseline with New City Court  
Level of Service assessment (AM Peak)

**Legend 1 Pedestrian Comfort Levels**

TfL recommended minimum for Office and Retail areas

A+ comfortable

A

A-

B+

B

B-

C+

C

C-

D

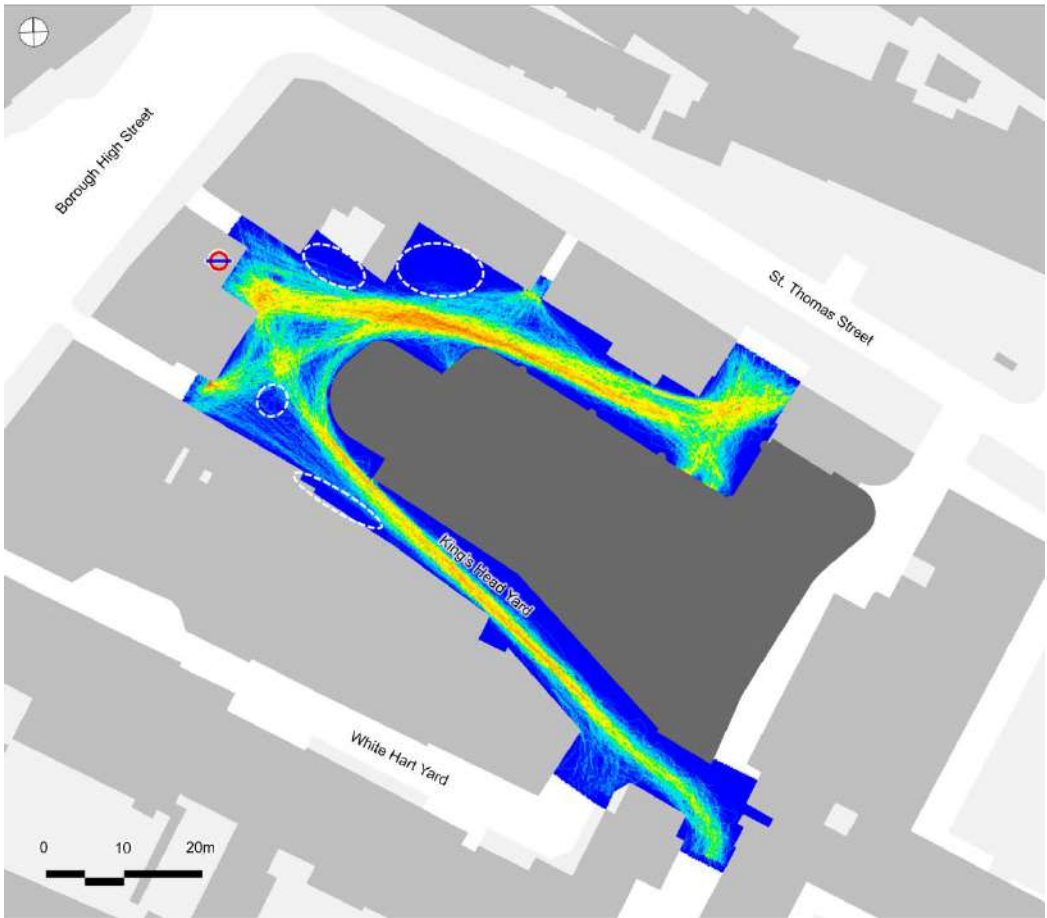
E very uncomfortable

F effective width < 1.50m

# Executive summary   **Key findings and conclusions**   Landscape design assessment

The proposed landscape design successfully accommodates the key pedestrian desire lines.

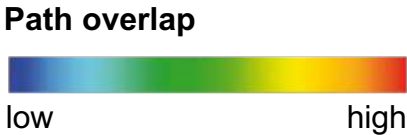
It locates landscape features and furniture at suitable locations that do not obstruct dominant movement lines and allow visibility at key orientation points.



**2031 Future baseline with New City Court**  
**Pedestrian desire lines**  
**Tabula rasa - AM Peak**



**2031 Future baseline with New City Court**  
**Pedestrian desire lines**  
**Proposed landscape design - AM Peak**



# **Pedestrian Movement Forecast**

# Pedestrian movement model Methodology

## Pedestrian Movement Model

### Spatial Layout Attraction



The spatial structure of an urban place determines its accessibility, which can be defined as the degree of ease that users have when moving around any environment.

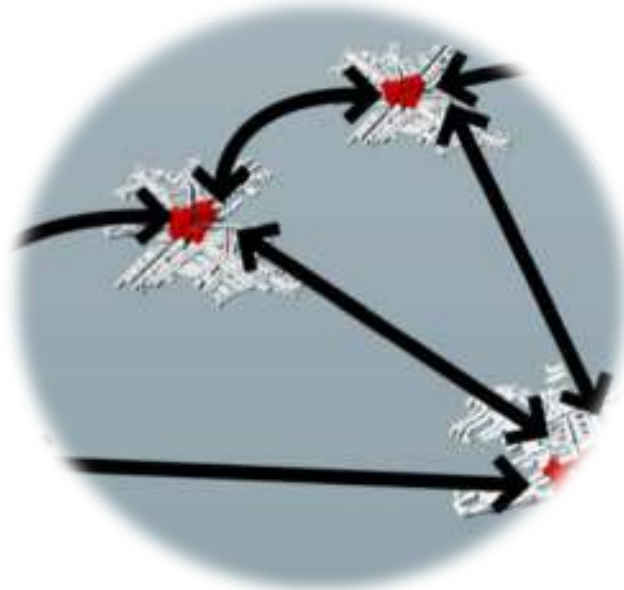
Pedestrian movement patterns are fundamentally influenced by the degree to which the design of the development creates an accessible, intelligible spatial layout in which all routes and public spaces are sufficiently activated.

### Land Use Attraction



The strength of attraction of movement-sensitive land uses, especially retail and community facilities, as well as additional development quantum in the area.

### Transport Attraction



The degree to which public and private transport systems integrate with the development.

A multivariable Pedestrian Movement Model explains the relationship between spatial and land-use components and its combined influence on pedestrian movement patterns.

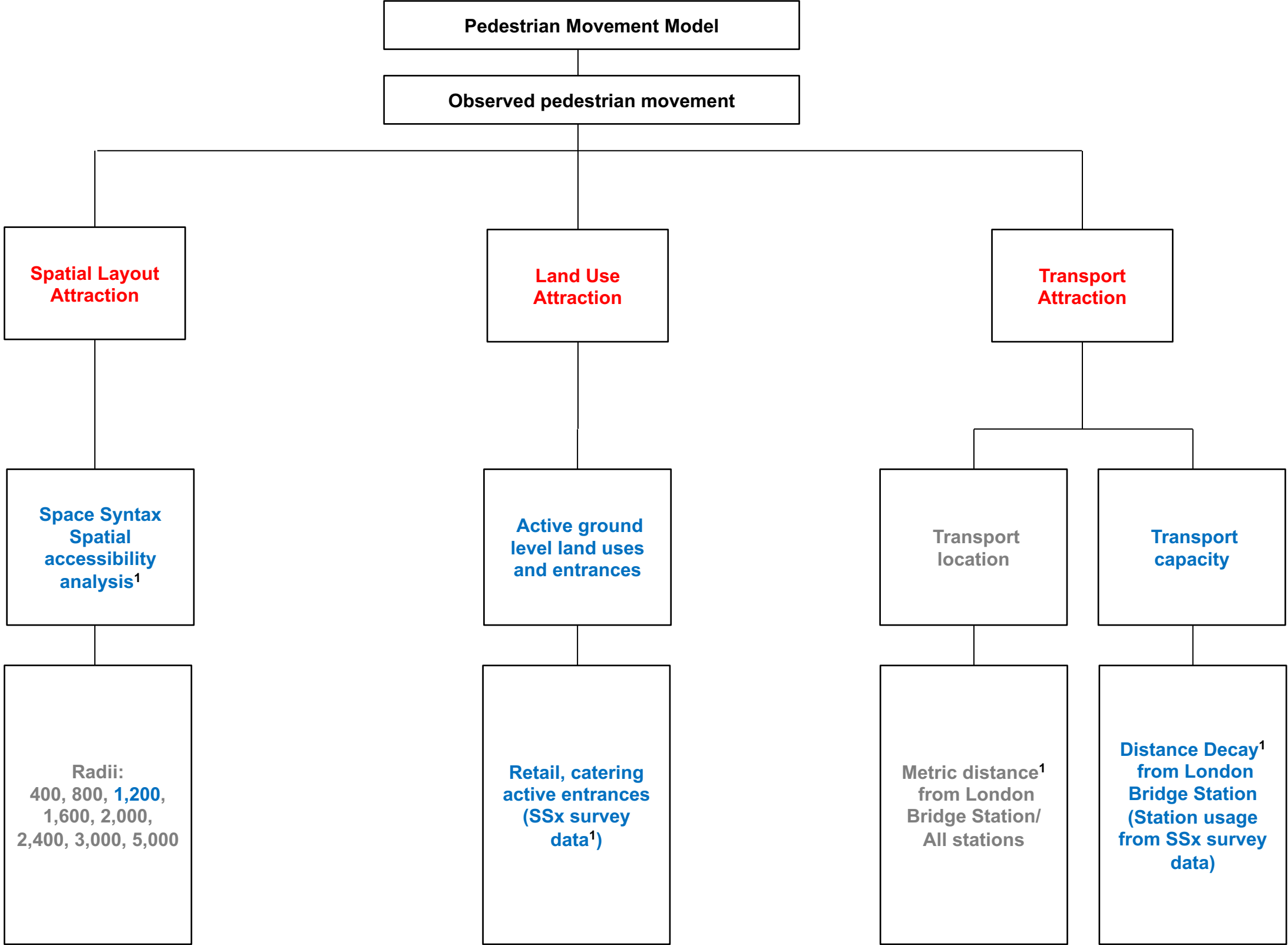
It has three elements:

1. Spatial Layout Attraction
2. Transport Attraction
3. Land Use Attraction

## Pedestrian movement data

## Pedestrian forecast

# Pedestrian movement model **Variables**



The **first stage** of the Pedestrian Movement Model is to establish the relationship between observed pedestrian movement and a number of variables analysed in the baseline study. To do so we used a correlation matrix to identify the impact of each of the variables.

In the **second stage**, three categories: Spatial Layout Attraction, Transport Attraction and Land Use Attraction were analysed as variables using **multiple regression analysis**. **R-Square values** were used to identify the model with the highest goodness-of-fit. The results were incorporated into a Pedestrian Movement Model.

The variables in the diagram to the left indicate the ones that have been tested in the analysis.

The ones highlighted in blue, spatial accessibility at 1,200m radius, active ground level land use/ entrances and distance from London Bridge Station entrances, are the variables that were found to have a higher impact on the observed movement in the area.

### Notes

<sup>1</sup> Detailed methodology description in Appendix 2.

# Pedestrian movement model

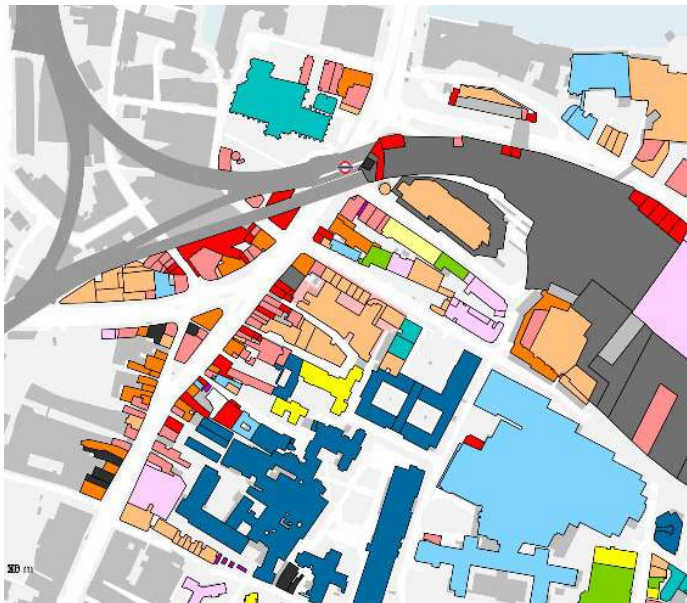
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**Spatial layout attraction**  
Weekday All Day Avg R square = 59%



**Transport attraction**  
Weekday All Day Avg R square = 26%



**Land use attraction**  
Weekday All Day Avg R square = 23%

The observed movement in the study area around the site has a good level of correspondence with the spatial accessibility values of the street network.

The statistical correlation analysis for each variable individually showed that **59% of the observed movement can be explained based solely on Spatial Layout Attraction.**

The inclusion of transport and land use attraction in the model improves the correlation.

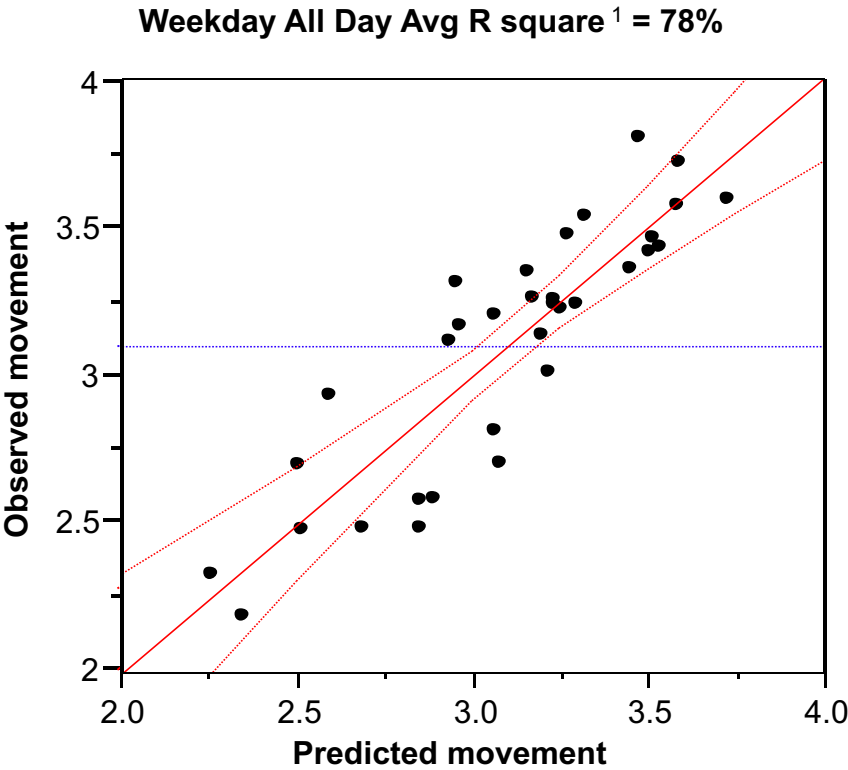
The following variables were found to have an influence on pedestrian movement:

1. Spatial accessibility at 1,200m
2. Linear Distance Decay from London Bridge Station entrances
3. Active ground level land use/ entrances.

The inclusion of additional variables results in a higher correlation where **78% of the observed movement can be explained by the model.**

The graph to the left shows the fit between the modelled and observed data.

The values of **t-ratio**<sup>1</sup> highlighted in the Parameter Estimates table (below the graph) show that the most significant variable in the models is the spatial layout, followed by transport and land use.

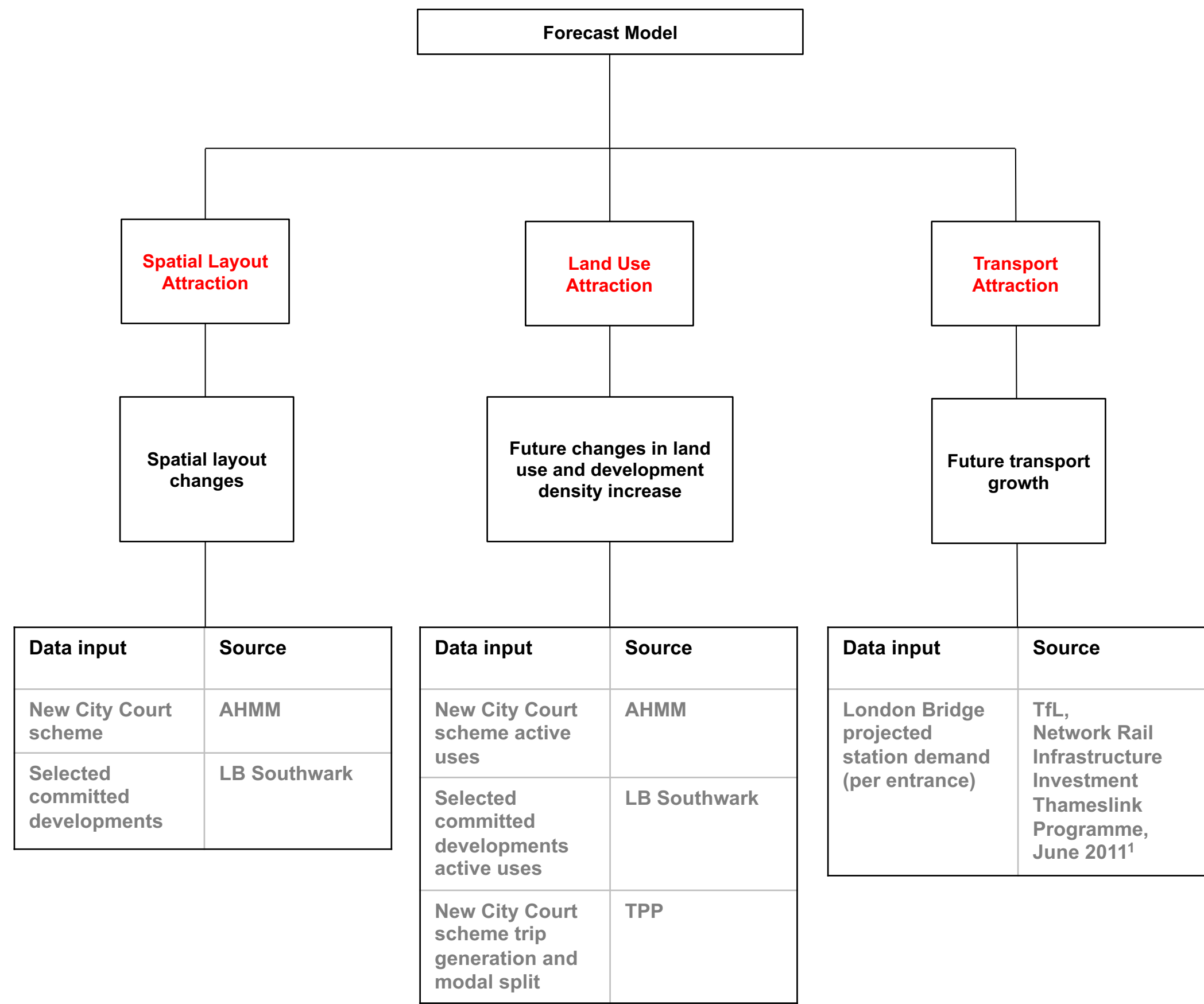


Parameter Estimates				
Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	-0.811124	0.569967	-1.42	0.1654
Active_Both[1-0]	0.1696789	0.079517	2.13	0.0414
log_DD_2	0.5022315	0.131007	3.83	0.0006
NACH1200	1.4551695	0.205019	7.10	<.0001

**Land use**  
**Transport**  
**Spatial Layout**

<sup>1</sup> See Glossary- Appendix 2

# Pedestrian movement forecast



The calibrated Pedestrian Movement Model has been used as a Forecast Model to evaluate how changes in spatial layout, land use and the transport growth will impact pedestrian movement patterns under two scenarios:

**Scenario 1:**  
**2031 Future baseline - Do nothing scenario**  
All Day Average and AM Peak

**Scenario 2:**  
**2031 Future baseline with New City Court scheme**  
All Day Average and AM Peak.

The chart on the left shows data used in the model.

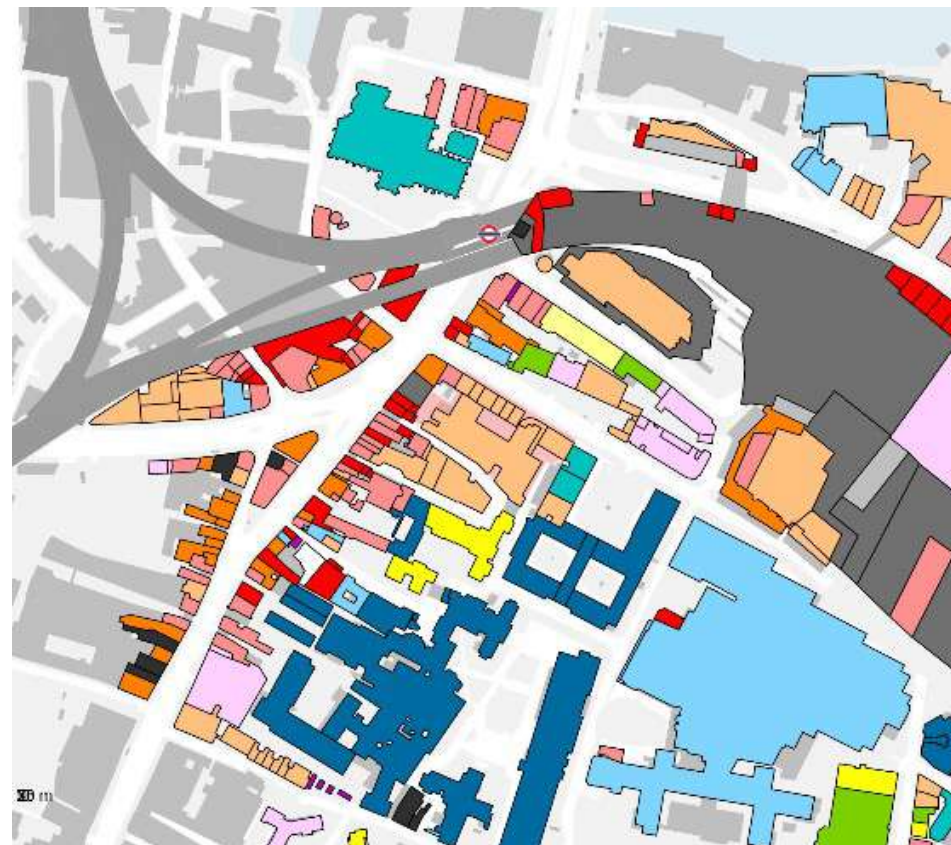
**Notes**  
<sup>1</sup> See Appendix 5

# Pedestrian movement forecast **Scenario 1** 2031 Future baseline - Do nothing

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**Spatial Layout Attraction**  
**Future baseline model**  
 Spatial accessibility r1,200



**Land use attraction**  
**Future developments**  
 Active ground level land use/ entrances.



**Transport attraction**  
**Future transport growth**  
 Linear Distance Decay from London Bridge Station entrances

Selected number of planned developments which propose changes to the street network connectivity. These include:

1. London Bridge
2. Low Line
3. Fielden House apartments
4. 1 Tower Bridge apartments
5. KCL Science Gallery
6. The Quill apartments
7. Guy's Cancer Centre
8. Brandon House
9. 185 Park Street

TfL's predicted footfall distribution for the total commuter forecast in 2031. TfL's prediction is based on RODS 2016 and Railplan 2031 combined Standard Forecasting approach (source TfL).

Network Rail, Infrastructure Investment Thameslink Programme, London Bridge Station, June 2011

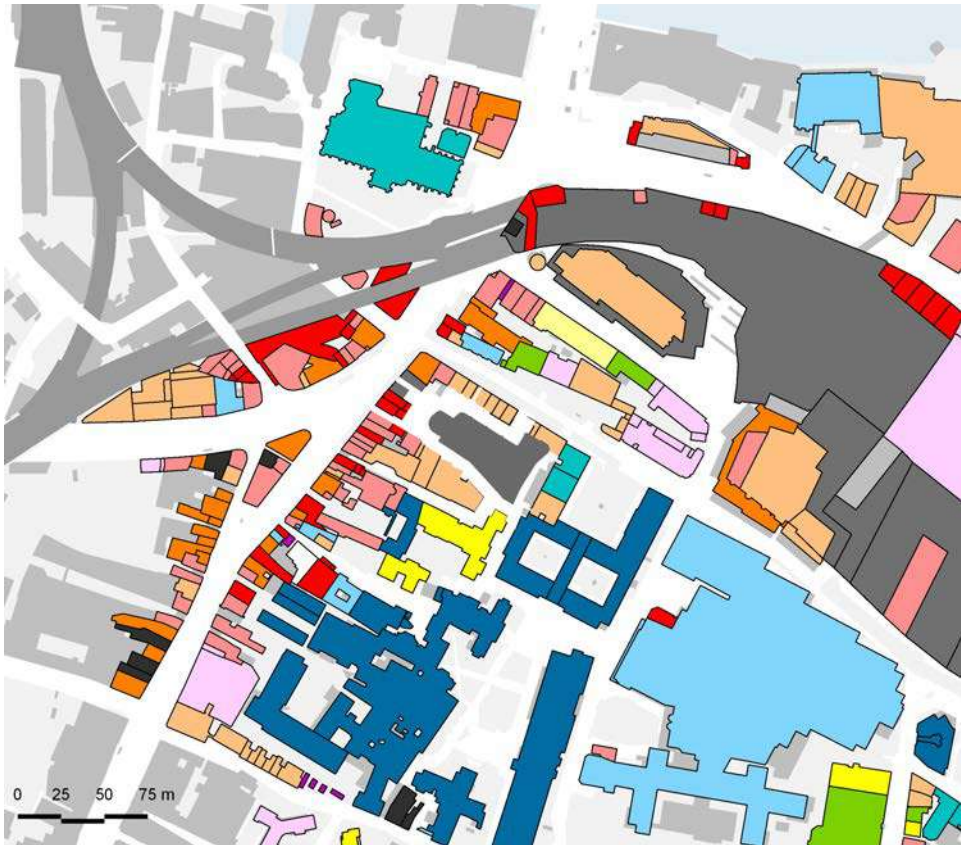
# Pedestrian movement forecast **Scenario 2** 2031 Future baseline with New City Court



**Spatial Layout Attraction**  
Future baseline and New City Court scheme model  
Spatial accessibility r1,200

Selected number of planned developments which propose changes to the street network connectivity. These include:

1. London Bridge
2. Low Line
3. Fielden House apartments
4. 1 Tower Bridge apartments
5. KCL Science Gallery
6. The Quill apartments
7. Guy's Cancer Centre
8. Brandon House
9. 185 Park Street



**Land use attraction**  
Future developments and New City Court scheme  
Active ground level land use/ entrances.  
New City Court development density increase

Active frontages as a result of the future developments and the New City Court scheme.

New City Court scheme trip generation and modal split data.



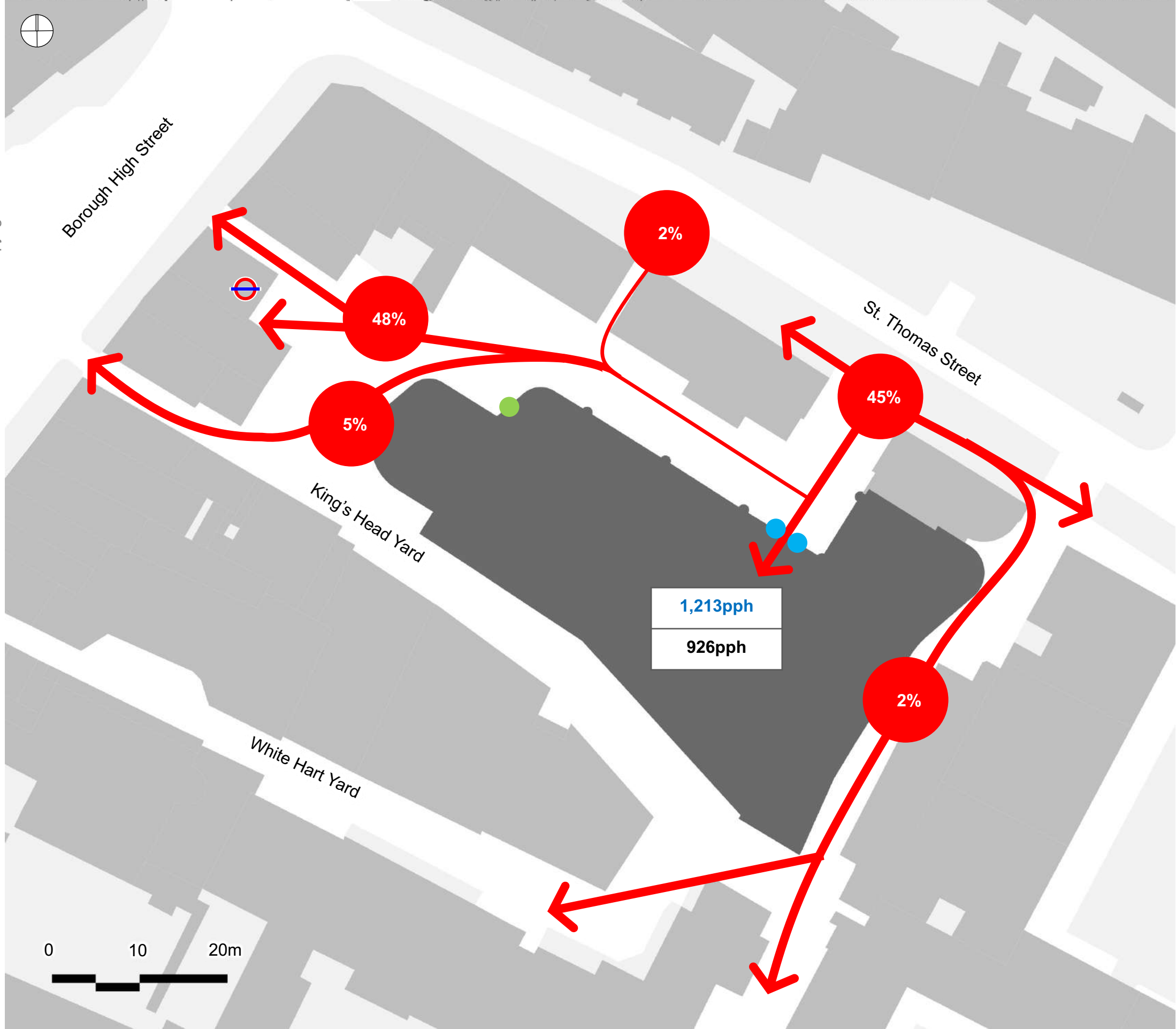
**Transport attraction**  
Future transport growth  
Linear Distance Decay from London Bridge Station entrances

TfL's predicted footfall distribution for the total commuter forecast in 2031. TfL's prediction is based on RODS 2016 and Railplan 2031 combined Standard Forecasting approach (source TfL).

Network Rail, Infrastructure Investment Thameslink Programme, London Bridge Station, June 2011

# Pedestrian demand analysis New City Court office trips distribution

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The image shows the expected AM peak and all day average demand flow in and out of New City Court (NCC) scheme.

The AM peak (08:30-09:30) demand in and out of the NCC is 1,213pph and the all day average pedestrian demand is 926pph (excluding bicycle trips). The peak demand is based on TPP's trip generation and mode split data for the NCC (see Appendix 5).

The distribution of movement for each of the office entrances is based on the mode split table provided by TPP (see Appendix 5). The same distribution has been assumed for AM peak and all day average.

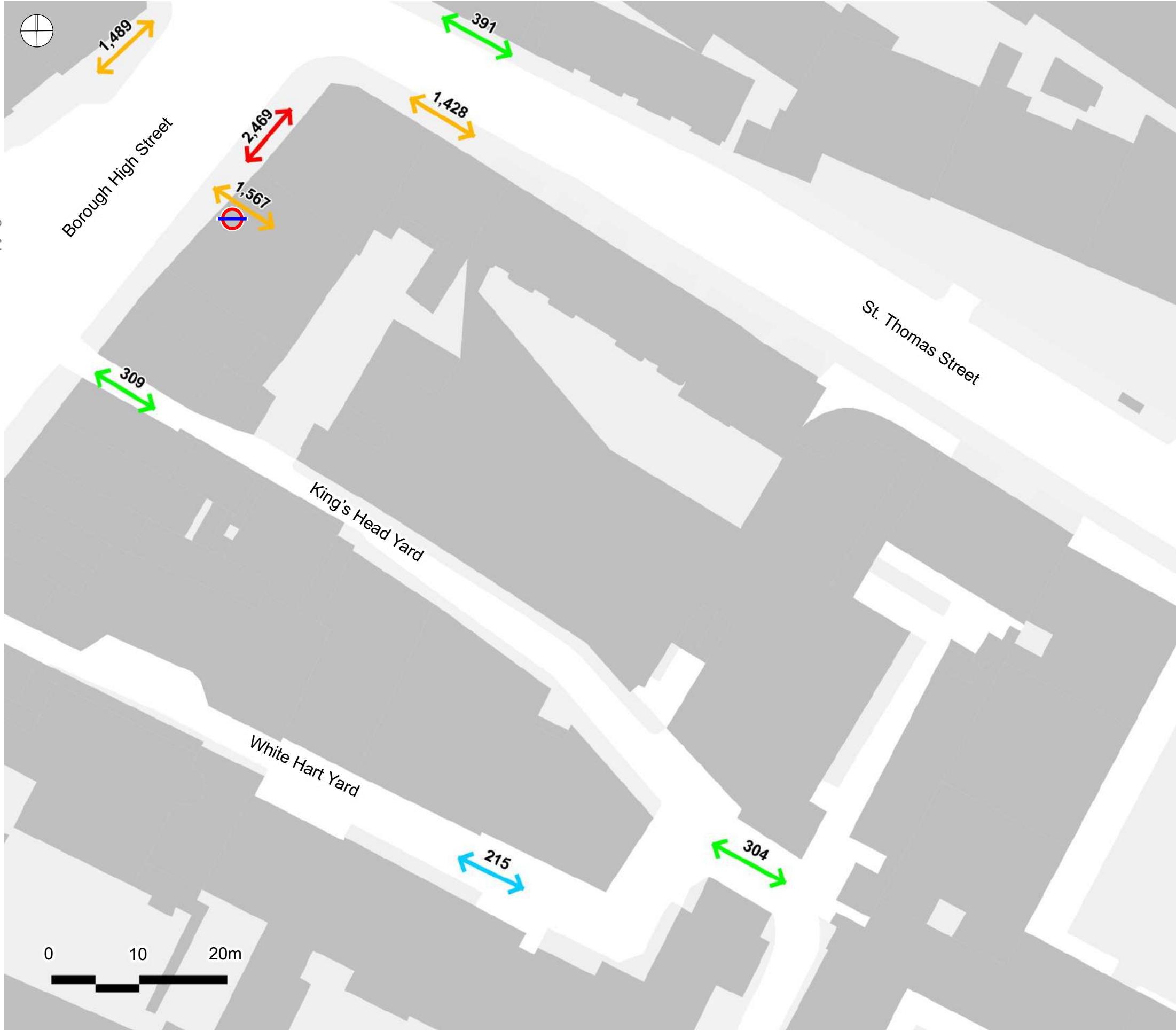
160 people per hour (pph) have been added at the Garden entrance to the tower and distributed using the same mode split as the office trips.

NCC AM peak trips (in/out excluding bicycles)
NCC All day average trips (in/out)

- Office entrances
- Garden entrance
- Underground
- Pedestrian movement lines

Pedestrian movement 2016 Baseline All day average weekday

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The eastern footway of Borough High Street was the busiest location in the immediate context of the site, with all day average movement levels at 2,469pph.

The southern footway of St Thomas Street was also busy with significantly higher movement than the northern one.

King's Head Yard and White Hart Yard were relatively quieter, but were well used.

**Note:**  
London Bridge Station was under redevelopment during the surveys and the new southern exit on St Thomas Street was not open.

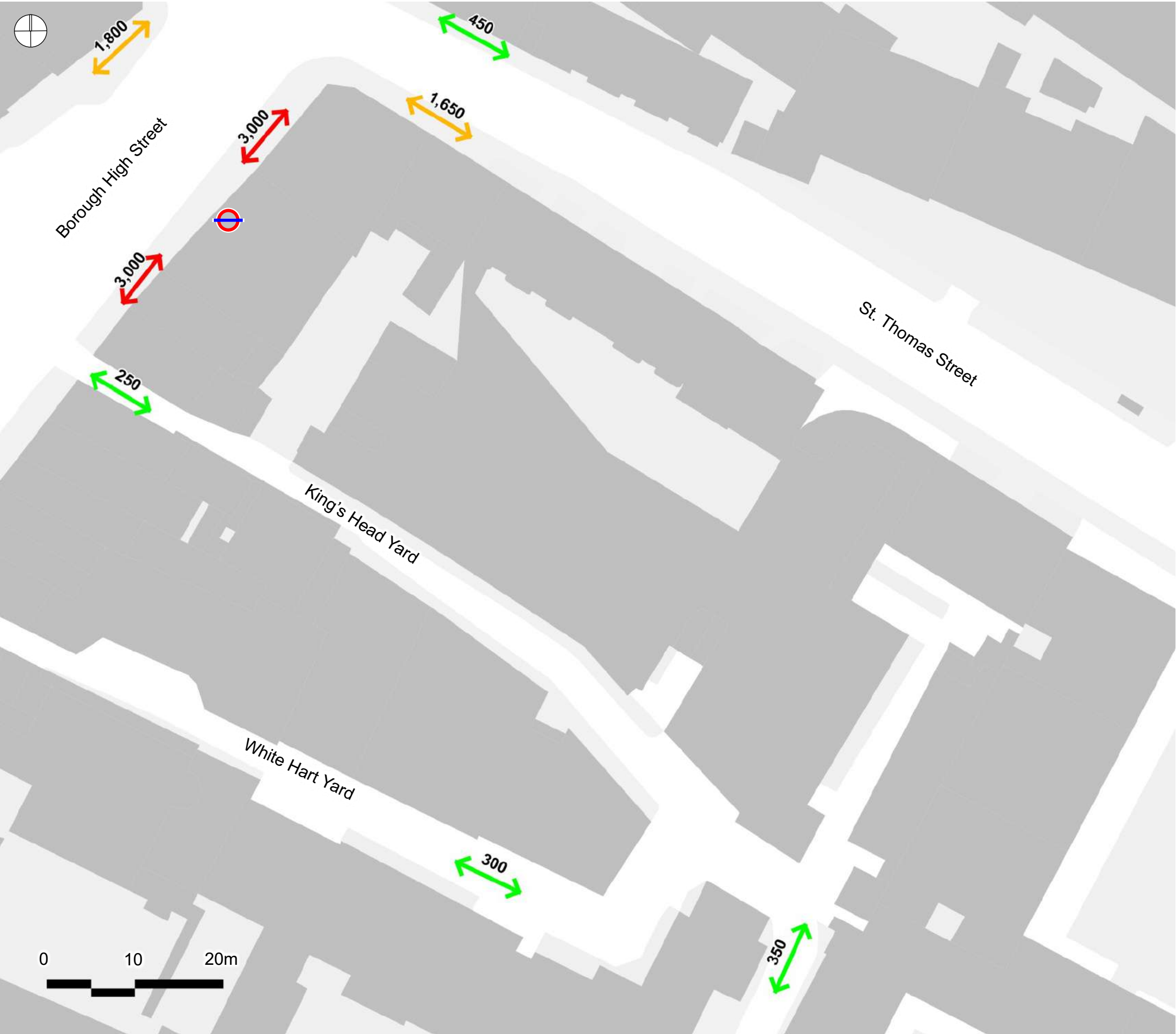
**Pedestrian movement**  
People per hour

↔ (red)	2000 and above
↔ (yellow)	1000 – 2000
↔ (light green)	500 – 1000
↔ (green)	250 – 500
↔ (light blue)	100 – 250
↔ (blue)	0 – 100

⊖ Underground

Pedestrian movement 2031 Future baseline - Do nothing All day average weekday

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The image shows the results of the cumulative impact on all day average pedestrian movement patterns of:

- a) changes to the layout (planned developments)
- b) changes in active ground level land use/entrance (planned developments)
- c) future transport growth (London Bridge projected station demand).

The pedestrian movement forecast for the “do nothing” scenario shows a significant increase of movement along Borough High Street and St Thomas Street.

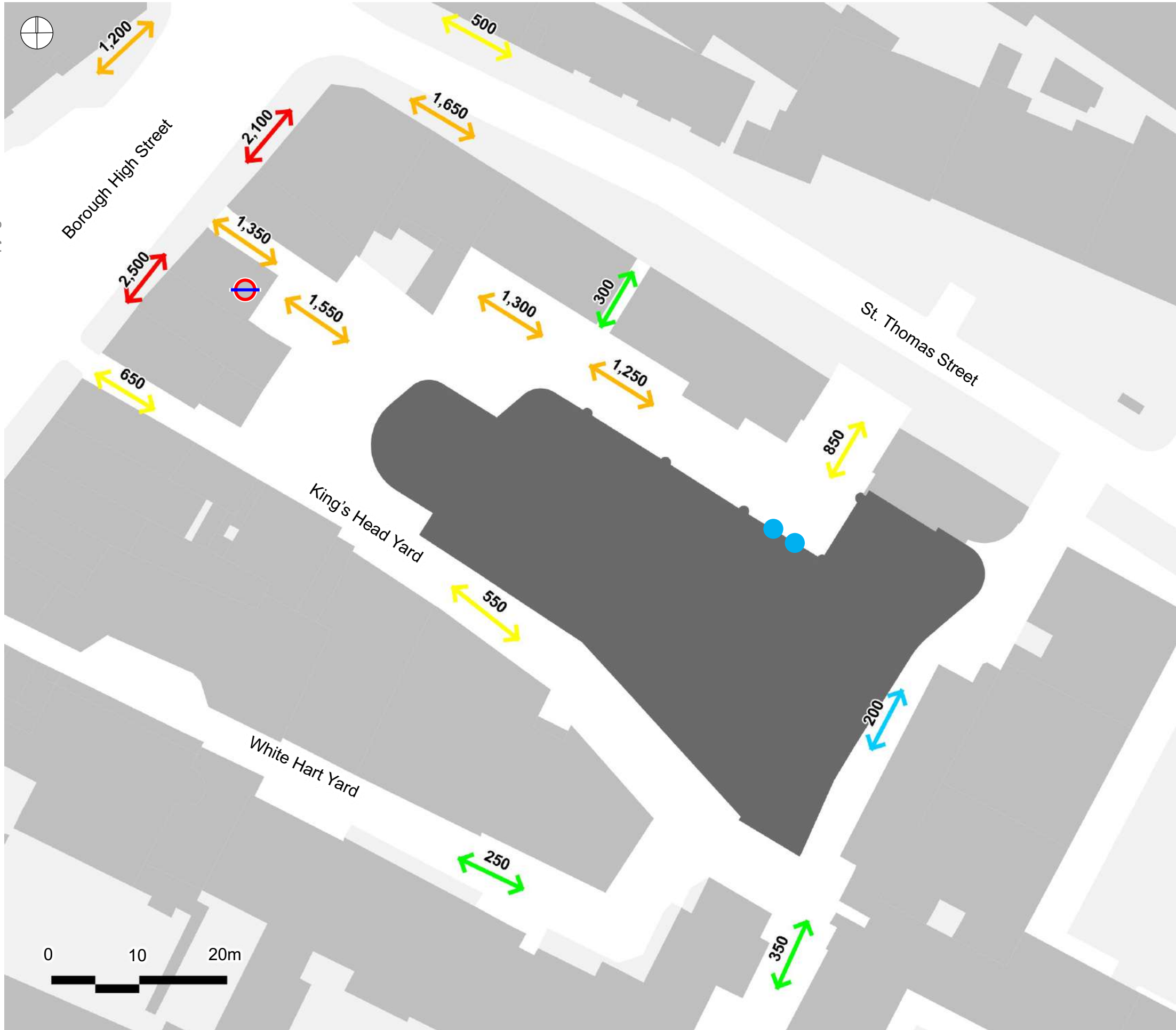
**Pedestrian movement**  
People per hour

- 2000 and above
- 1000 – 2000
- 500 – 1000
- 250 – 500
- 100 – 250
- 0 – 100

Underground

Pedestrian movement 2031 Future baseline with New City Court All day average weekday

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The image shows the results of the cumulative impact on all day average pedestrian movement patterns of:

- a) changes to the layout (planned developments and New City Court scheme)
- b) changes in active ground level land use/ entrance (planned developments and New City Court scheme)
- c) future transport growth (London Bridge projected station demand)
- d) New City Court all day average trips

The additional permeability of the proposed New City Court scheme improves permeability and circulation choices. The result is a more even distribution of movement relieving pressure off Borough High Street and St Thomas Street.

● Office entrances

**Pedestrian movement**  
People per hour

- ↔ 2000 and above
- ↔ 1000 – 2000
- ↔ 500 – 1000
- ↔ 250 – 500
- ↔ 100 – 250
- ↔ 0 – 100

⊖ Underground

Pedestrian movement 2016 Baseline AM Peak

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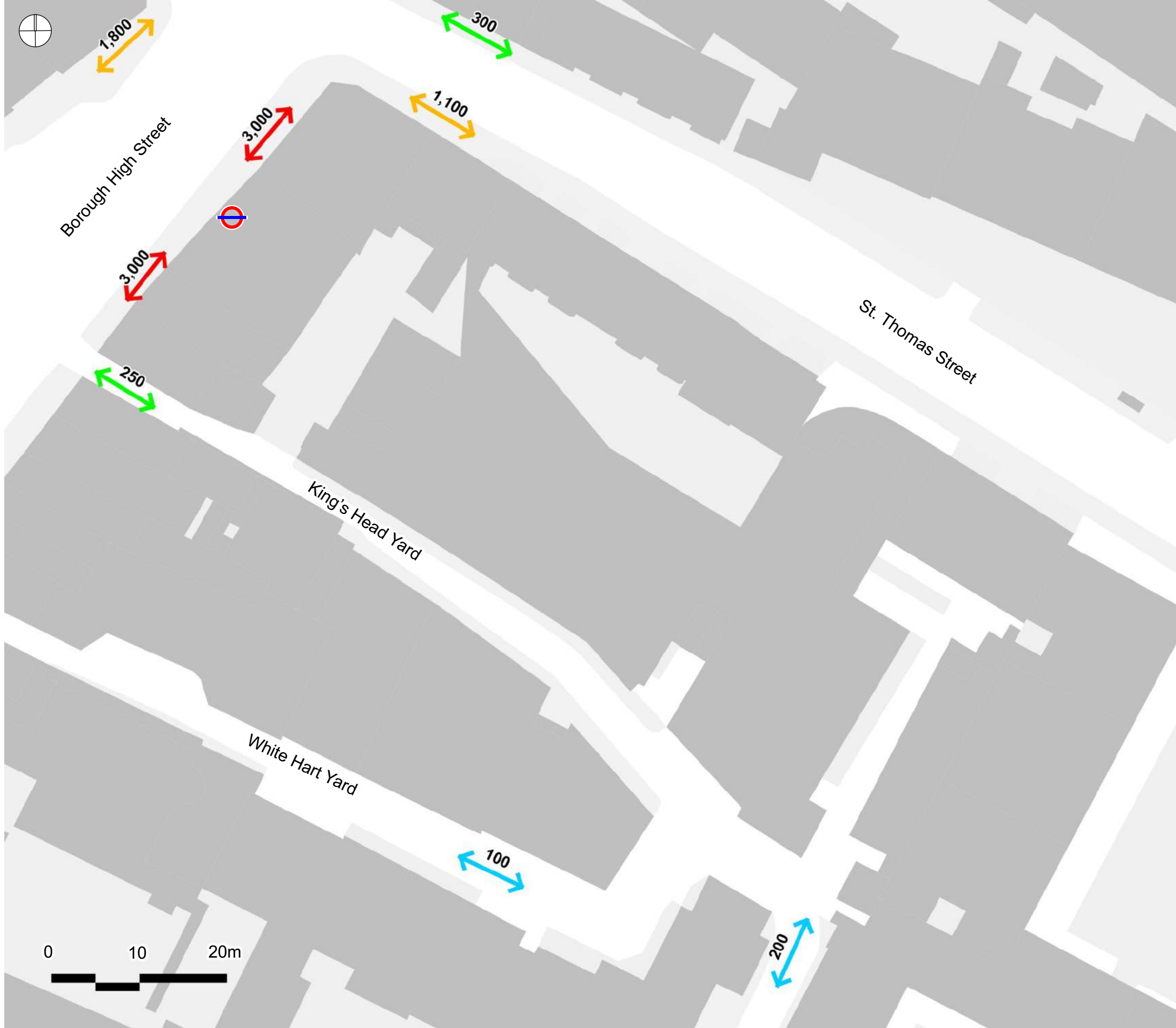
**Pedestrian movement**  
People per hour

↔ (Red)	2000 and above
↔ (Orange)	1000 – 2000
↔ (Yellow)	500 – 1000
↔ (Green)	250 – 500
↔ (Light Blue)	100 – 250
↔ (Dark Blue)	0 – 100

⊖ Underground

Pedestrian movement 2031 Future baseline - Do nothing AM Peak

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The image shows the results of the cumulative impact on AM Peak pedestrian movement patterns of:

- a) changes to the layout (planned developments)
- b) changes in active ground level land use/entrance (planned developments)
- c) future transport growth (London Bridge projected station demand).

**Pedestrian movement**  
People per hour

- ↔ 2000 and above
- ↔ 1000 – 2000
- ↔ 500 – 1000
- ↔ 250 – 500
- ↔ 100 – 250
- ↔ 0 – 100

⊕ Underground

Pedestrian movement 2031 Future baseline with New City Court AM Peak

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The image shows the results of the cumulative impact on AM Peak pedestrian movement patterns of:

- a) changes to the layout (planned developments and New City Court scheme)
- b) changes in active ground level land use/entrance (planned developments and New City Court scheme)
- c) future transport growth (London Bridge projected station demand)
- d) New City Court AM Peak trips

● Office entrances

**Pedestrian movement**  
People per hour

- ↔ 2000 and above
- ↔ 1000 – 2000
- ↔ 500 – 1000
- ↔ 250 – 500
- ↔ 100 – 250
- ↔ 0 – 100

⊖ Underground

# **Pedestrian Comfort Level Assessment**

2016 Baseline

Scenario 1: 2031 Future baseline - Do nothing

Scenario 2: 2031 Future baseline with New City Court

# TfL Pedestrian Comfort Level on Footways Methodology

## Pedestrian Comfort Level

The Level of Service (LoS) at key locations has been assessed using the Pedestrian Comfort Levels (PCL) assessment developed by Transport for London (TfL) (Transport for London, 2010. Pedestrian Comfort Level Guidance, London: Transport for London).

PCL is an indicator of comfort in relation to the usable footway width.

PCL is based on the pedestrian density in relation to footway width. It is calculated as people per minute per metre (ppmm). The resulting scores are graded into six ranges from comfortable (A) to very uncomfortable (E) as shown to the right. For example: 1,088 (pedestrians per hour) ÷ 60 (minutes per hour) = 18.13 (pedestrians per minute) ÷ 9.6 (effective width of route in metres) ≈ 1.89 ppmm = A+.

TfL Spreadsheet Version 1.4 has been used to assess Pedestrian Comfort Levels. Average Flow is used for average PCL and Peak Hour Flow for Peak PCL.

## Pavement width

PCL can be applied to different footway conditions found in urban environments. Effective width is estimated by adapting gross width by taking into account unusable spaces related to furniture and/or obstructions according to a set of rules which include:

- 1) a 20 cm buffer is deducted from the clear footway width from kerb edges, guard railings or building edges/walls;
- 2) a 20 cm buffer is deducted from stationary objects; and
- 3) any width under 60 cm is considered unusable.

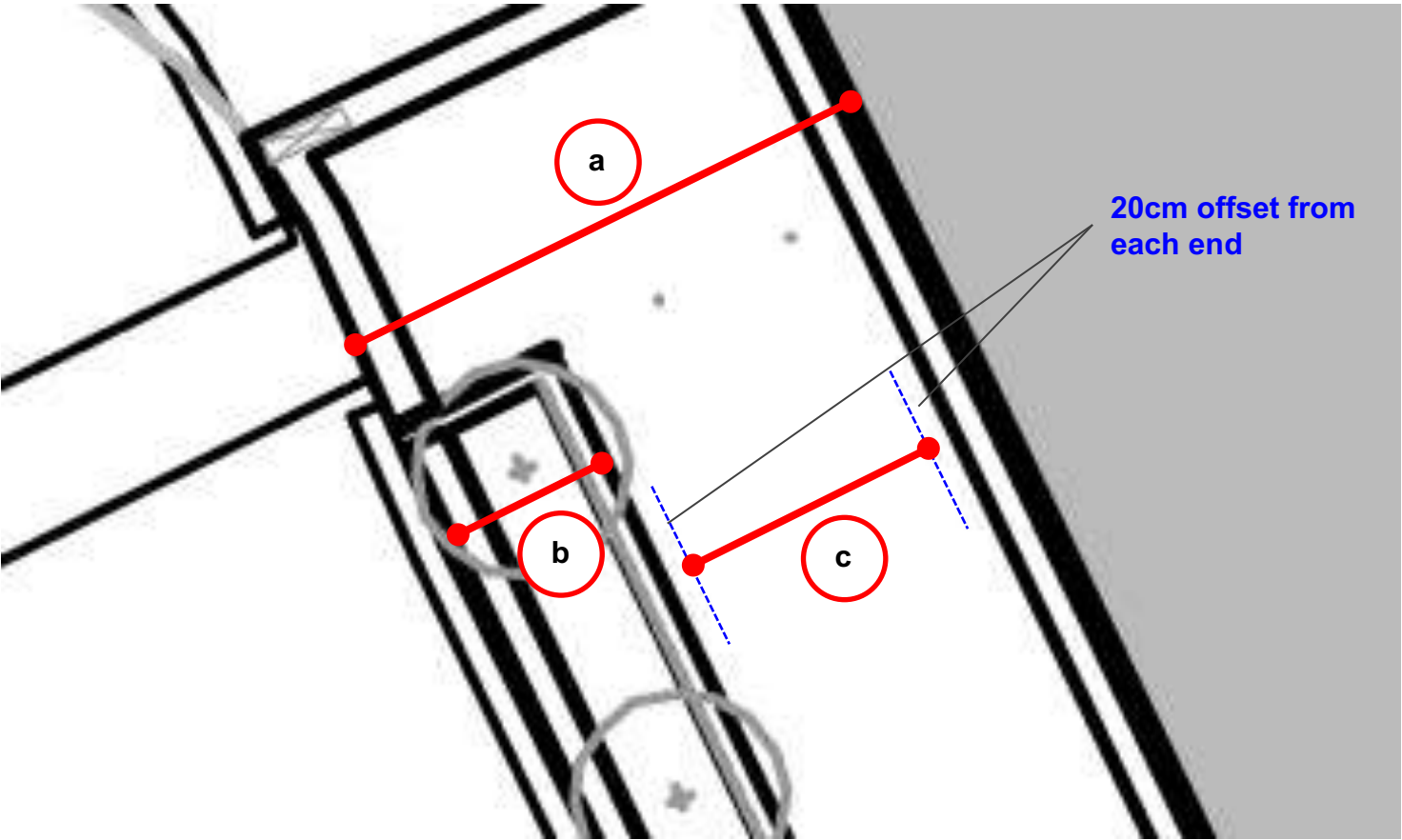
In this assessment, where street furniture/objects are shown in the layout, the assessment of effective width of footway makes allowance for these.

The figure to the right shows an example of a location assessment.  
Total width (a) = 7.50 metres  
Planter width (b) = 2.36 metres  
Effective width = (a) – (b) – 0.2 (from the A1 building edge) – 0.2 (from the planter) = 4.74 metres.

## Pedestrian Comfort Levels

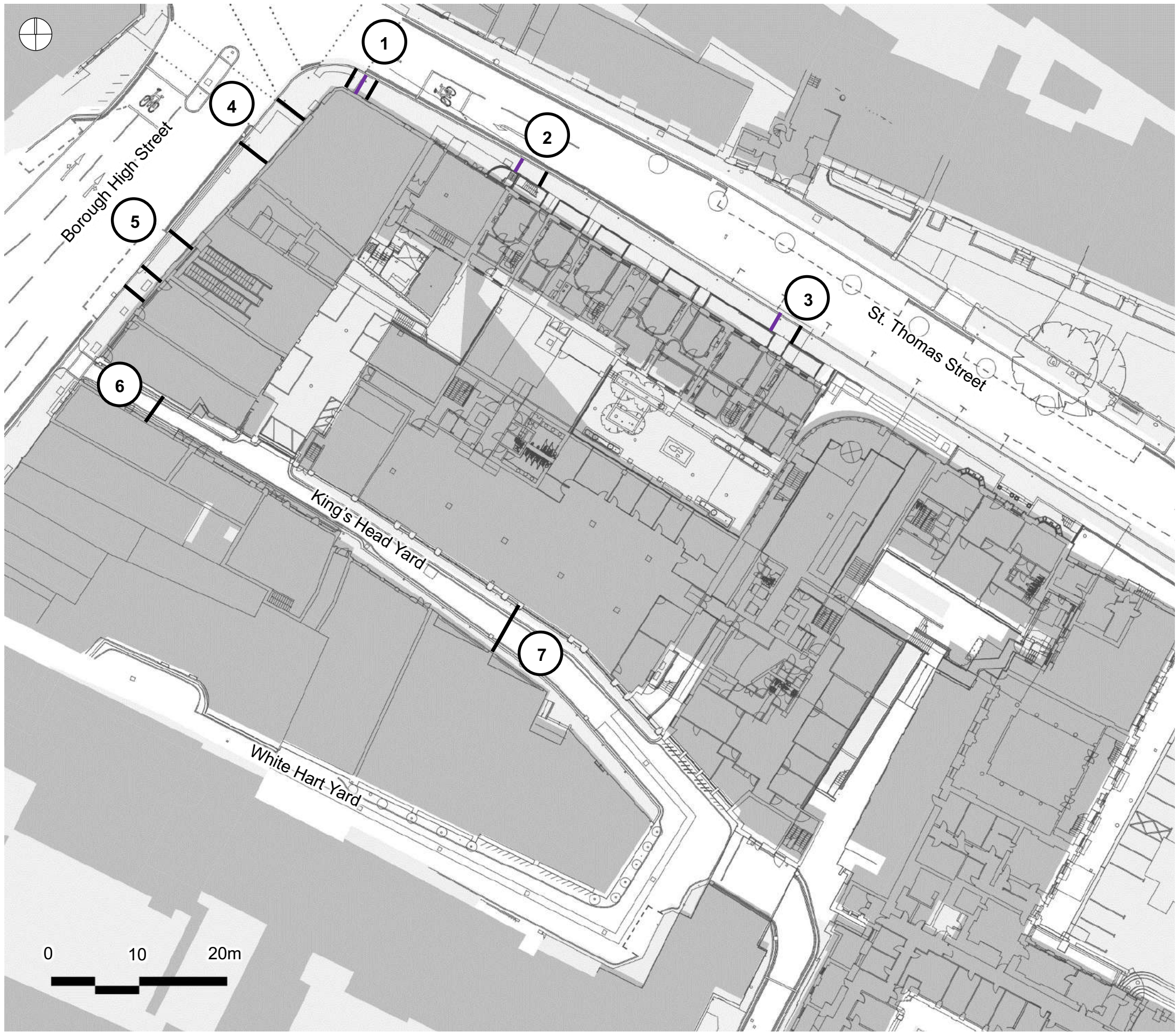
TfL recommended minimum for Office and Retail areas	A+	< 3 ppmm	comfortable
	A	3 - 5 ppmm	
	A-	6 - 8 ppmm	
	B+	9 - 11 ppmm	
	B	12 - 14 ppmm	
	B-	15 - 17 ppmm	very uncomfortable
	C+	18 - 20 ppmm	
	C	21 - 23 ppmm	
	C-	24 - 26 ppmm	
	D	27 - 35 ppmm	
	E	> 35 ppmm	

## Pavement width calculation



# Pedestrian Comfort Level Assessment **Locations** 2016 Baseline and Do nothing scenario

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The PCL for the Existing and Do nothing scenario has been assessed at 7 key locations.

The footway width at locations 1-5 varies due to street furniture and other obstructions such as railings, sign posts, bollards etc. resulting in a reduction of the effective width used for movement.

Different points of this locations were therefore measured in order to assess the pinch points as well as the average footway width.

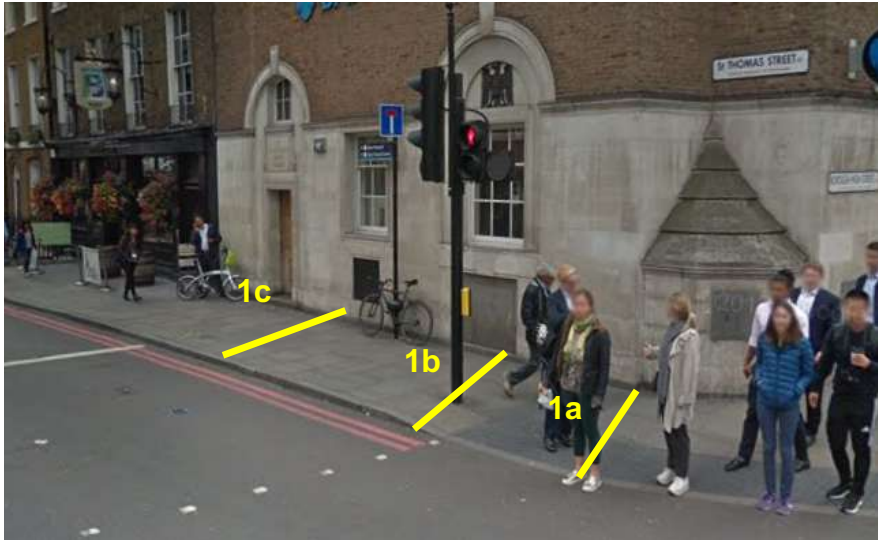
Three points - highlighted in purple – have an effective footway width of less than 1.50m, the acceptable minimum to allow wheelchair users and a walking person to pass each other<sup>1</sup>.

<sup>1</sup> Transport for London (TfL), 2010. Pedestrian Comfort Guidance for London.

— PCL assessment locations

Pedestrian Comfort Level Assessment **Locations** 2016 Baseline and Do nothing scenario

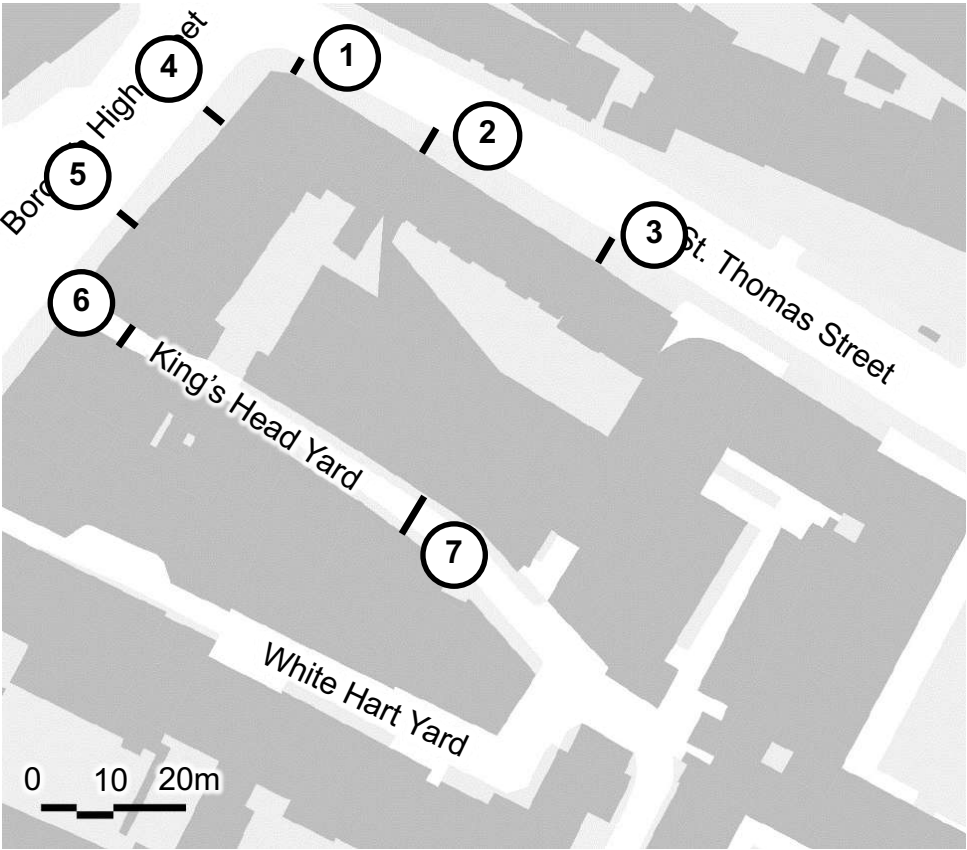
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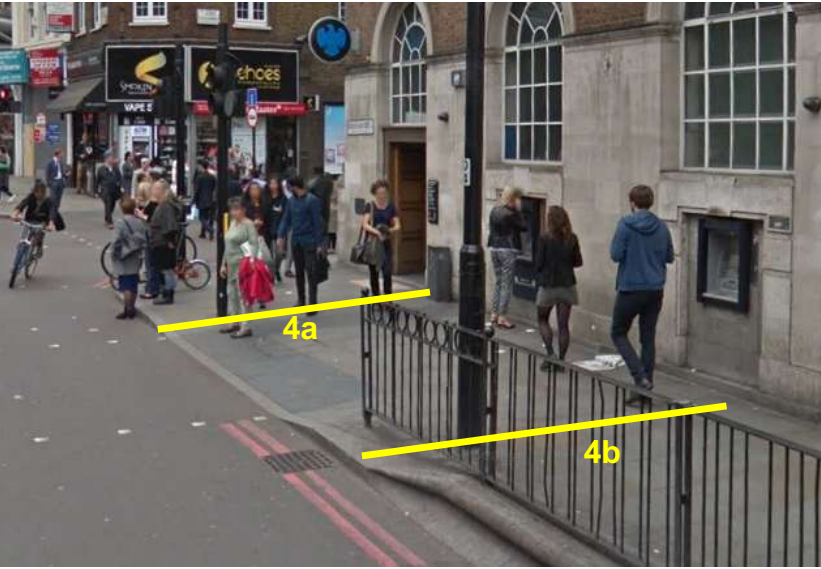
**Location 1**  
**1a**  
Total width: 2.60m  
Effective width: 2.20m  
**1b**  
Total width: 2.60m (traffic light)  
Effective width: 1.30m  
**1c**  
Total width: 2.70m  
Effective width: 2.30m



**Location 2**  
**2a**  
Total width: 1.90m (bollard)  
Effective width: 0.90m  
**2b**  
Total width: 2.0m  
Effective width: 1.60m



**Location 3**  
**3a**  
Total width: 2.10m (bollard)  
Effective width: 1.20m  
**3b**  
Total width: 2.10m  
Effective width: 1.70m

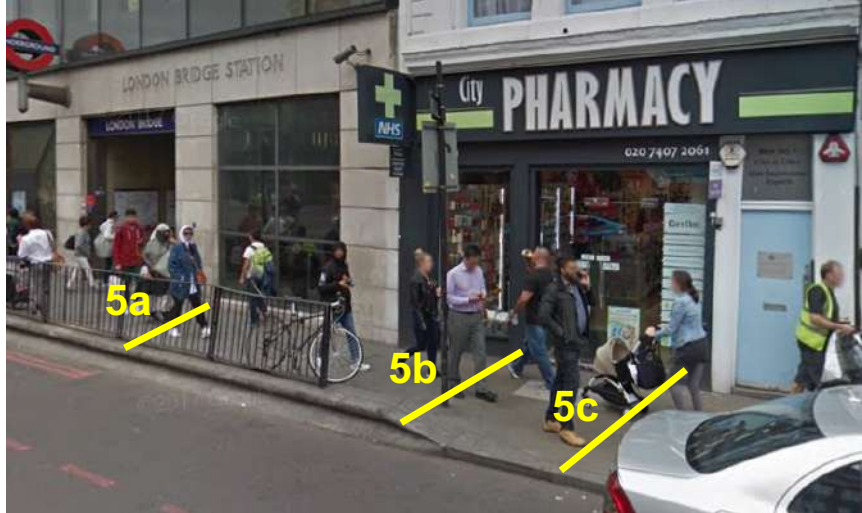


**Location 4**  
**4a**  
Total width: 4.10m (traffic light and box)  
Effective width: 2.50m  
**4b**  
Total width: 3.80m (lamp post and railing)  
Effective width: 2.40m

Footway widths are based on measurements from CAD Survey Drawing- Existing Level00 (14032\_X\_(01)\_P120) provided by AHMM.

Pedestrian Comfort Level Assessment **Locations** 2016 Baseline and Do nothing scenario

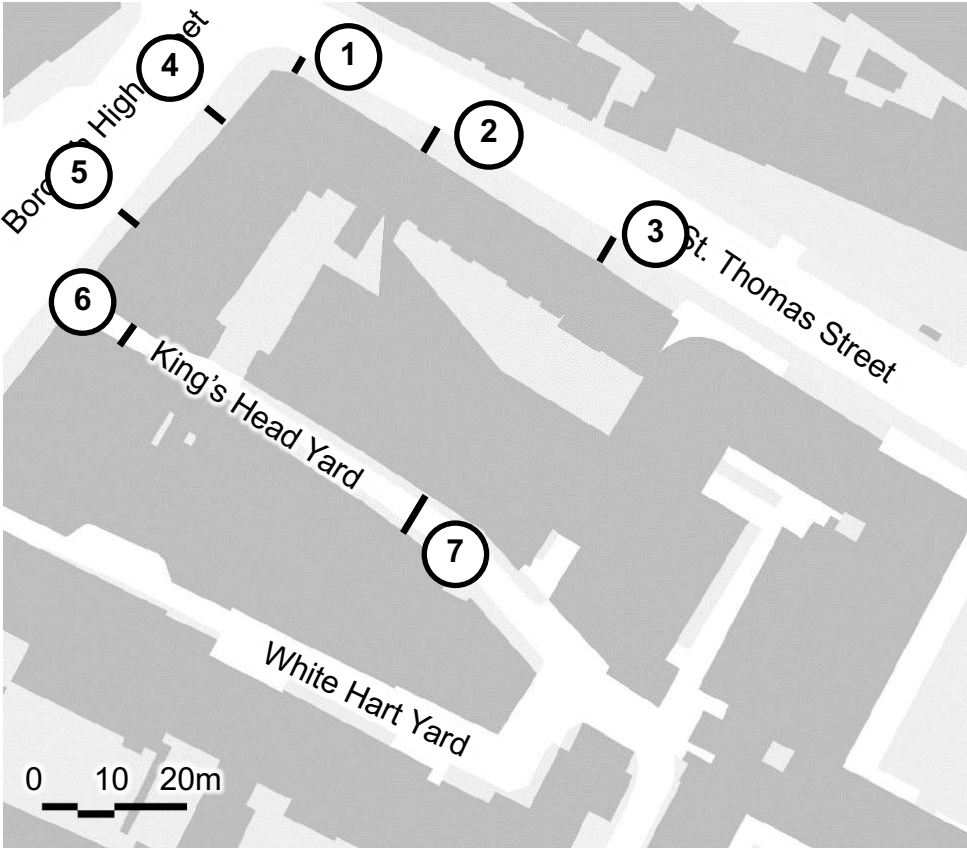
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**Location 5**  
**5a**  
Total width: 3.40m (railing)  
Effective width: 2.40m  
**5b**  
Total width: 3.10m (sign post and railing)  
Effective width: 1.80m  
**5c**  
Total width: 2.90m  
Effective width: 2.50m



**Location 6**  
Total width: 2.70m (full street width-shared space)  
Effective width: 2.30m

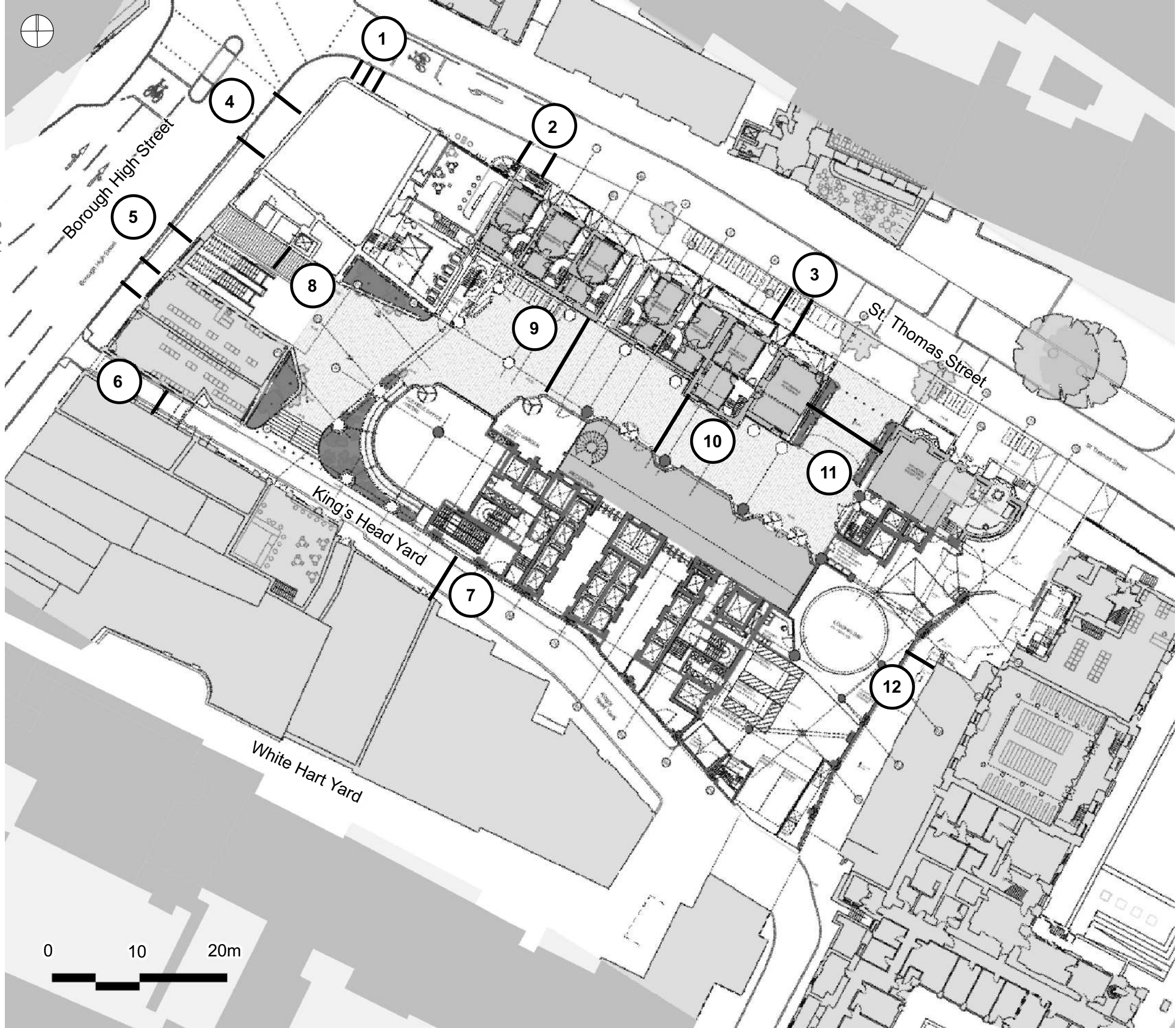


**Location 7**  
Total width: 5.70m (bollard) (full street width-shared space)  
Effective width: 4.4m

Footway widths are based on measurements from CAD Survey Drawing- Existing Level00 (14032\_X\_(01)\_P120) provided by AHMM.

# Pedestrian Comfort Level Assessment **Locations** **New City Court scheme**

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Footway widths at locations 1, 4, 5 and 6 are the same for the Existing, Do nothing and New City Court scheme scenarios.

The width at locations 2 and 3 has increased as a result of the widening of the footway along St Thomas Street.

The PCL for the future layout scenario has five new locations (8-12). The proposed landscape design has been taken into account in the assessment.

— PCL assessment locations

Pedestrian Comfort Level assessment 2016 Baseline

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Location	Street width (m)		Movement (pph)		PCL (ppmm)		PCL	
	Total Width	Effective Width	Average	AM Peak Hour	Average	AM Peak	Average	AM Peak
1a	2.6	2.2	1,428	906	11	7	B+	A-
1b	2.6	1.3	1,428	906	18	12	F	F
1c	2.7	2.3	1,428	906	10	7	B+	A-
2a	1.9	0.9	1,428	906	26	17	F	F
2b	2	1.6	1,428	906	15	9	B-	B+
3a	2.1	1.2	1,428	906	20	13	F	F
3b	2.1	1.7	1,428	906	14	9	B	B+
4a	4.1	2.5	2,469	2,562	16	17	B-	B-
4b	3.8	2.4	2,469	2,562	17	18	B-	C+
5a	3.4	2.4	2,469	2,562	17	18	B-	C+
5b	3.1	1.8	2,469	2,562	23	24	C	C-
5c	2.9	2.5	2,469	2,562	16	17	B-	B-
6	2.7	2.3	309	207	2	2	A+	A+
7	5.7	4.4	309	207	1	1	A+	A+

Table 1 Pedestrian Comfort Level - Existing

Locations 1b, 2a and 3a have an effective footway width of less than 1.50m, which is the acceptable minimum to allow wheelchair users and a walking person to pass each other<sup>1</sup>.

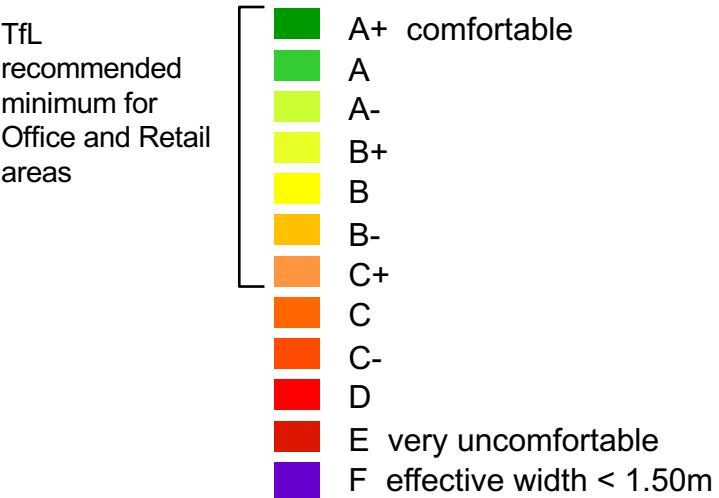
The PCL at location 5b was less than the TfL recommended minimum for Office and Retail areas during both All day average and AM peak time.

<sup>1</sup> Transport for London (TfL), 2010. Pedestrian Comfort Guidance for London.



Figure 1 Level of Service assessment locations (AM Peak)

Legend 1 Pedestrian Comfort Levels



Pedestrian Comfort Level assessment 2031 Future baseline - Do nothing

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Location	Street width (m)		Movement (pph)		PCL (ppmm)		PCL	
	Total Width	Effective Width	Average	AM Peak Hour	Average	AM Peak	Average	AM Peak
1a	2.6	2.2	1,650	1,100	13	8	B	A-
1b	2.6	1.3	1,650	1,100	21	14	F	F
1c	2.7	2.3	1,650	1,100	12	8	B	A-
2a	1.9	0.9	1,650	1,100	31	20	F	F
2b	2	1.6	1,650	1,100	17	11	B-	B+
3a	2.1	1.2	1,650	1,100	23	15	F	F
3b	2.1	1.7	1,650	1,100	16	11	B-	B+
4a	4.1	2.5	3,000	3,000	20	20	C+	C+
4b	3.8	2.4	3,000	3,000	21	21	C	C
5a	3.4	2.4	3,000	3,000	21	21	C	C
5b	3.1	1.8	3,000	3,000	28	28	D	D
5c	2.9	2.5	3,000	3,000	20	20	C+	C+
6	2.7	2.3	250	250	2	2	A+	A+
7	5.7	4.4	250	250	1	1	A+	A+

Table 2 Pedestrian Comfort Level - 2031 Future baseline - Do nothing

Similar to 2016 Baseline, locations 1b, 2a and 3a have an effective footway width of less than 1.50m, which is the acceptable minimum to allow wheelchair users and a walking person to pass each other<sup>1</sup>.

Due to the increase of movement levels, there is additional pressure, particularly along the eastern footway of Borough High Street with the PCL at three locations - 4b, 5a and 5b - being less than the TfL recommended minimum for Office and Retail areas during both All day average and AM peak time.

<sup>1</sup> Transport for London (TfL), 2010. Pedestrian Comfort Guidance for London.



Figure 2 Level of Service assessment locations (AM Peak)

Legend 1 Pedestrian Comfort Levels



Pedestrian Comfort Level assessment 2031 Future baseline + NCC + existing St Thomas widths

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Location	Street width (m)		Movement (pph)		PCL (ppmm)		PCL	
	Total Width	Effective Width	Average	AM Peak Hour	Average	AM Peak	Average	AM Peak
1a	2.6	2.2	1,650	1,150	13	9	B	B+
1b	2.6	1.3	1,650	1,150	21	15	F	F
1c	2.7	2.3	1,650	1,150	12	8	B	A-
2a	1.9	0.9	1,650	1,150	31	21	F	F
2b	2	1.6	1,650	1,150	17	12	B-	B
3a	2.1	1.2	1,650	1,150	23	16	F	F
3b	2.1	1.7	1,650	1,150	16	11	B-	B+
4a	4.1	2.5	2,100	2,150	14	14	B	B
4b	3.8	2.4	2,100	2,150	15	15	B-	B-
5a	3.4	2.4	2,500	2,450	17	17	B-	B-
5b	3.1	1.8	2,500	2,450	23	23	C	C
5c	2.9	2.5	2,500	2,450	17	16	B-	B-
6	2.7	2.3	650	500	5	4	A	A
7	6.2	4.4	550	500	2	2	A+	A+
8	3.5	3.1	1,350	1,650	7	9	A-	B+
9	9	8.6	1,300	1,300	3	3	A	A
10	7.4	7	1,250	1,300	3	3	A	A
11	9.6	6.7	850	1,000	2	2	A+	A+
12	5.8	5.4	200	250	1	1	A+	A+

Table 3 Pedestrian Comfort Level 2031 Future baseline with New City Court scheme and existing footway widths on St Thomas Street.

All locations within the site boundary are comfortable and well above the minimum recommended.

The additional permeability improves the pedestrian comfort levels on Borough High Street, taking away pressure off it.

Similar to the baseline scenarios, locations 1b, 2a and 3a have an effective footway width of less than 1.50m, which is the acceptable minimum to allow wheelchair users and a walking person to pass each other.

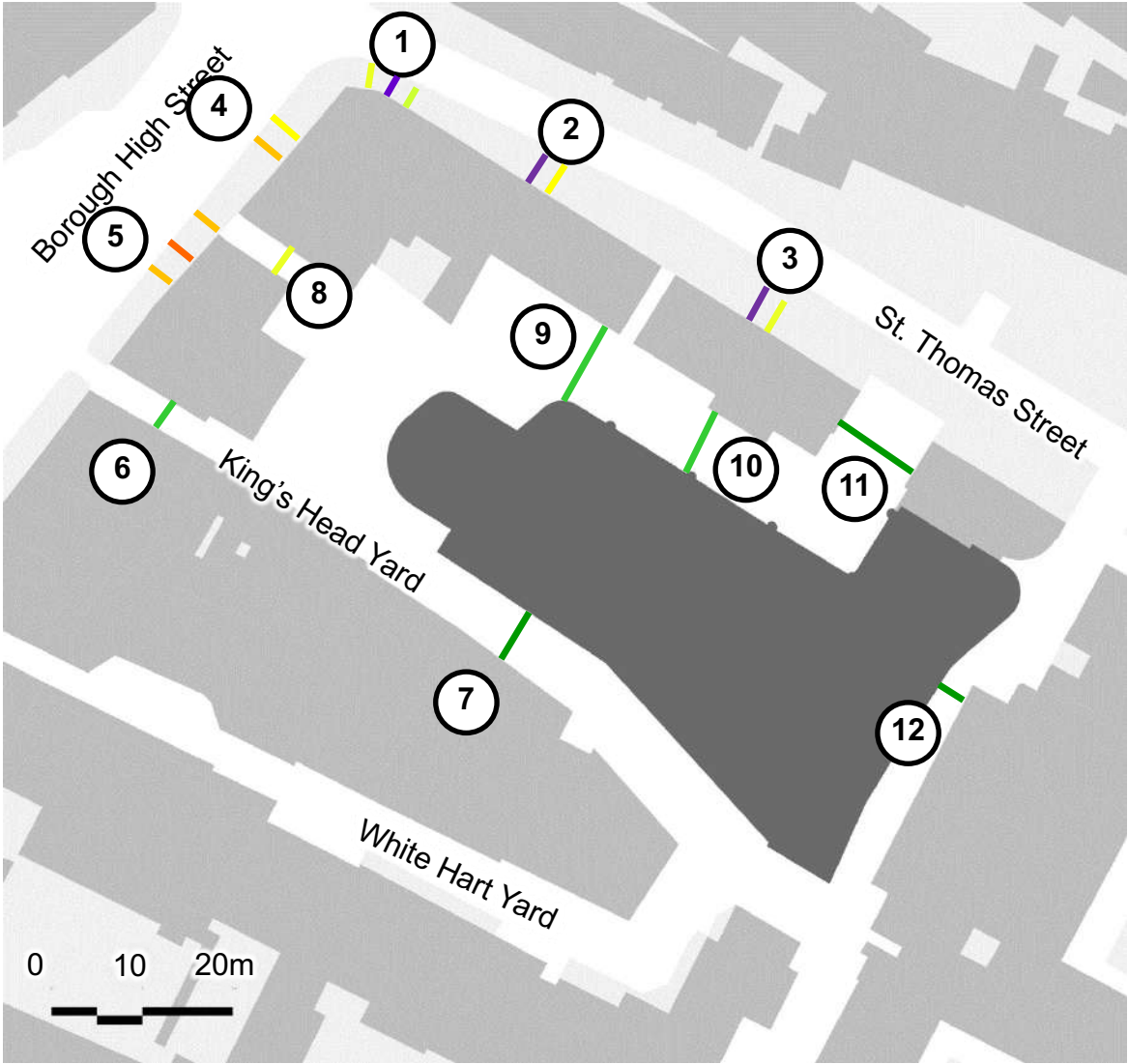
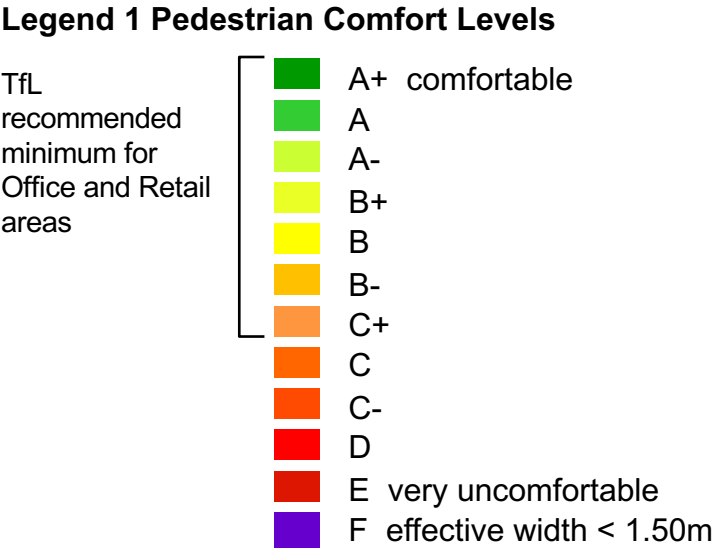


Figure 3 Level of Service assessment locations (AM Peak).  
Plans for indicative purposes and do not reflect the existing St Thomas Street widths used in the table to the left.



Pedestrian Comfort Level assessment 2031 Future baseline + NCC + increased St Thomas widths

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Location	Street width (m)		Movement (pph)		PCL (ppmm)		PCL	
	Total Width	Effective Width	Average	AM Peak Hour	Average	AM Peak	Average	AM Peak
1a	2.6	2.2	1,650	1,150	13	9	B	B+
1b	2.6	1.3	1,650	1,150	21	15	F	F
1c	2.7	2.3	1,650	1,150	12	8	B	A-
2a	2.6	1.6	1,650	1,150	17	12	B-	B
2b	3	2.6	1,650	1,150	11	7	B+	A-
3a	4.5	1.8	1,650	1,150	15	11	B-	B+
3b	4.5	1.8	1,650	1,150	15	11	B-	B+
4a	4.1	2.5	2,100	2,150	14	14	B	B
4b	3.8	2.4	2,100	2,150	15	15	B-	B-
5a	3.4	2.4	2,500	2,450	17	17	B-	B-
5b	3.1	1.8	2,500	2,450	23	23	C	C
5c	2.9	2.5	2,500	2,450	17	16	B-	B-
6	2.7	2.3	650	500	5	4	A	A
7	6.2	4.4	550	500	2	2	A+	A+
8	3.5	3.1	1,350	1,650	7	9	A-	B+
9	9	8.6	1,300	1,300	3	3	A	A
10	7.4	7	1,250	1,300	3	3	A	A
11	9.6	6.7	850	1,000	2	2	A+	A+
12	5.8	5.4	200	250	1	1	A+	A+

Table 4 Pedestrian Comfort Level 2031 Future baseline with New City Court scheme and increased footway widths on the southern footway of St Thomas Street.

All locations within the site boundary are comfortable and well above the minimum recommended.

The additional permeability and the improved public realm that the proposed scheme offers significantly improves the pedestrian comfort levels around the site, by increasing the footway width at locations 2 and 3 and by taking away pressure off Borough High Street.

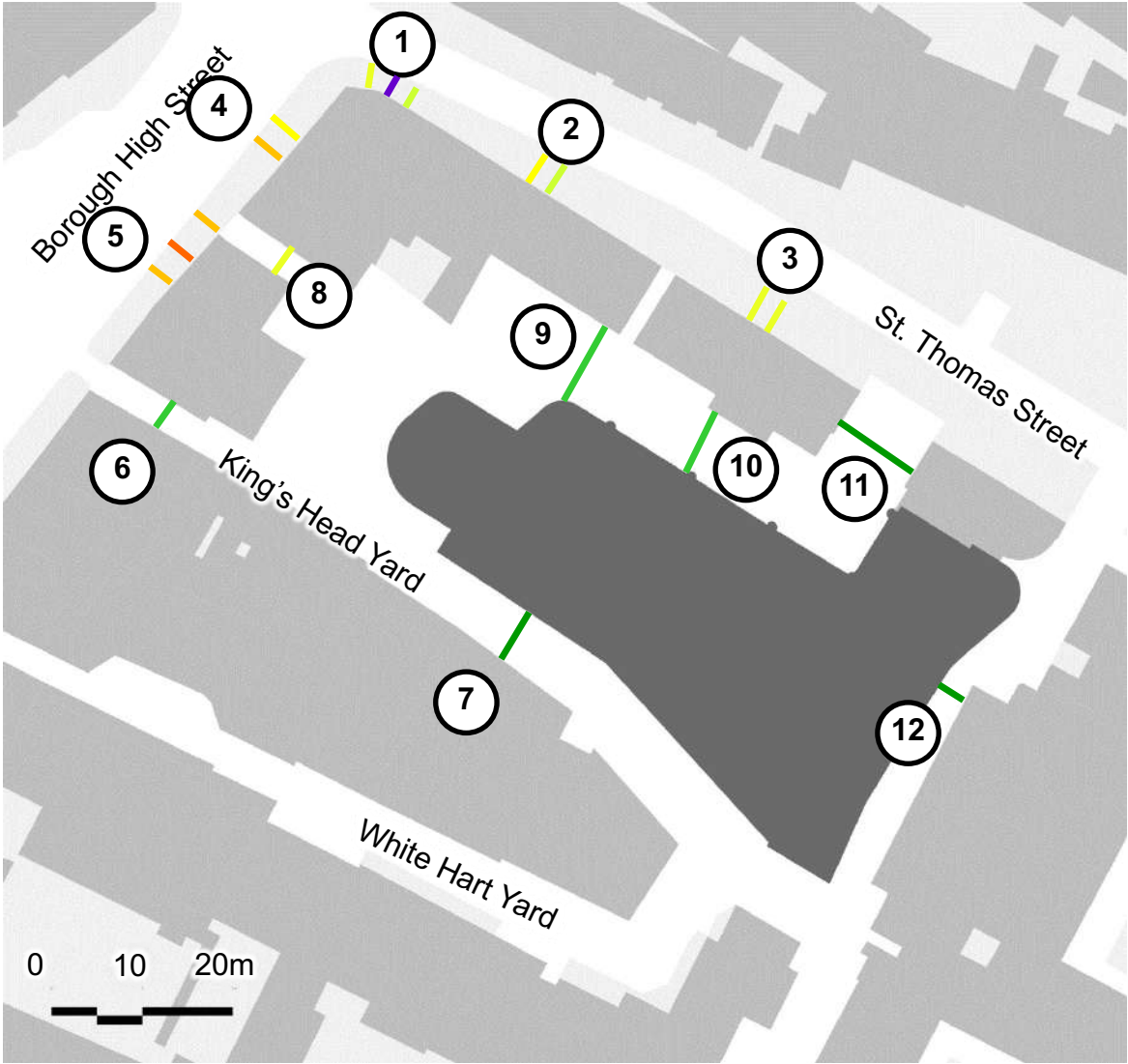


Figure 4 Level of Service assessment locations (AM Peak)

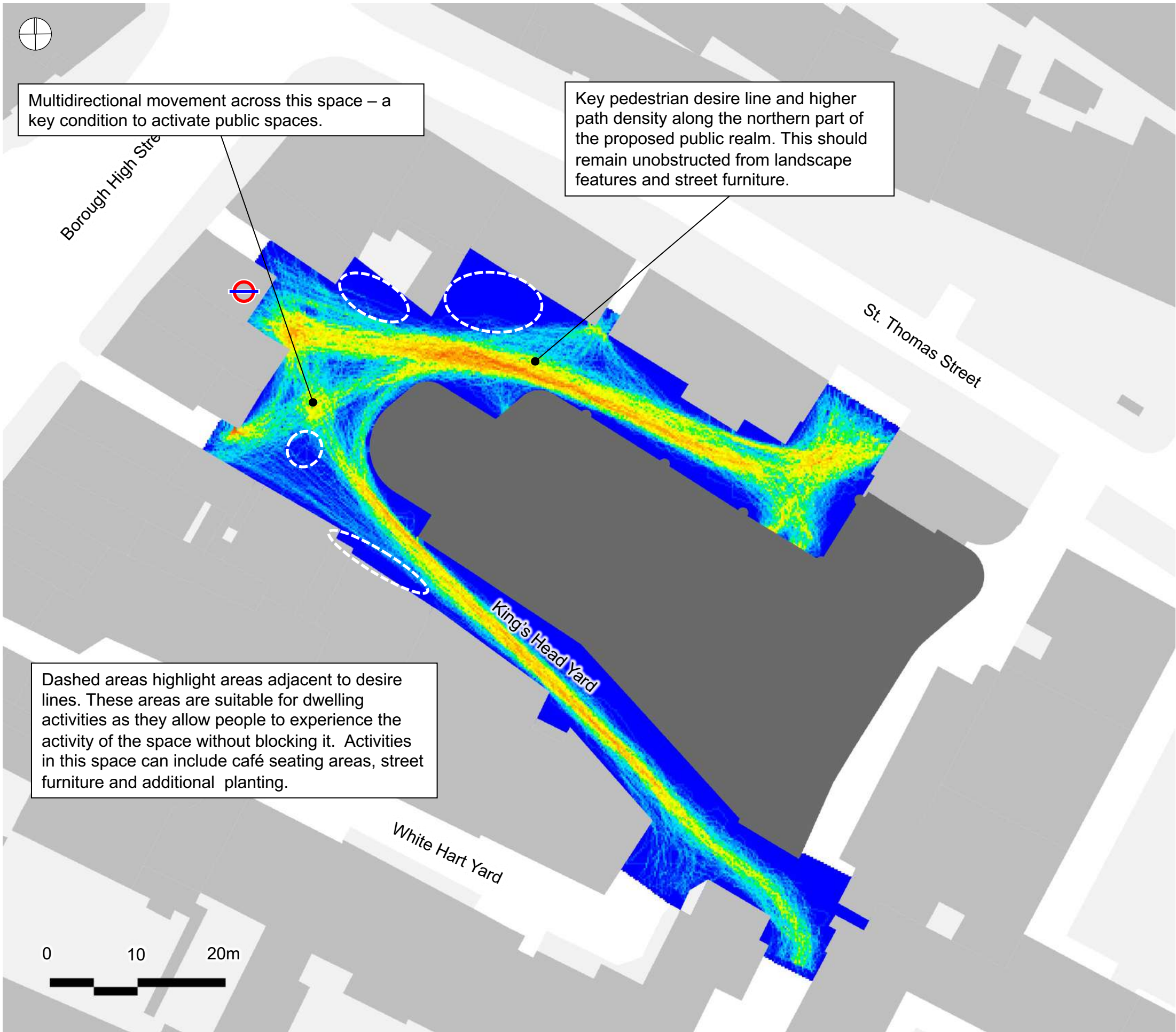
Legend 1 Pedestrian Comfort Levels



# **Landscape design assessment**

Agent Based Model **AM peak** **Cumulative** Tabula rasa

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Agent Based Models (ABM) simulate human behaviour in two key ways. First, individual agents can ‘see’ and therefore make wayfinding and navigation decisions based on the legibility of the layout. Secondly, agents can be programmed to move between origins and destinations.

The model therefore identifies emergent pedestrian desire lines, in this case for an AM peak scenario.

The model has two components:

- a) through movement**  
Movement between all access points of the proposed development, including the LUL entrance (flows are based on the pedestrian movement forecast).
- b) to movement - New City Court development trips**  
New City Court development trips between access points and office entrances/ garden entrance (distribution based on pedestrian demand analysis p.15).

The resulting analysis represents the density of movement according to the number of times an agent ‘steps’ on a specific point. The warmer colours represent higher density of path overlap.

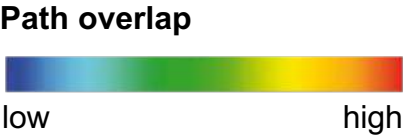
For more details see Appendix 3.

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The proposed landscape design successfully accommodates the key pedestrian desire lines.

It locates landscape features and furniture at suitable locations that do not obstruct movement lines and allow visibility at key orientation points.



# Appendices

# Appendix 1

Summary of Urban Baseline Study -  
Space Syntax, December 2016

# Key findings Urban form Spatial layout and land use patterns

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## Existing spatial accessibility

The site sits behind Borough High Street, a key primary north-south route at both city-wide and local scales.

St Thomas Street, Borough High Street, Great Maze Pond and Newcomen Street form the primary local network structure.

King's Head Yard, White Hart Yard and Talbot Yard have average to low accessibility levels; however they provide additional permeability through the large urban block.

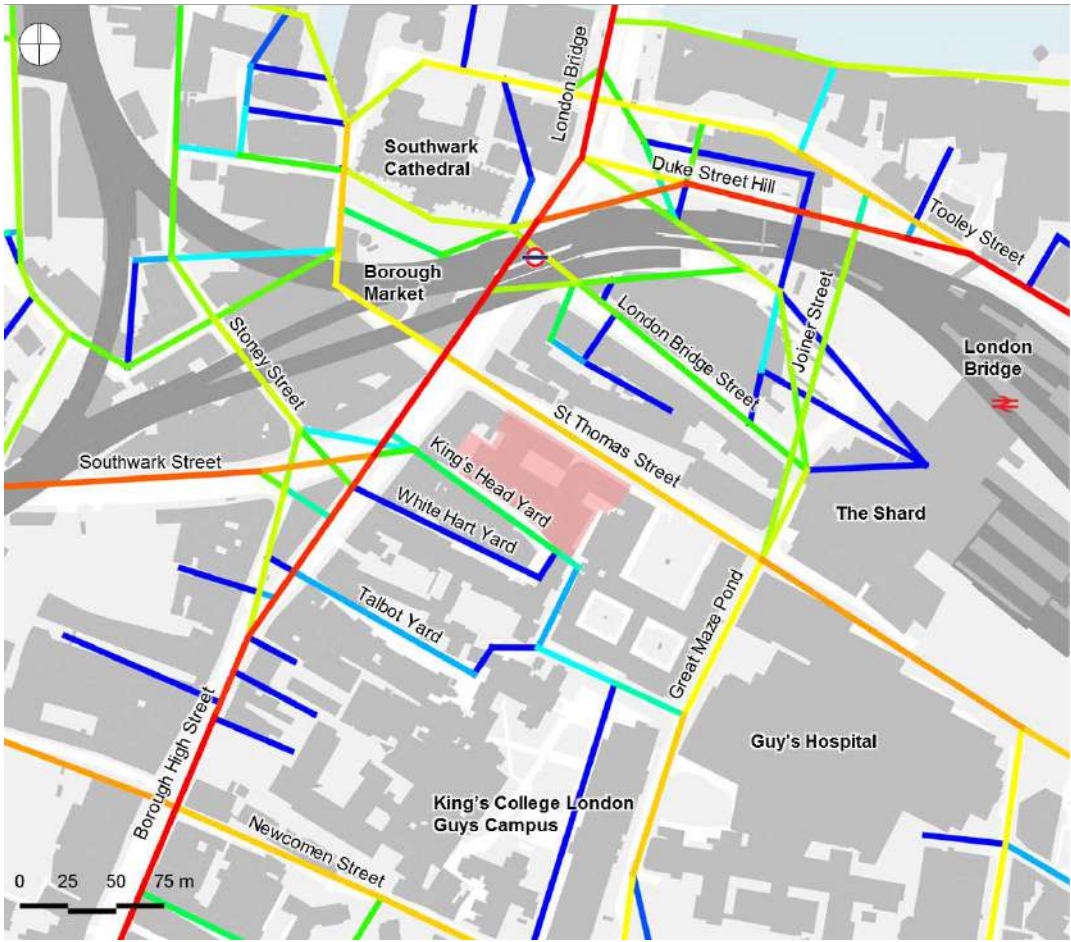
## Land use patterns

The site has a rich variety of land uses that creates distinct character areas and attract a mix of different users: tourists, office workers, commuters and locals.

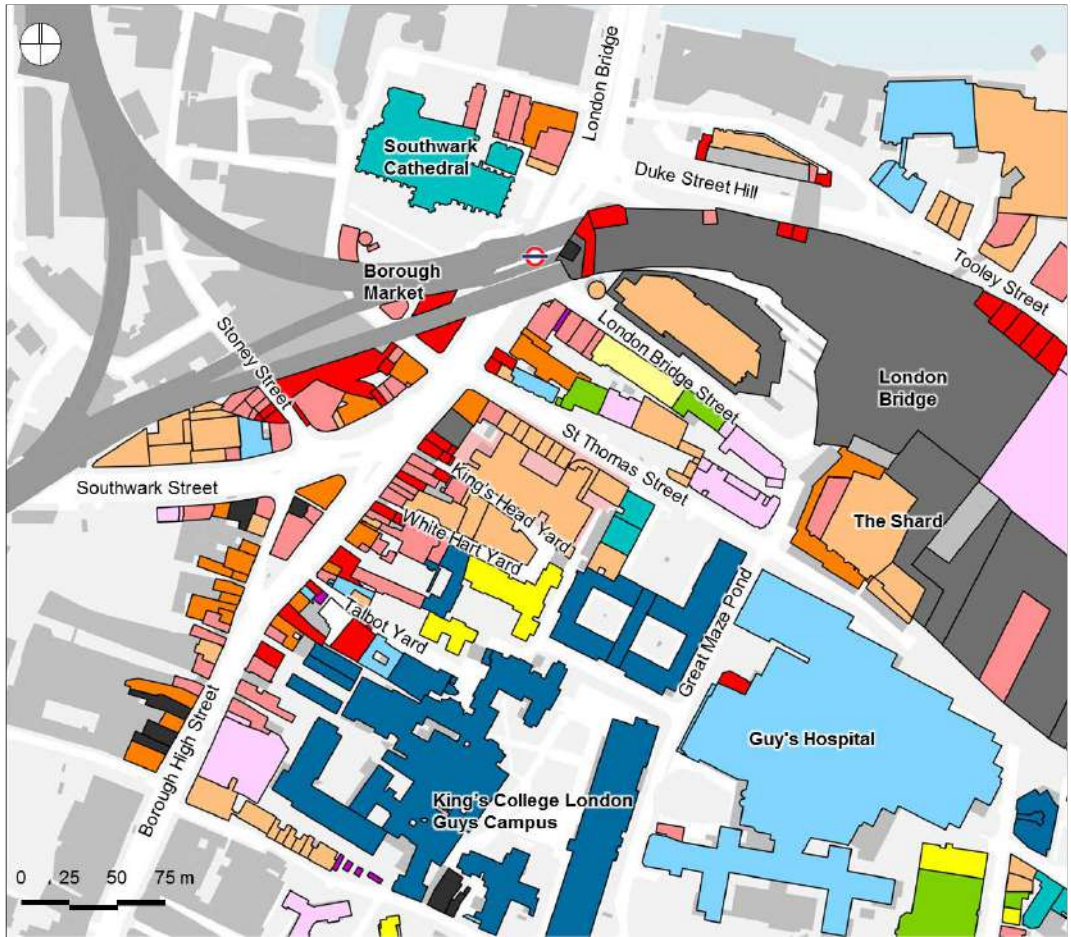
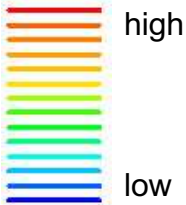
Borough High Street has as a mix of small scale retail, catering and services.

Key movement attractors in the area include London Bridge Station, with entrances along Borough High Street and St Thomas Street, Guy's Hospital, King's College and Borough Market, used by both locals and tourists.

Commercial uses are also found across the area as well as a number vacant and under construction sites, including the major redevelopment of London Bridge Station.



Existing spatial accessibility



Ground floor land use



# Key findings Urban form Transport attraction

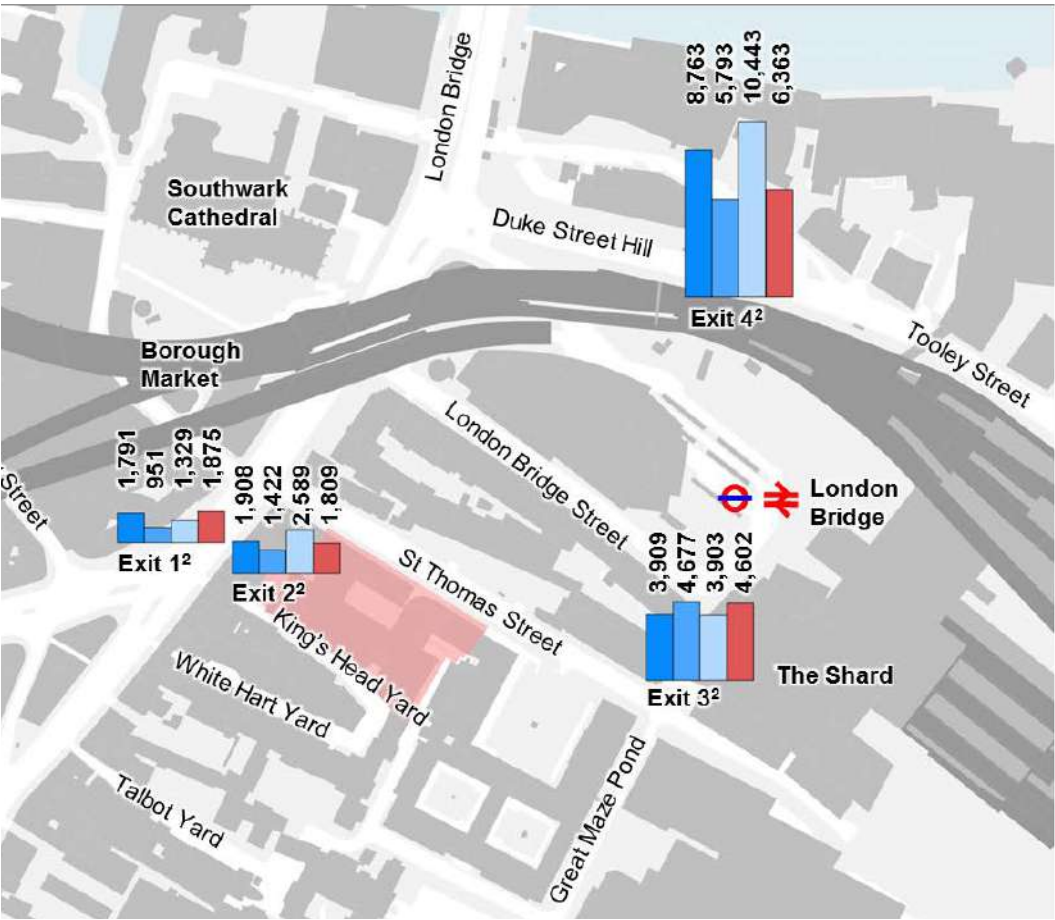
London Bridge Station is a key movement generator in the area and accounts for high movement levels to the north of the site, particularly during commuting periods.

## Borough High Street east – station exit

On average, the three dominant pedestrian routes were found along the eastern pavement of Borough High Street, north and south, as well as towards east along the southern pavement of St Thomas Street.

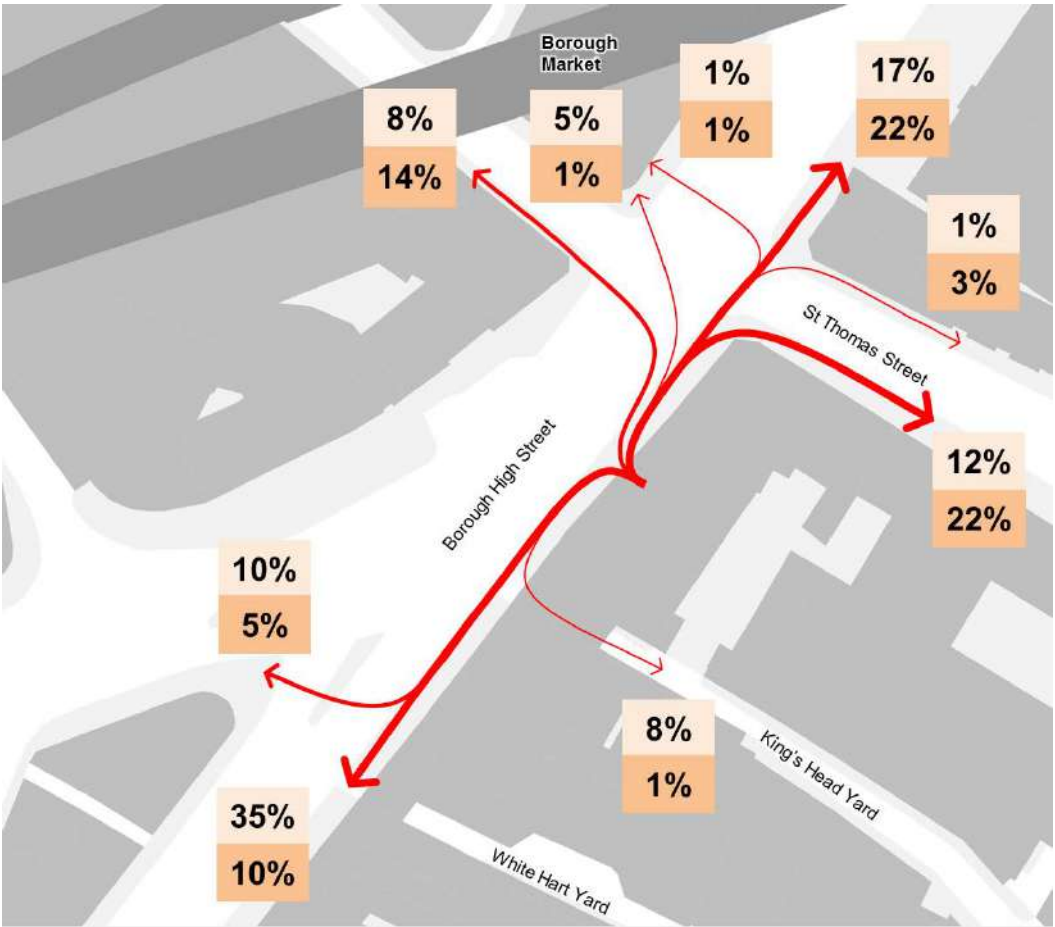
In the morning, 21% of the pedestrians that exited the station walked towards the east, along St Thomas Street and King’s Head Yard.

This percentage was higher during lunchtime, at 26%.



Average movement in and out of the station (pph)

- Weekday, AM Peak
- Weekday, Lunch Peak
- Weekday, PM Peak
- Weekend, Lunch Peak



Pedestrian routes from station exit

- Morning 08:00 -10:00
- Lunch 12:00 - 14:00

**Note:** London Bridge Station was under redevelopment during the surveys and the new southern exit on St Thomas Street was not open.

# Key findings Urban function Pedestrian movement patterns

## Pedestrian movement patterns

Overall movement levels in the study area were 23% higher during the weekday (1,369pph) than during the weekend. However, the area remained busy during the weekend with good movement levels (1,113pph).

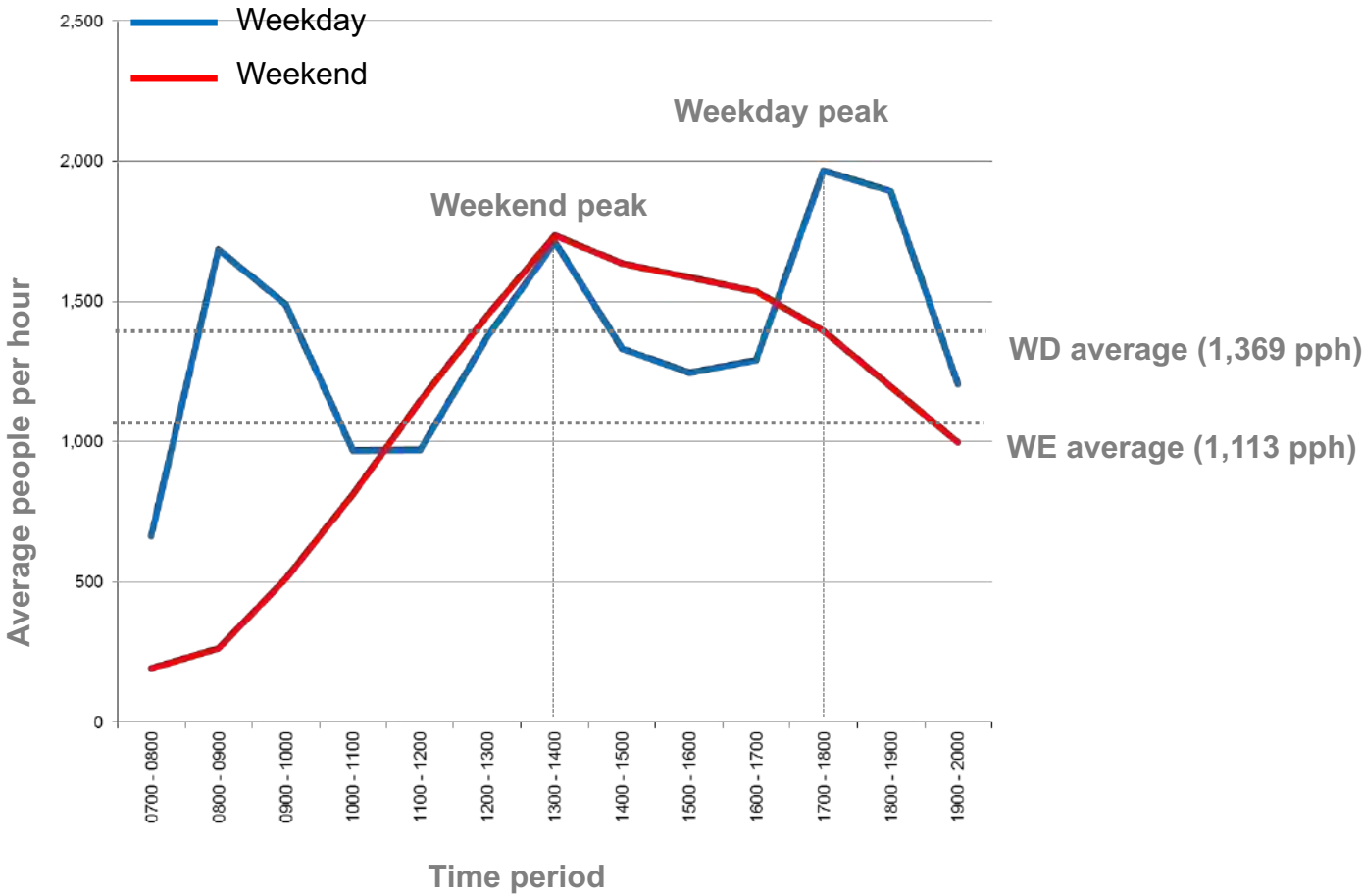
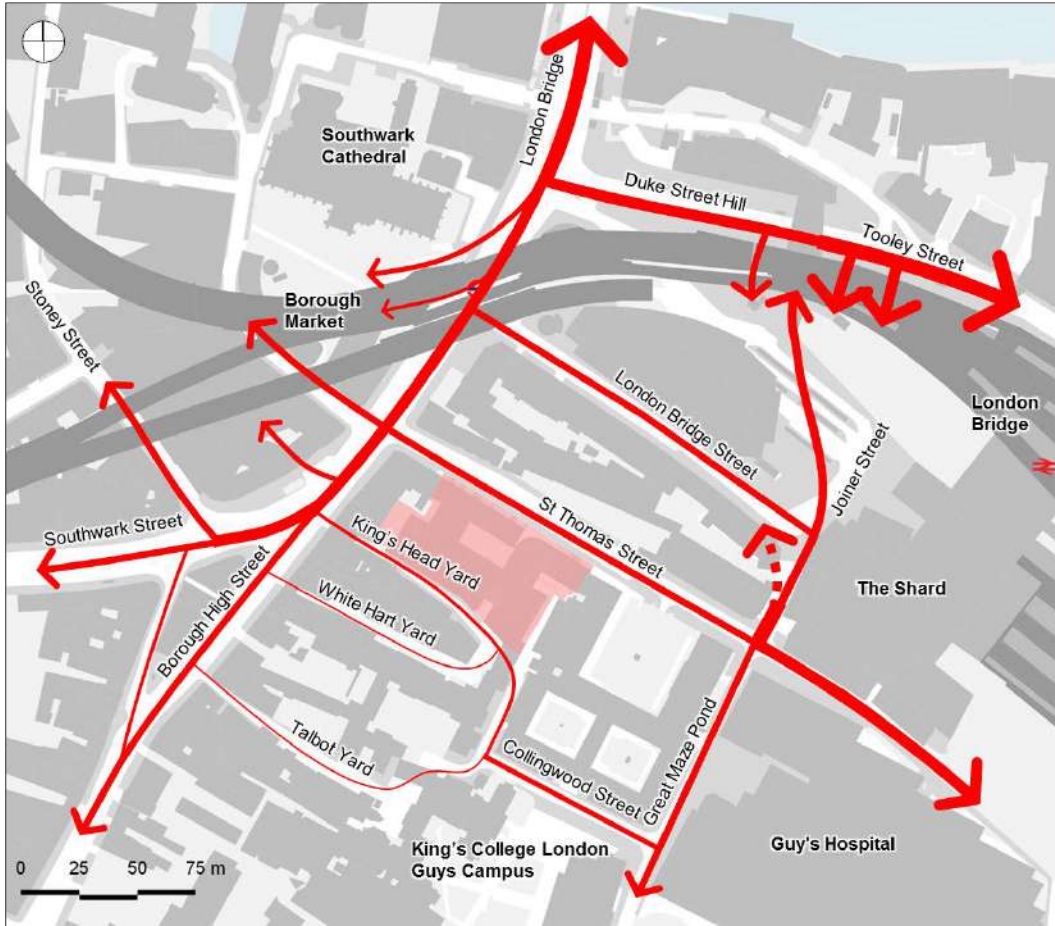
The weekday movement had three clear peaks: a morning and evening commute and a lunch time peak. The “w” shape pattern is typical of office areas. However in this area, the movement levels remained high in the evening, due to the presence leisure land uses in the area.

During the weekend, movement gradually increased towards the afternoon peaking at lunchtime. This is typical of areas with shopping or leisure profiles.

The movement distribution on both weekday and the weekend days is consistent. Borough High Street and St Thomas Street remained busy on both weekday and weekend days with similar daily average movement (3,958pph and 3,672pph respectively for weekday and weekend movement for Borough High Street, and 1,819pph and 1,620pph respectively for St Thomas Street). Although the daily averages are similar, most of the weekend movement happens between midday and the early evening.

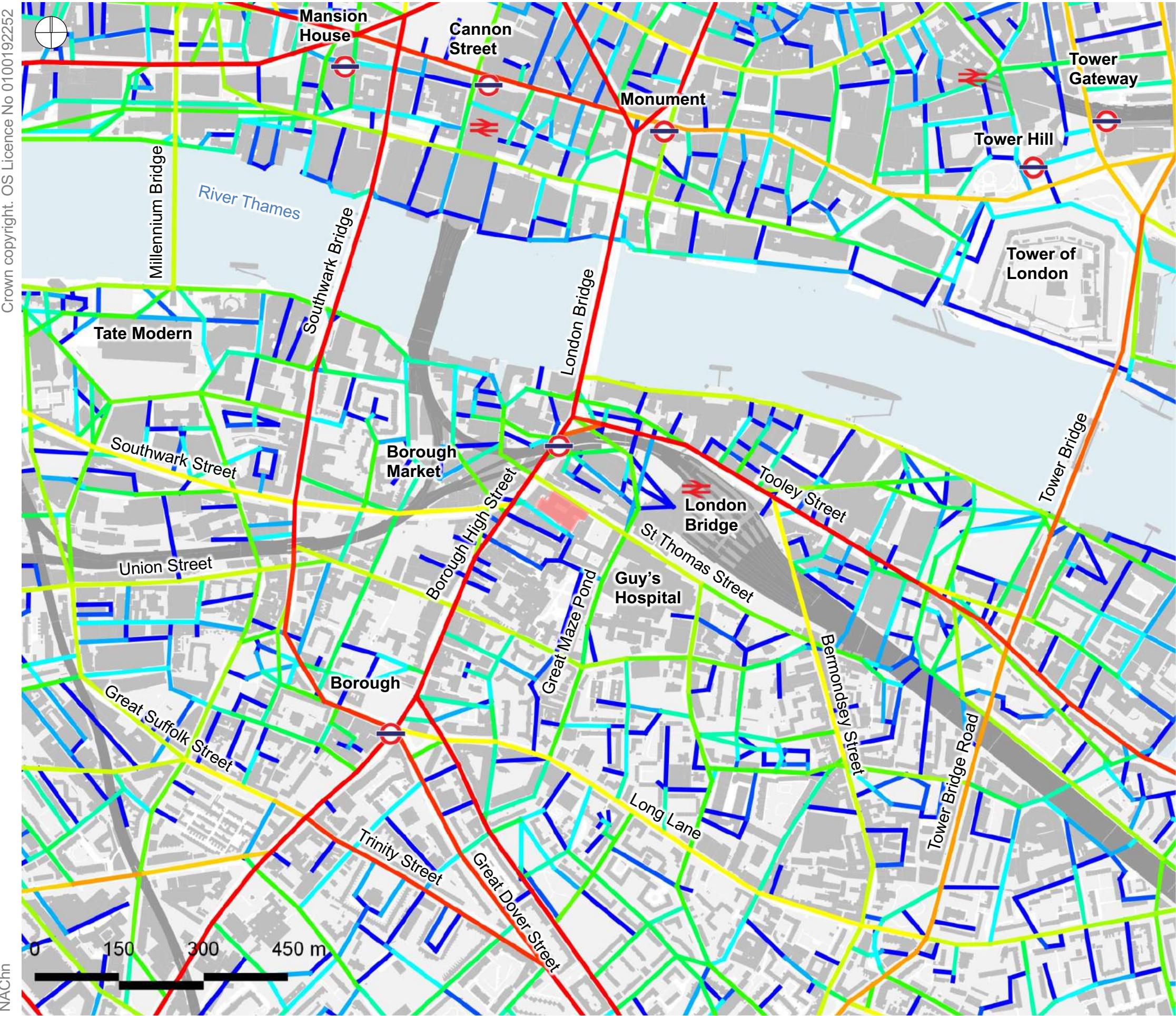
In contrast, movement along London Bridge and Tooley Street decreased during the weekend, indicating that this area is used by weekday commuters.

There is an important movement line running between Borough High Street and Great Maze Pond. King’s Head Yard and Collingwood Street were well used, particularly during lunchtime (669pph and 1,656pph respectively). These were quieter over the weekend, potentially due to the impact of the King’s College campus and Guy’s Hospital as important attractors in the area.



Spatial accessibility City-wide route hierarchy Existing

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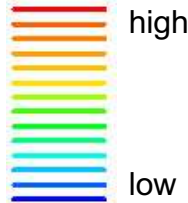


The spatial accessibility analysis highlights the route hierarchy of an area. Highly accessible streets are likely to attract more through-movement.

This image shows a city-wide spatial analysis and highlights the large scale route structure across London. These routes are the ones that relate to long distance vehicular flows and commuter's movement.

Southwark Bridge, London Bridge/Borough High Street and Tower Bridge are key north-south routes with Tooley Street providing east-west links.

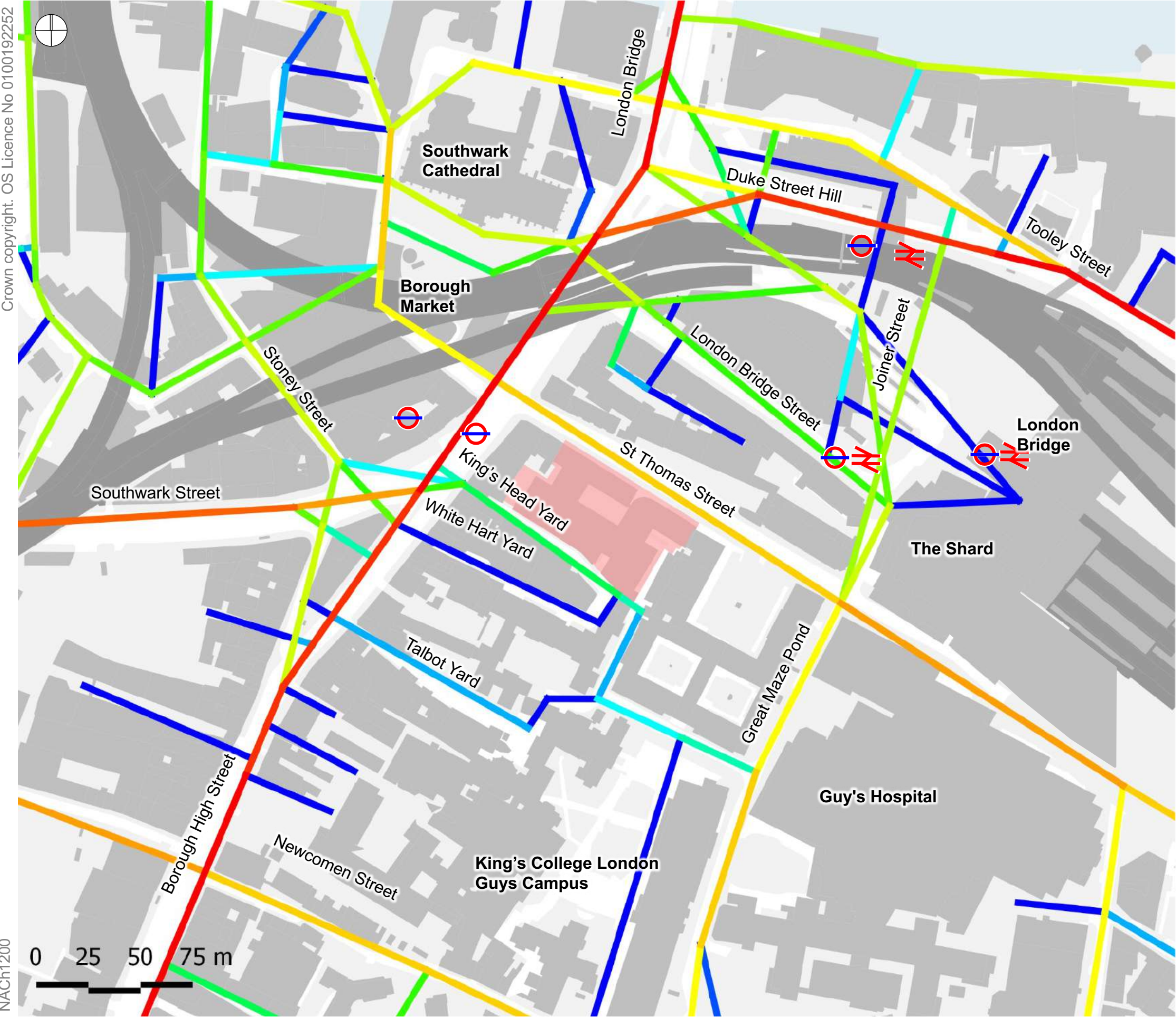
Spatial accessibility



- Underground station
- Railway station
- Project site

NAChn

Spatial accessibility Local route hierarchy Existing 15min walk



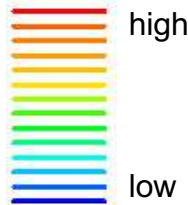
The local route hierarchy highlights routes which form part of the local or walking catchment of the area, estimated at 1,200 metres or a 15min walk.

Borough High Street and Tooley Street are part of the primary network at both city-wide and local scales.

Southwark Street and St Thomas Street are also highlighted as important routes at the local scale.

King's Head Yard, White Hart Yard and Talbot Yard have average to low accessibility levels, however they provide additional permeability and alternative routes to those provided by the primary route network.

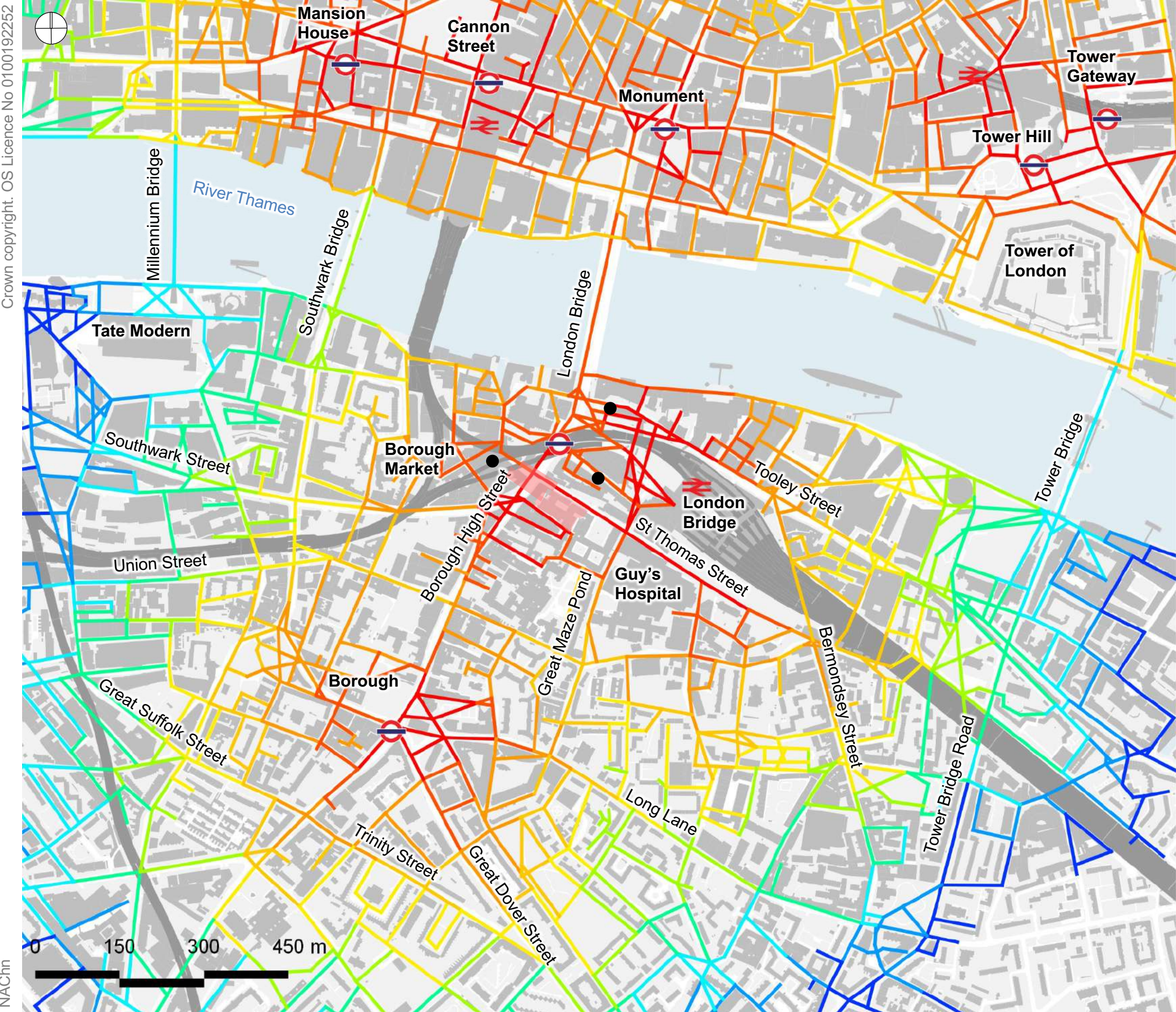
Spatial accessibility



- Underground station
- Railway station
- Project site

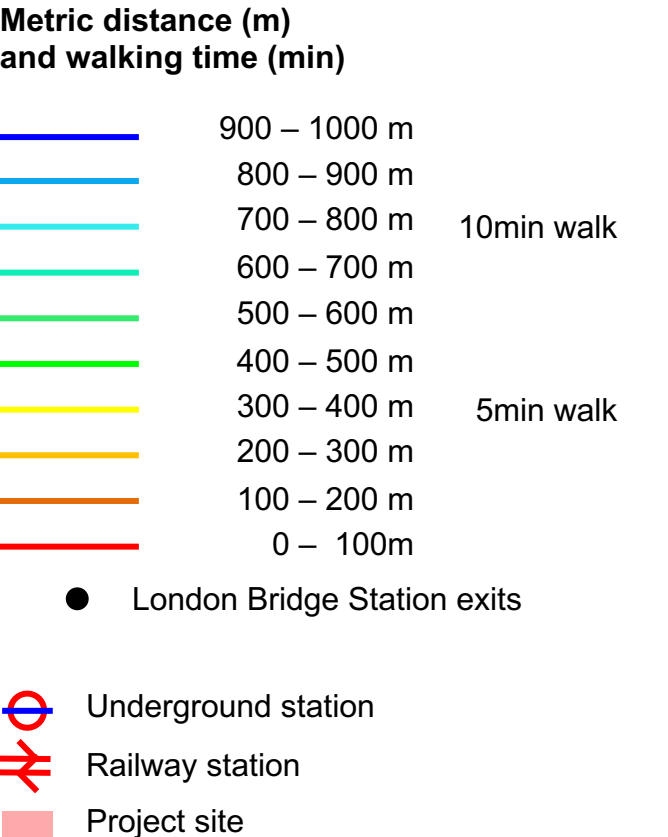
# Transport attraction Walking distance from major transport nodes

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This image shows the accessibility of transport nodes in terms of distance and walking time.

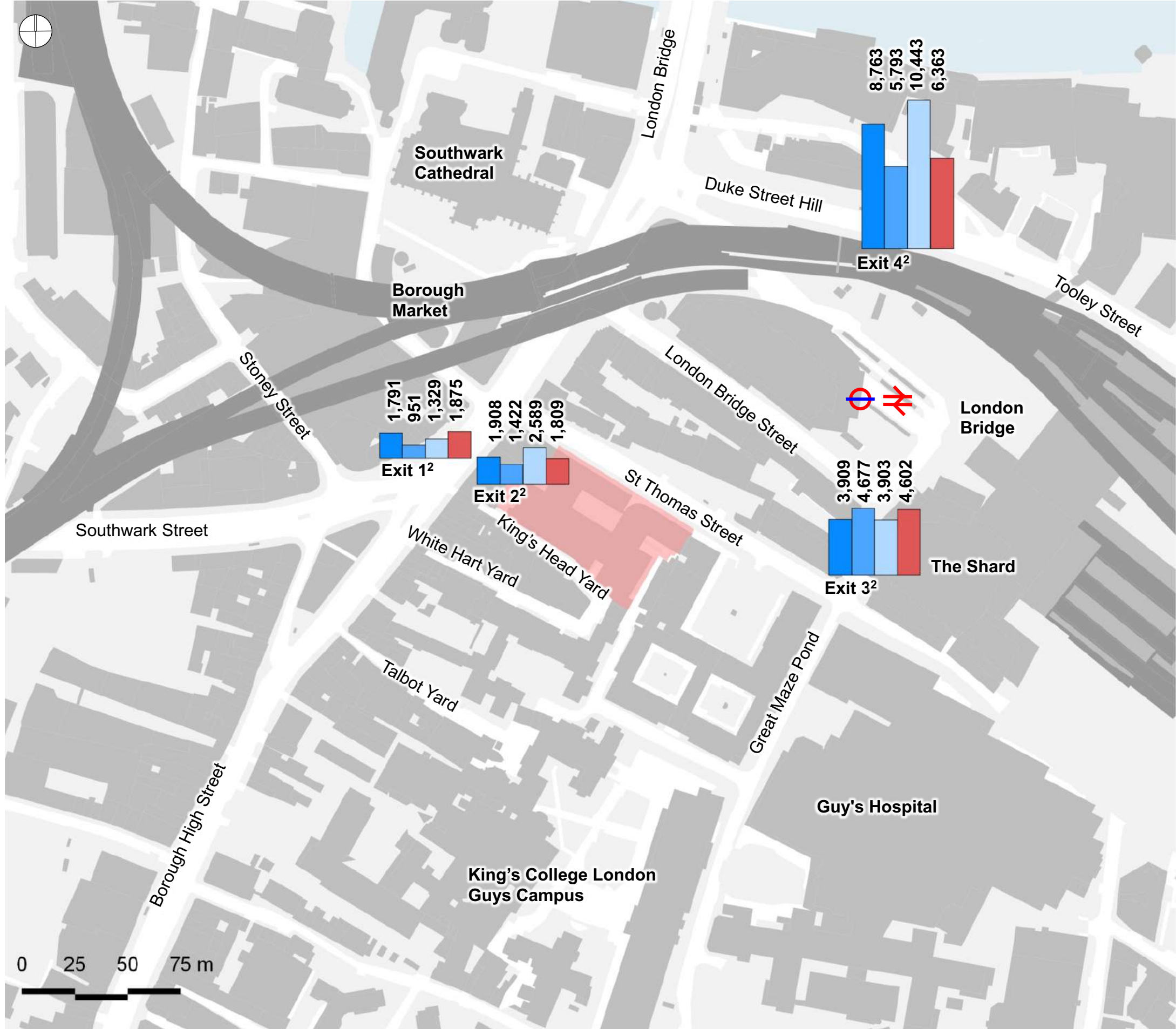
London Bridge Station, under redevelopment during the surveys, is adjacent to the site and has significant impact on the pedestrian movement patterns along St Thomas Street and Borough High Street at the perimeter of the site.



NAChn

# Transport attraction London Bridge Station

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## London Bridge Station usage data

**Annual entries and exits<sup>1</sup>:**  
74.98 millions

**Daily entries and exits<sup>1</sup>:**

Weekday		
Entry	Exit	Total
116,460	115,763	232,223

Saturday		
Entry	Exit	Total
93,996	90,158	184,154

**Data sources:**  
<sup>1</sup> Counts - 2014 - Annual entries & exits  
London Underground Limited, 2015  
Transport for London.  
<sup>2</sup> Space Syntax survey data, September 2016

**Note:**  
Exit 3 data refers only to counts at the London Bridge Station passageway on St Thomas Street and does not include any movement up/down the escalator.

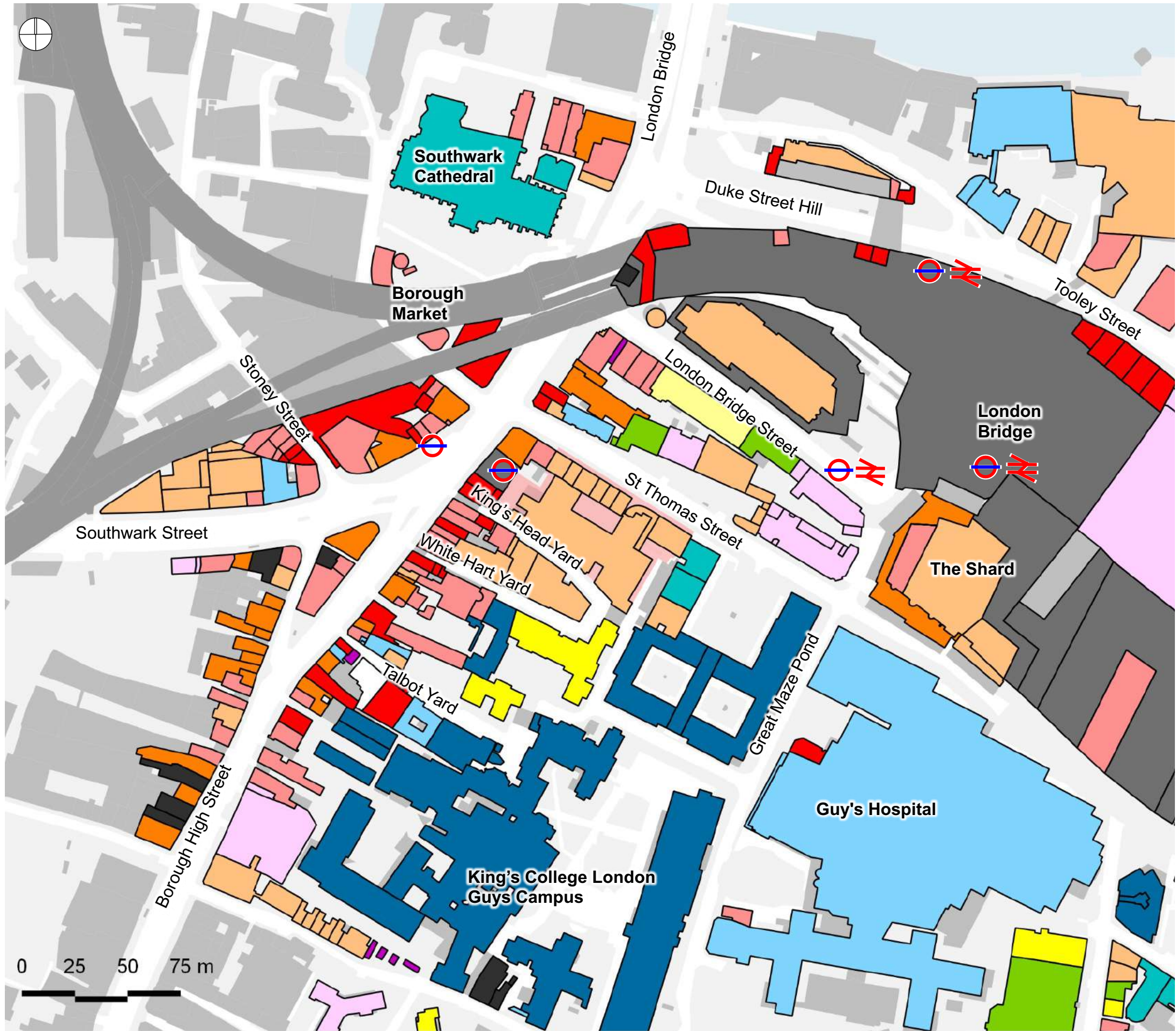
**Pedestrian flows<sup>2</sup>**  
People per hour

- Weekday, AM Peak
- Weekday, Lunch Peak
- Weekday, PM Peak
- Weekend, Lunch Peak

Underground station  
 Railway station  
 Project site

Land use patterns **Ground floor**

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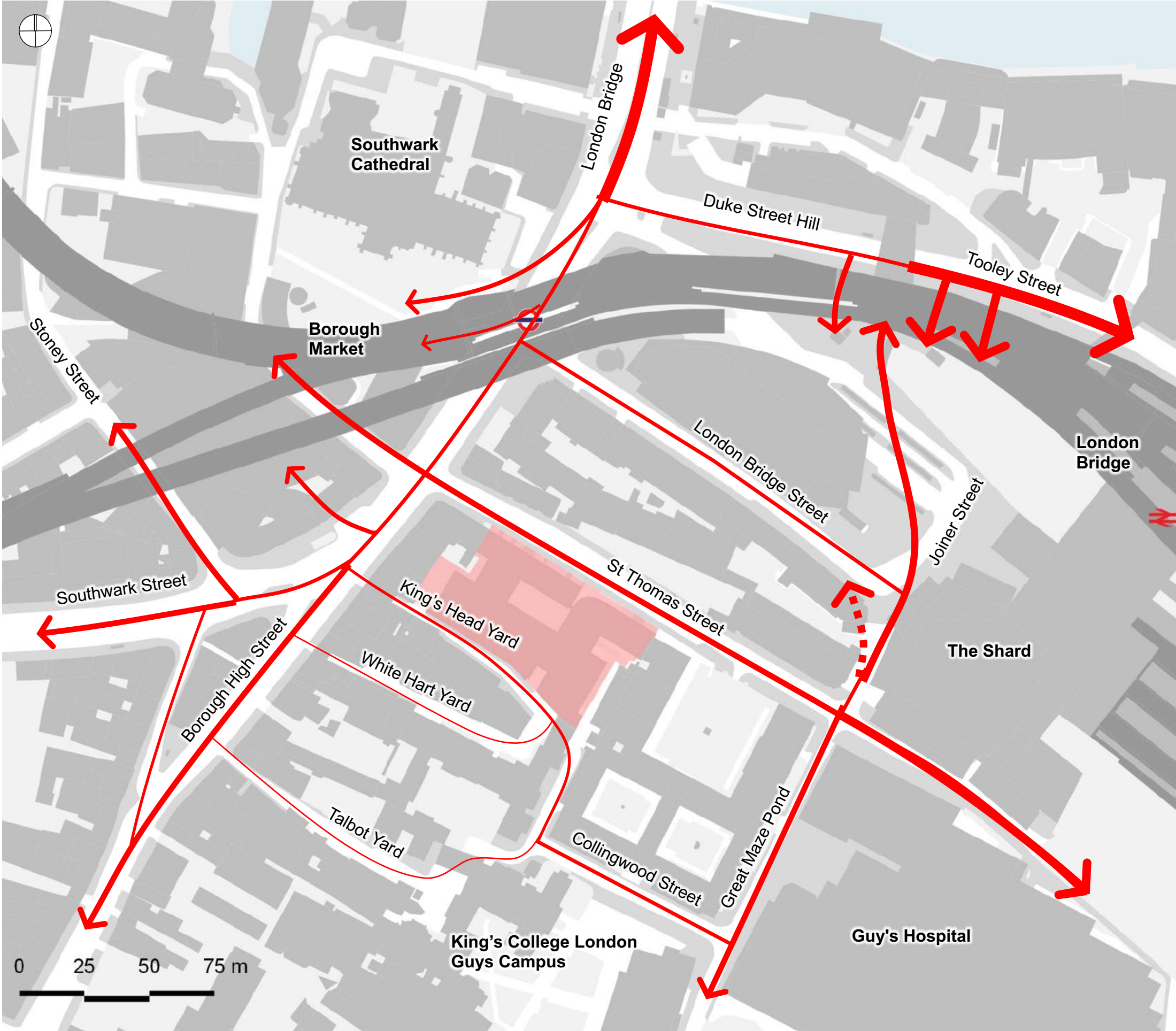
The land use mix found around the site creates a distinctive character and user profiles in the area.

A mix of small scale retail, catering and services clusters along Borough High Street.

The character of St Thomas Street is defined by London Bridge Station and Guy's Hospital, and the Shard to the east of Great Maze Pond, King's College.

Pedestrian movement patterns **Weekday summary** All day average

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London Bridge Station is a key movement generator with a significant impact in the area immediately adjacent to its entrances, particularly during commuting hours.

London Bridge and Tooley Street had high movement levels with all day average movement at 6,373 pph and 5,292pph respectively.

Pedestrian movement levels were also high along Borough High Street, particularly around the London Bridge Station entrances at the intersection with St Thomas Street (3,958pph). Observed movement levels were higher during lunch time at this location.

Movement levels decreased to the south part of Borough High Street.

St Thomas Street had consistently high movement levels, particularly to the east of Great Maze Pond (3,477pph). It's overall movement levels also increased during lunchtime.

King's Head Yard and Collingwood Street are well used, particularly during lunchtime (669pph and 1,656pph respectively) .

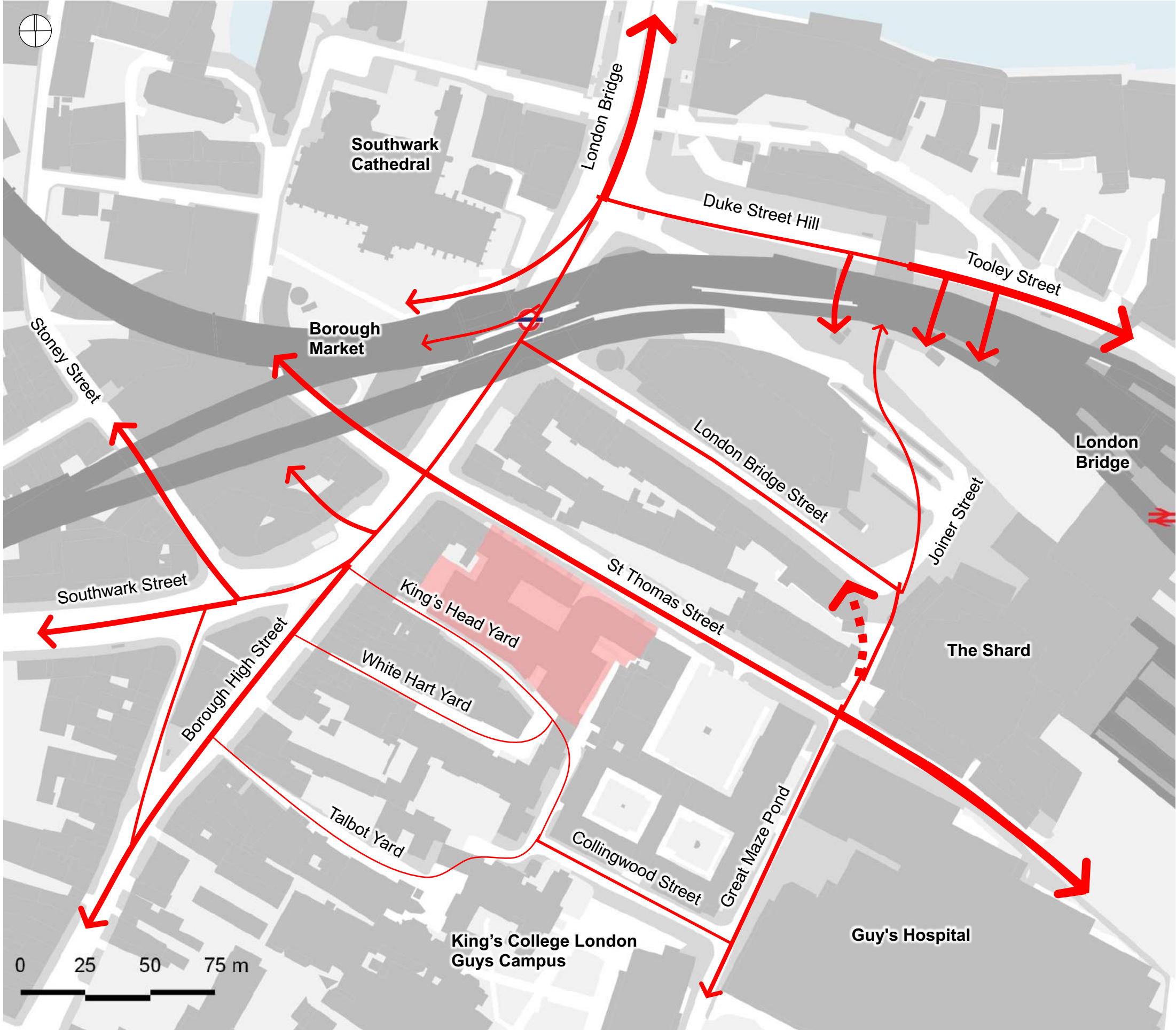
**Pedestrian movement**



Project site

Pedestrian movement patterns **Weekend summary** All day average

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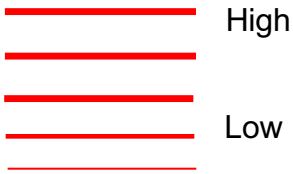


Movement distribution is consistent on both weekday and weekend days. However, movement along London Bridge and Tooley Street decreased during the weekend, indicating that the route is used by commuters.

Movement levels along Borough High Street and St Thomas Street remained high.

King's Head Yard and Collingwood Street had less movement during the weekend.

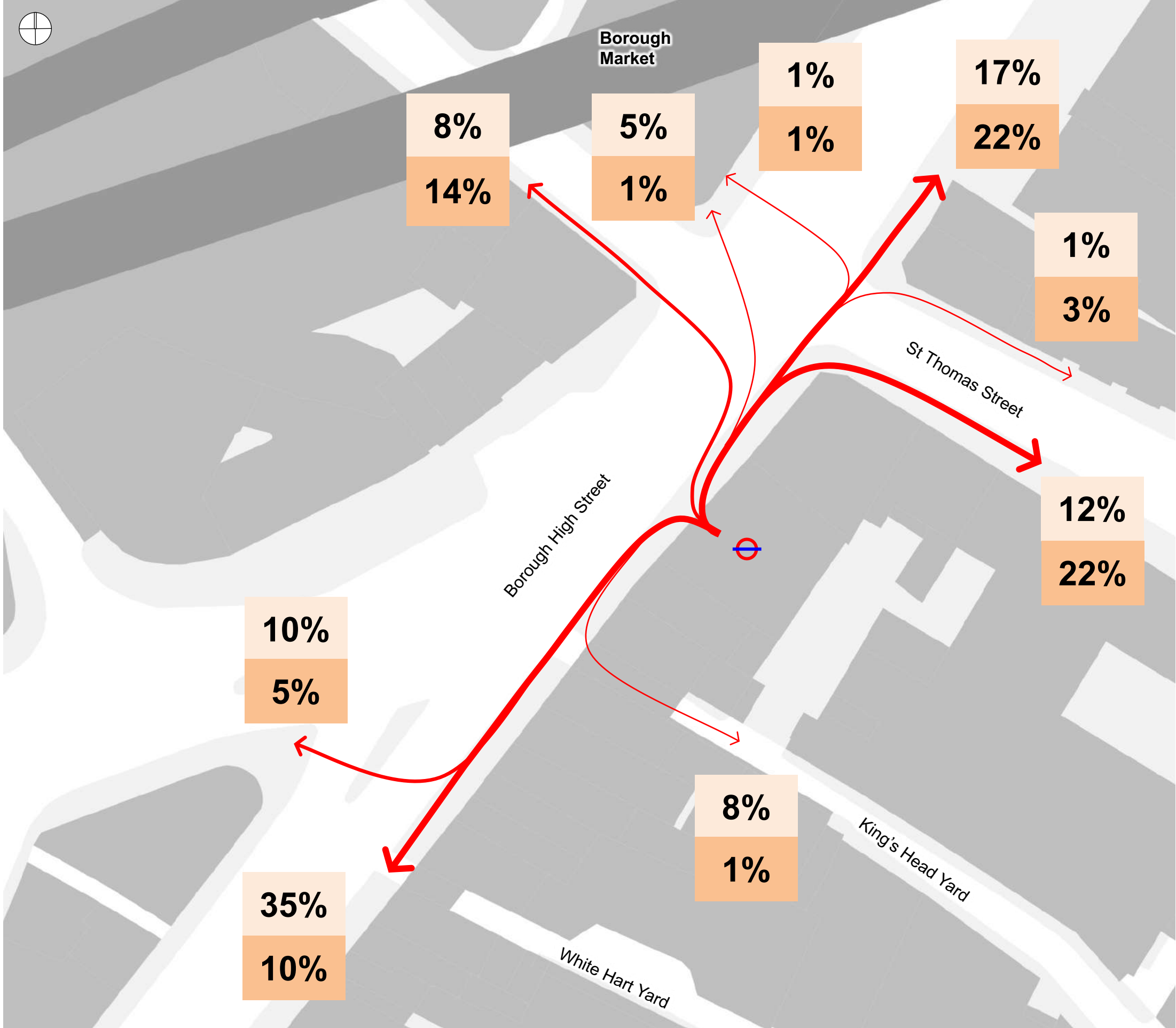
**Pedestrian movement**



Project site

**Pedestrian routes** **Station exit** **Morning and lunchtime** 08:00 - 10:00 and 12:00 - 14:00

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In order to understand the movement distribution from the Borough High Street London Underground entrance and the potential impact of a new entrance, we conducted a route survey.

Individual routes of people exiting the Borough High Street underground entrance were recorded on Thursday 20<sup>th</sup> October 2016 from 08:00 to 10:00 and from 12:00 to 14:00.

The analysis shows that the three dominant pedestrian routes were along the eastern pavement of Borough High Street, and then east along the southern pavement of St Thomas Street.

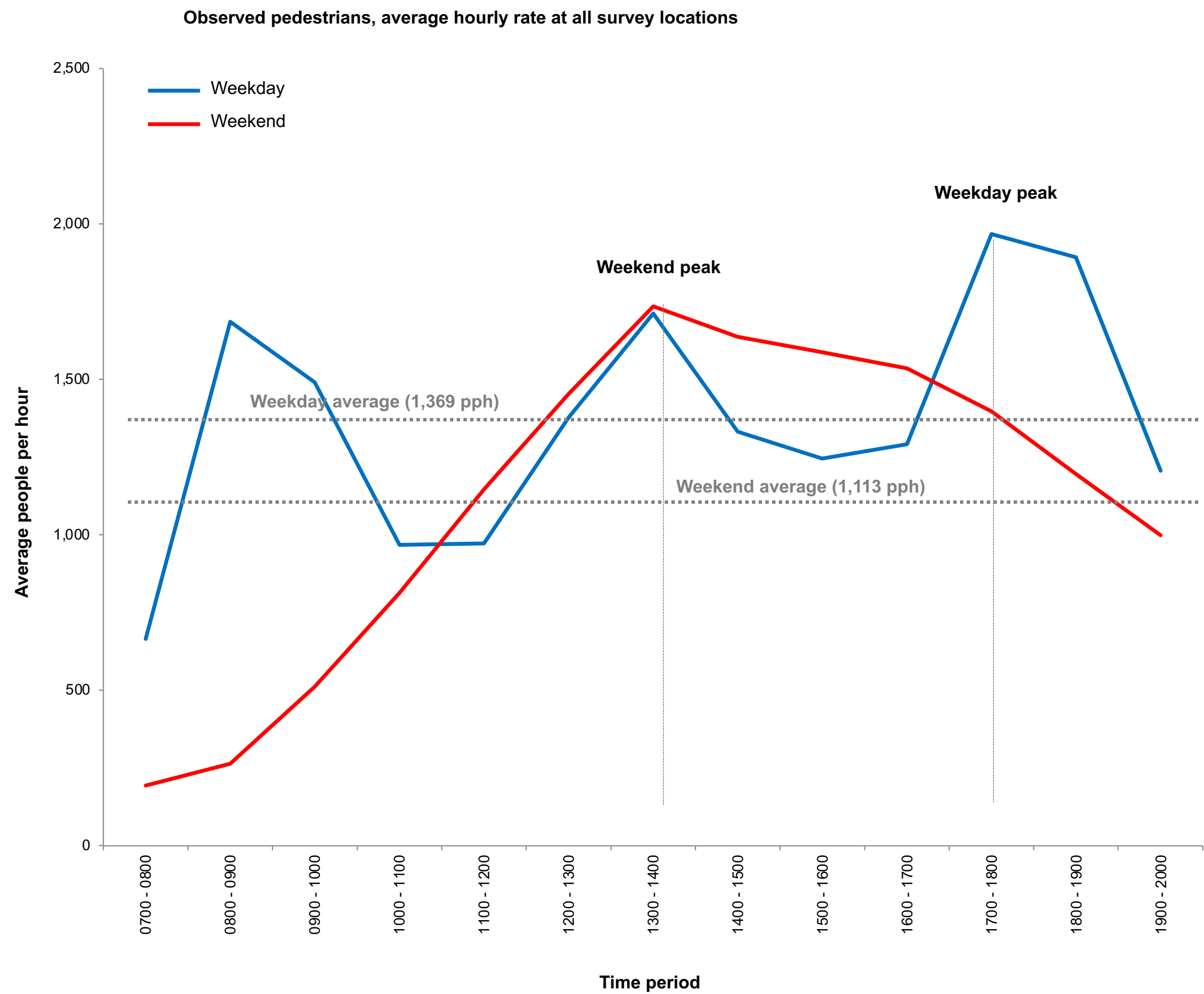
In the morning, 21% of the pedestrians that exited the station walked towards the east, along St Thomas Street and King's Head Yard.

This percentage was higher during lunchtime, at 26%.

**Note:**  
3% of the pedestrian routes in the morning peak (08:00-10:00) entered a building within the survey area, while during lunchtime the percentage was 21%. These are not shown in the diagram.

-% Morning 08:00 -10:00  
-% Lunch 12:00 - 14:00

# Pedestrian movement patterns Distribution across the day Weekday and weekend



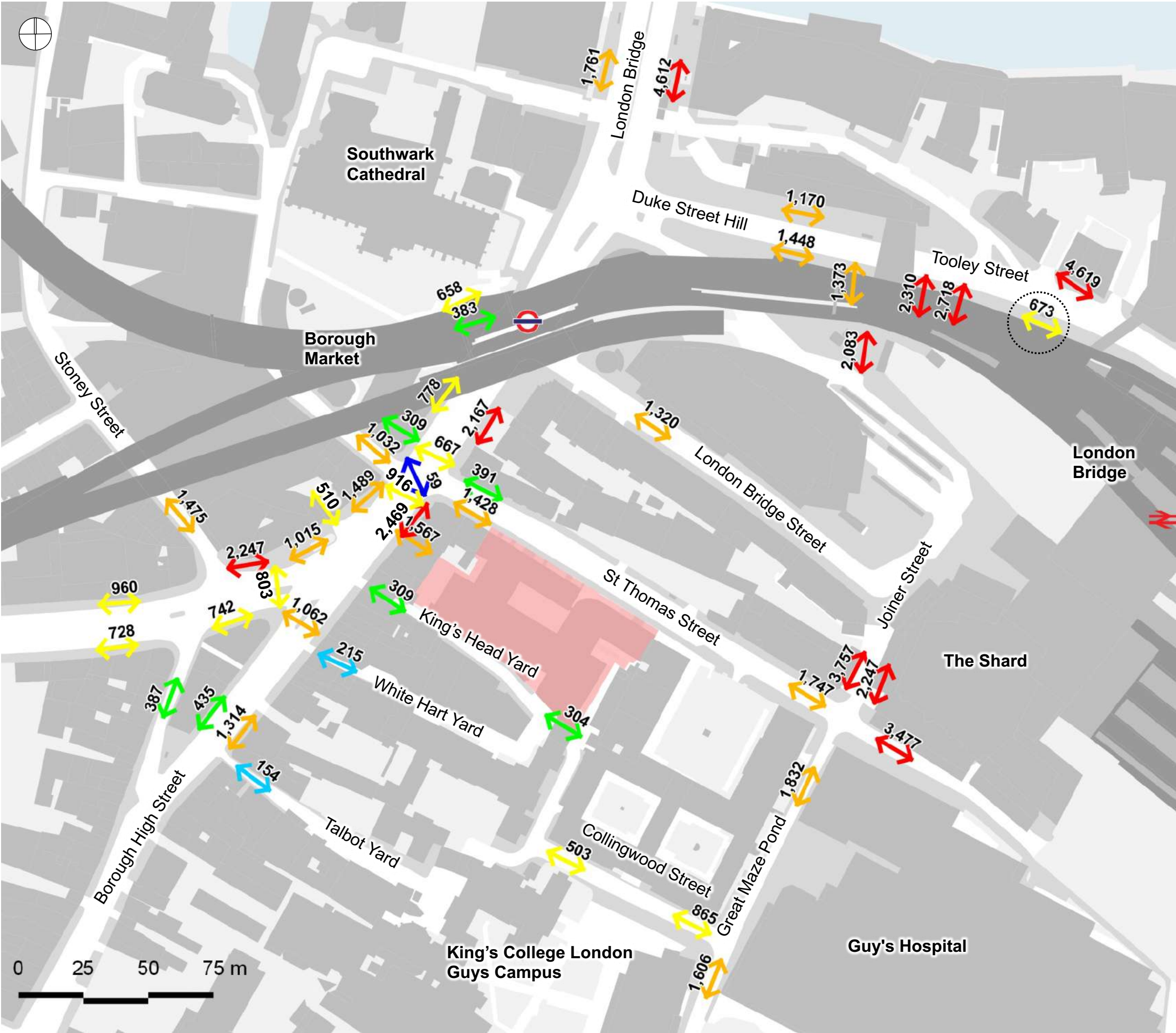
Overall movement levels in the study area were 23% higher during the weekday than during the weekend.

Weekday movement patterns show three clear peaks: morning and evening commute peaks and a lunch time peak. This “w” shape pattern is typical of office areas. However, movement levels remained high in the evening, suggesting a combination of longer dwell-time as well as people arriving in the area because it works as a leisure destination.

The weekend movement pattern shows a gradual increased towards the afternoon, with its peak at lunchtime. This is typical of areas with shopping or leisure activity.

# Pedestrian movement patterns Weekday All day average

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There were consistently higher flows along the eastern pavement of Borough High Street.

○ Footway closed during some of the survey time periods

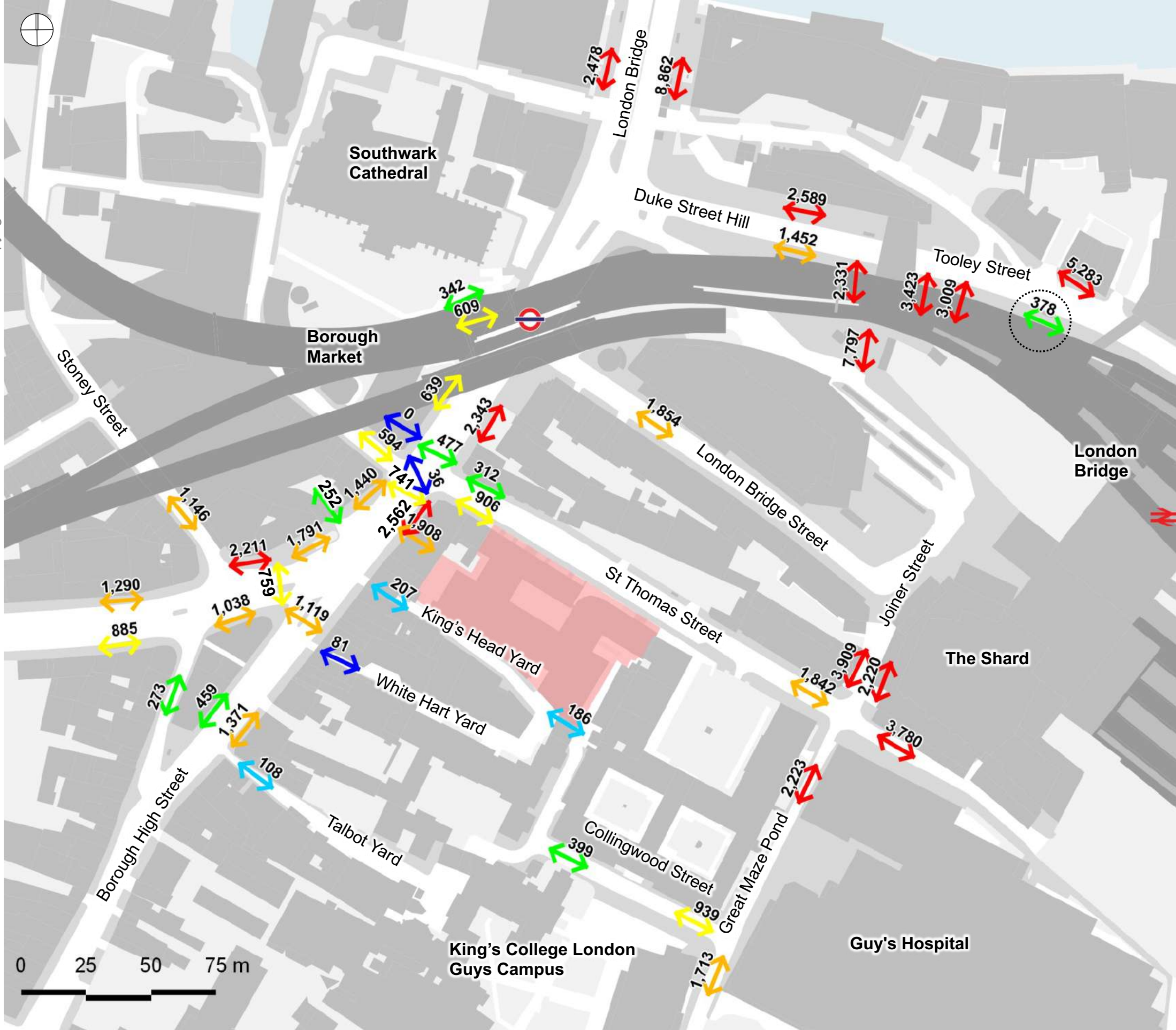
**Pedestrian movement**  
People per hour

- ↔ 2000 and above
- ↔ 1000 – 2000
- ↔ 500 – 1000
- ↔ 250 – 500
- ↔ 100 – 250
- ↔ 0 – 100

Project site

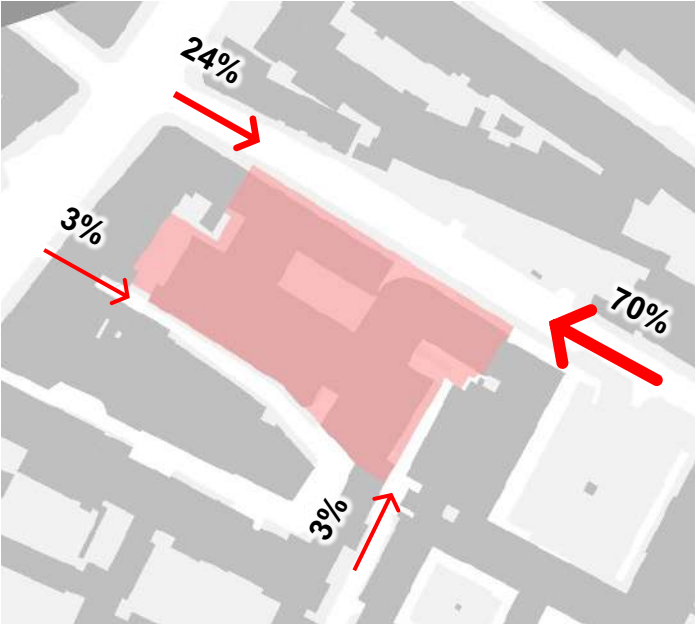
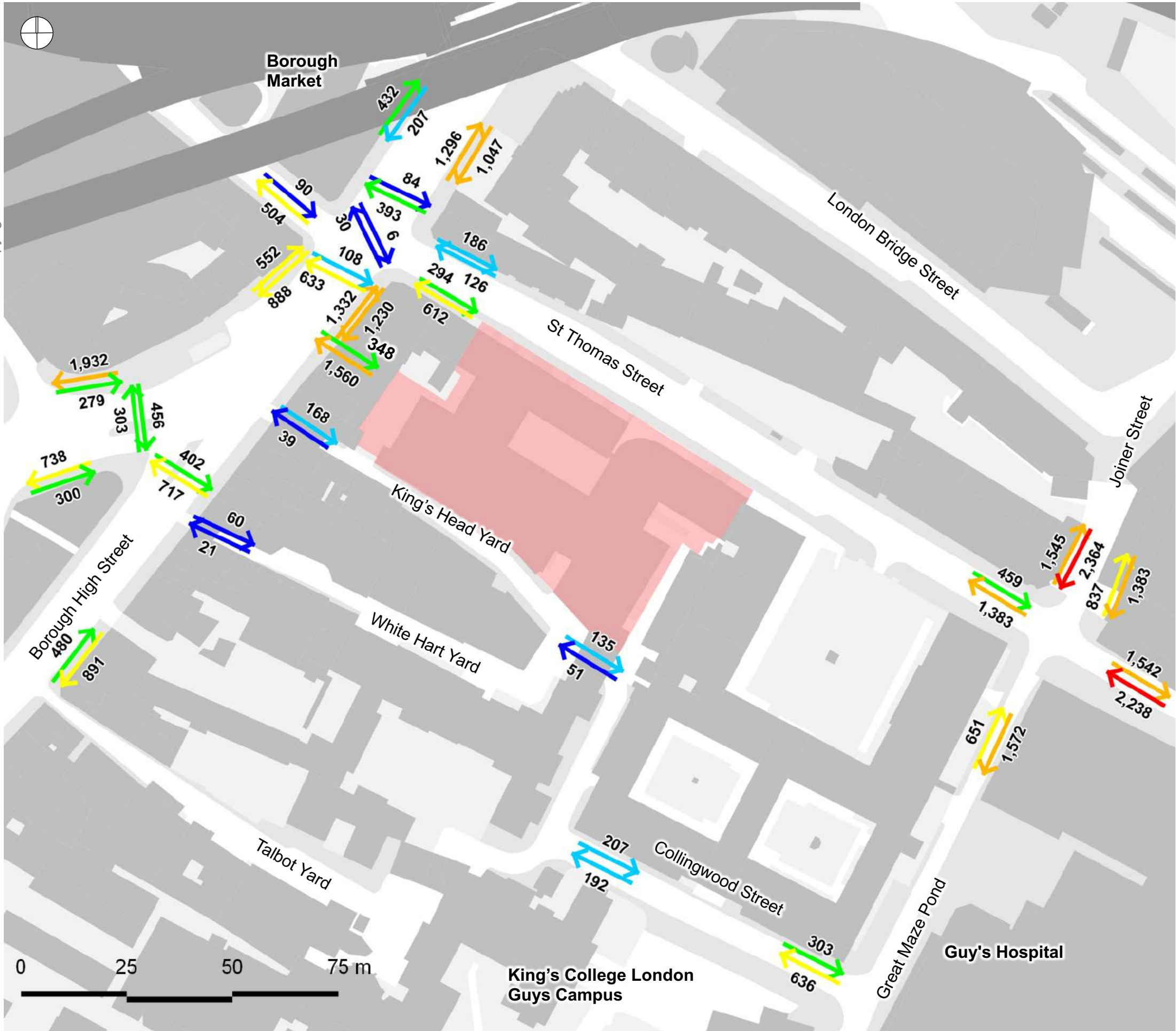
Pedestrian movement patterns **Weekday Morning peak** 08:00 - 09:00

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Pedestrian movement patterns **Weekday Morning peak 08:00 - 09:00** Directional

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**Pedestrian movement**  
People per hour

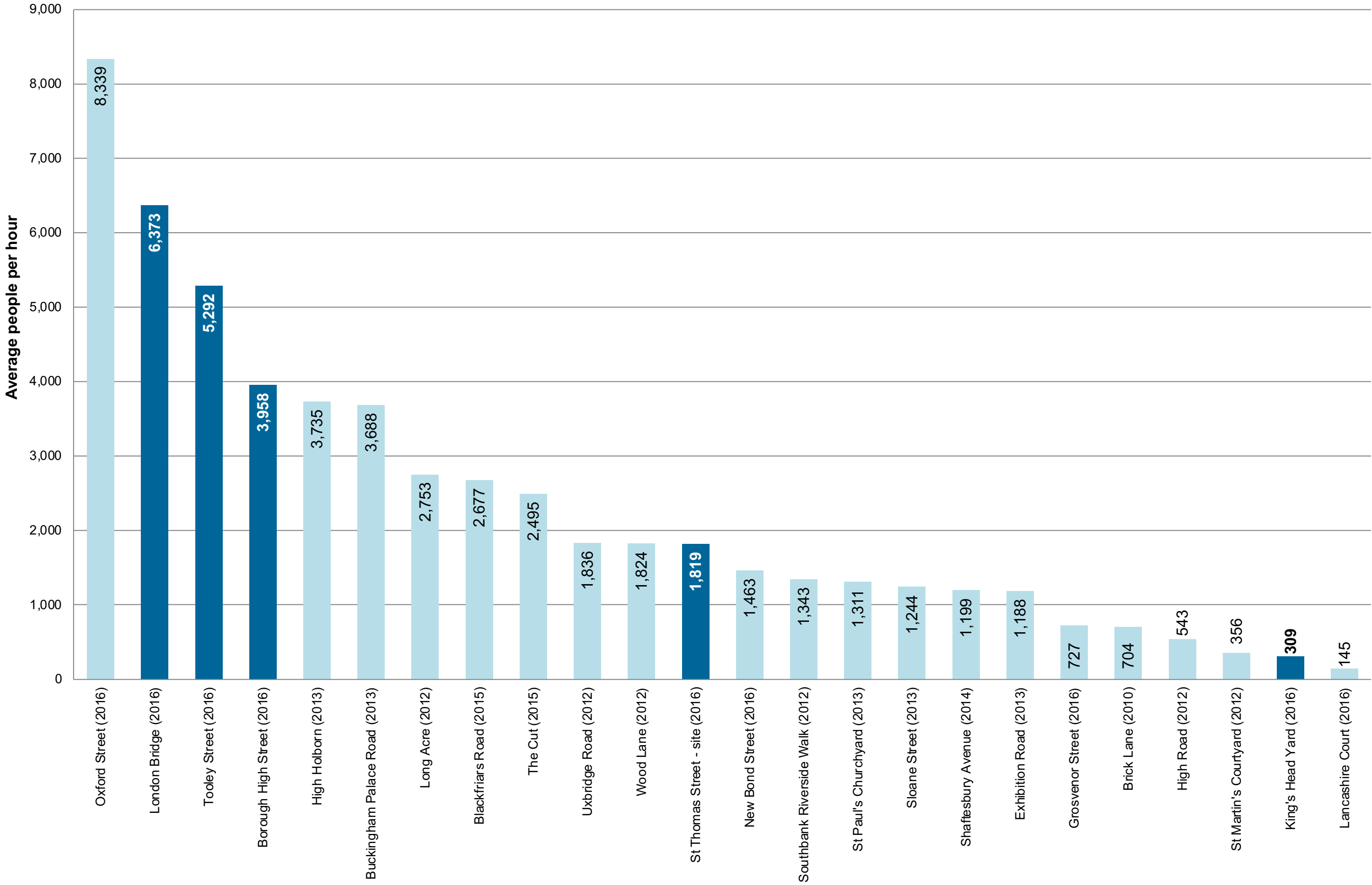
- ↔ 2000 and above
- ↔ 1000 – 2000
- ↔ 500 – 1000
- ↔ 250 – 500
- ↔ 100 – 250
- ↔ 0 – 100

Project site

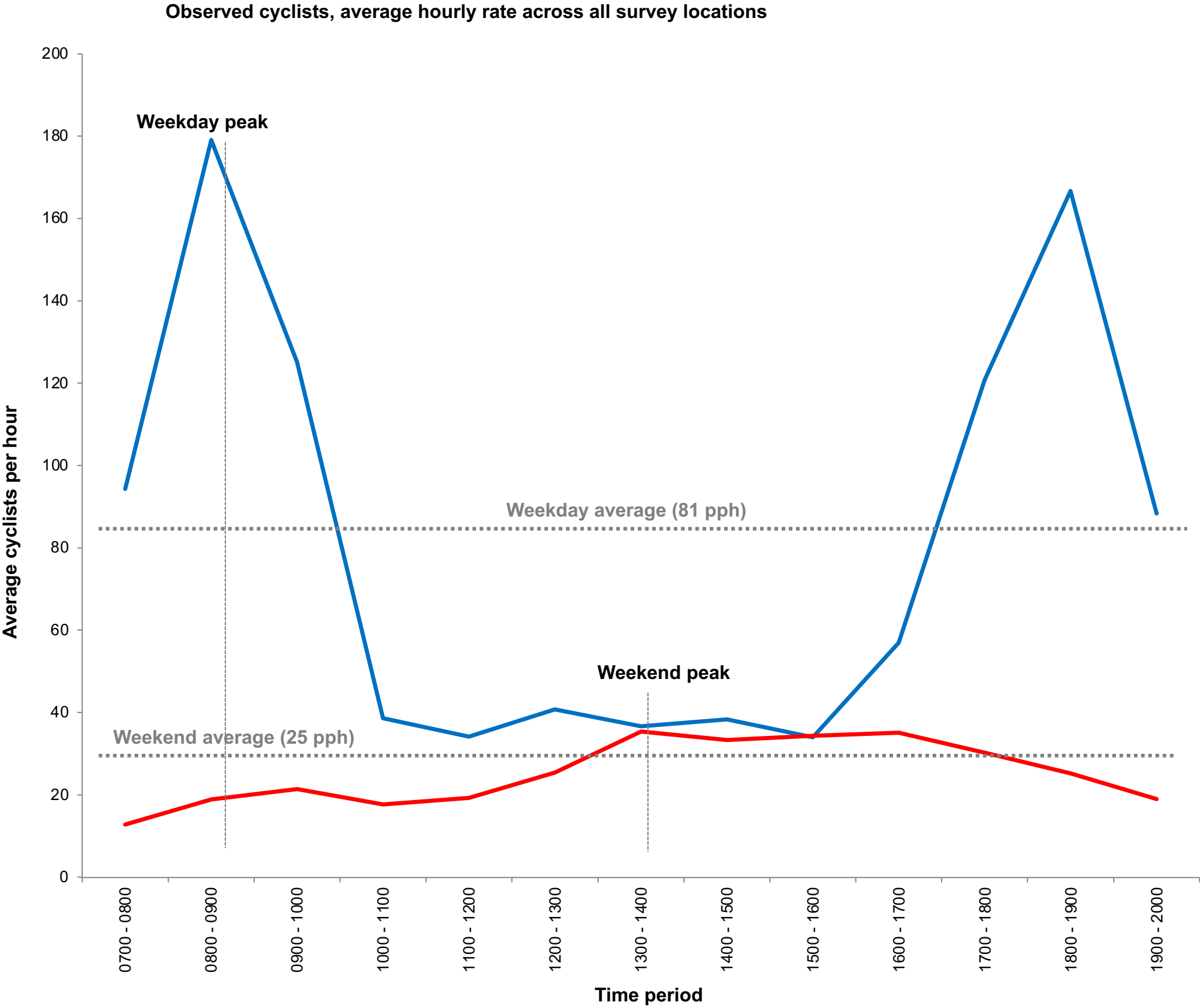
## Pedestrian movement patterns



Pedestrian movement patterns **London streets comparison** All day average movement



# Cyclist movement patterns Distribution across the day Weekday and weekend

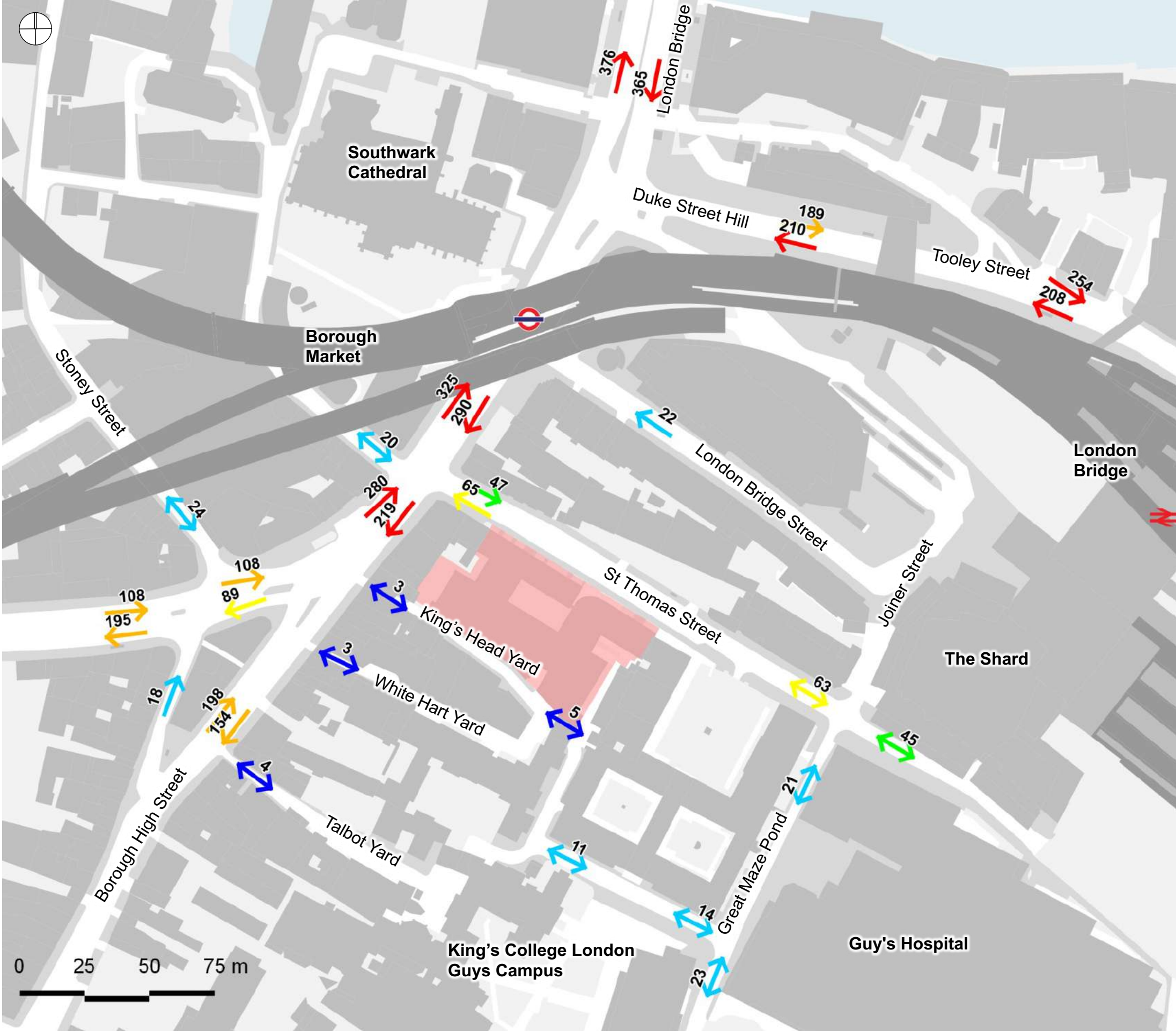


Cycling activity largely follows a commuting pattern. During the weekday, the observed cyclist movement in the area shows a “U” shape pattern with the highest peak in the morning between 08:00 and 09:00.

Weekend cyclist movement levels were markedly low.

Cyclist movement patterns **Weekday** All day average

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Cyclists use the primary route network, along London Bridge, Borough High Street and Tooley Street.

**Cyclist movement**  
Cyclists per hour

- ↔ 200 and above
- ↔ 100 – 200
- ↔ 50 – 100
- ↔ 25 – 50
- ↔ 10 – 25
- ↔ 0 – 10

Project site

# Appendix 2

Glossary and Methodology Urban Form and Function

# Glossary

**Land use patterns and urban character**

The location and distribution of ground floor land uses and building entrances (or frontages). These elements affect the character of the public realm, the perceived pedestrian comfort, safety, attractiveness and conviviality, and therefore the movement potential of a street.

**Transport attraction**

The degree to which public and private transport systems impact an area. These is related to ease of pedestrian access to/from key transport nodes in the area as well as passenger volume.

**Multiple regression analysis**

Regression is a statistical correlation analysis that is used to fit models to data. A multiple regression is used to predict the value of a single dependent variable based on the value of two or more independent variables.

**Multivariable pedestrian movement model**

Statistical correlation analysis (multiple regression, see above) between the observed pedestrian movement and two or more independent variables, for example spatial accessibility and land use patterns. The model explains the relationship between urban form and pedestrian movement patterns. In this model, urban form is defined by three components: spatial layout attraction, land use attraction and transport attraction.

**R-Square (R<sup>2</sup>) value**

*R*<sup>2</sup> is the percentage of the variability in the outcome explained by the model.

**t-Ratio**

The values of t-ratio show the significance of each variable in the model.

# Methodology Urban Form and Function

## Urban Form

### 1. Spatial accessibility analysis

Spatial accessibility analysis measures key properties of the urban network which can then be linked to the movement potential of an area.

Both the urban grain and structure of a place contribute to its accessibility, which can be defined as the ability and degree of ease that people have when moving around in their environment.

Space Syntax analysis methods take into account standard route choice strategies and preferences of pedestrians and cyclists, and are able to robustly simulate pedestrian journeys.

The spatial accessibility model is based on a unique representation of publicly accessible streets and paths.

The resulting pattern of intersecting lines is then analysed using Space Syntax software. The software transforms the street pattern into a network graph by disaggregating the line network at the intersections to form a segment network. Each line is considered as a node and the links between nodes become intersections.

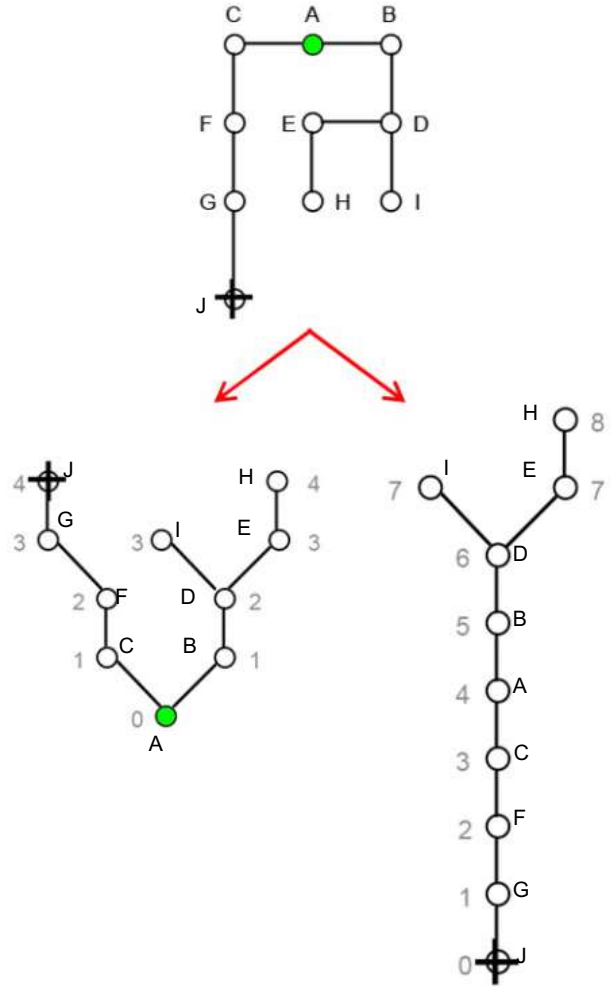
The cost between two line segments – how easy it is to move between them – is measured using the 'shortest' path between the pair which is then weighted by three key cost relations: metric (least length), topological (fewest turns) and angular (least angle change).

Spatial accessibility values can then be calculated from the spatial accessibility map by first selecting a line, then calculating how many other lines must be used wholly or in part to reach every other line in the whole spatial accessibility map (Figure 1). When this calculation is made for each line in the map it turns out that some lines require fewer changes of direction than others in order to cover the rest of the spatial accessibility map.

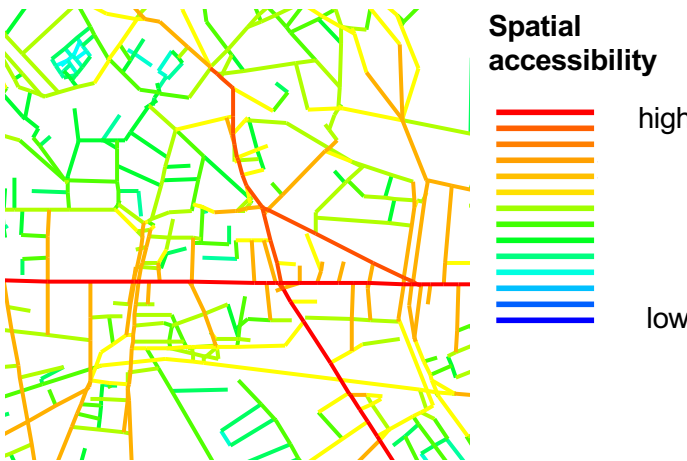
The 'spatial accessibility value' assigned to each line reflects the complexity of routes from that line to all the others within the system. This complexity influences movement in two ways.

First, lines with higher values are more easily accessible than segregated ones because they can be reached by simpler routes from other lines – thus they receive a high degree of 'to' movement.

Second, more accessible lines are more likely to be selected as part of a route between other pairs of lines: that is, they will attract more 'through' movement.



**Figure 1** Each segment in the spatial model is translated into a node. Above are graphs of the same layout seen from two different segment lines (nodes).



**Figure 2** Example of a processed Space Syntax model. Accessibility values assigned to each segment and represented by their colour.

# Methodology Urban Form and Function

## Urban Form (continued)

### 1. Spatial accessibility analysis (continued)

#### Key feature 1: analysis of 'angular movement'

Key to the success of this approach is the discovery that movement in buildings and cities often follows a 'least angle' path between origins and destinations. In other words, many people minimise the angular deviation from their origin to their destination, even if this means they sometimes take a slightly longer route.

#### Key feature 2: evaluation of multi-scale activity

A second key aspect is the multi-scale analysis of spatial layouts is that it allows short and long-distance journeys to be simultaneously evaluated. This analysis shows how different parts of the same network can be used both for short and long-distance journeys. Land use analysis shows that these multi-scale places are typically successful commercial locations, thus demonstrating the importance of careful spatial layout design in creating multi-scale opportunities for shops to trade to more than one scale of movement.

#### Key feature 3: integration of spatial layout, land use & transport factors

The simultaneous analysis of spatial layout, land use and transport factors (distance and volume of passengers) is a third key factor in the uniqueness and success of Space Syntax models. By demonstrating the fundamental role of space in determining land use potentials, then showing how the specific location of individual land use attractors and transport attractors exploits these potentials, Space Syntax models make it possible to integrate the three essential aspects of planning and design: spatial, land use and transport (please see diagram on p. 7).

### 2. Land use patterns and urban character survey

A ground floor land use and entrances survey was conducted in the immediate context of the site (September 2016). The survey was based on a combination of site visits, photographic surveys and desktop data analysis.

### 3. Walking distances from the station and distance decay

The street network was used to measure walking distances from the station. Metric distance was calculated and converted into walking time, where 400m are covered in 5 minutes (based on a conservative walking speed of 1.33m/s).

The distance decay (Dd) from the station was calculated for each segment of the spatial network with the following formula:  $Dd = \text{entry\&exit volume} / \text{distance from station}$ .

## Urban Function

### 4. Pedestrian movement survey

A camera-based pedestrian and cyclist movement survey was carried out at 49 key locations around the site on Thursday 15<sup>th</sup> September and Saturday 17<sup>th</sup> September 2016 between 07:00 and 20:00. Bi-directional, 10minute pedestrian counts were sampled at each location at half hour intervals and the results transformed into average hourly rates, in accordance to TfL's Pedestrian Comfort Level Guidance<sup>1</sup>.

London Bridge Station was under redevelopment during the surveys and the new southern exit was not open.

### 5. Pedestrian route survey

Individual route choices of passengers exiting the station on the eastern pavement of Borough High Street were recorded on Thursday 20<sup>th</sup> October 2016 from 08:00 to 10:00 and from 12:00 to 14:00.

#### Note

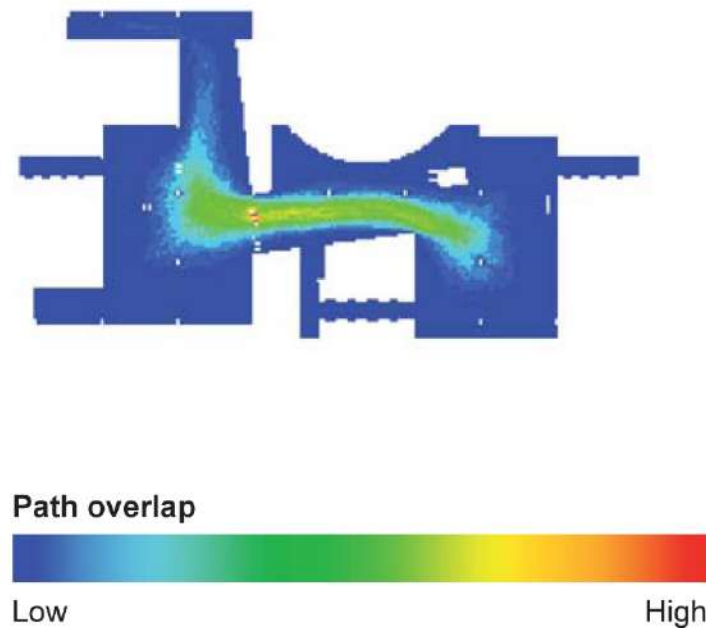
<sup>1</sup> Transport for London (TfL), 2010. Pedestrian Comfort Level Guidance, London

# Appendix 3

Agent analysis methodology

# Agent analysis methodology

1 Standard agent simulation



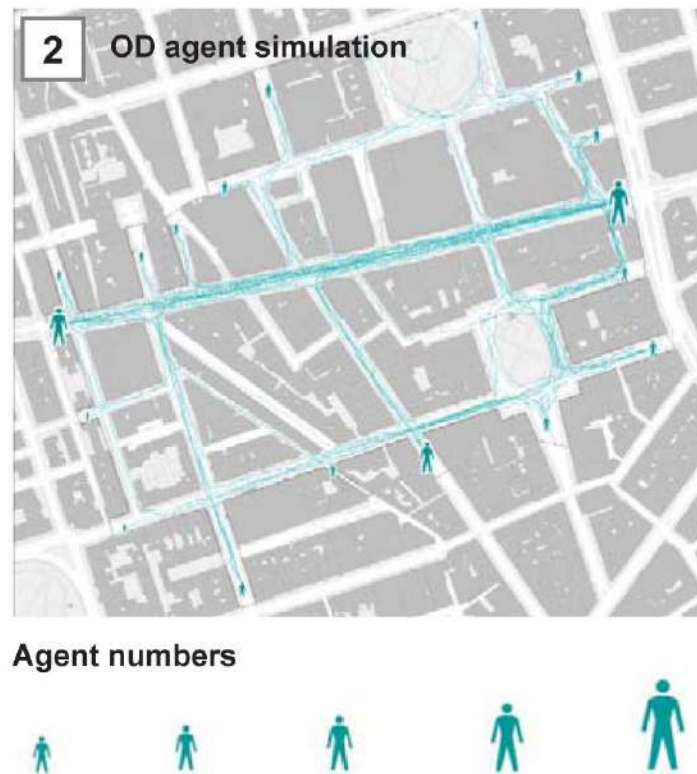
## Standard agent simulation

Our standard agent simulation model demonstrates likely movement patterns in a defined space, whether in a building or in the city, without impacts of any particular constraints or attractors. The model is mainly used to highlight the potential of the space layout of the space in subject.

The agents are programmed to move on the basis of the following rules.

- The agents navigate through the space on the basis of what they can see at each point in space.
- The agents decide the direction of their next steps at every several steps.
- The visibility is limited to 170 degree to the front, emulating ordinal human behaviour.

2 OD agent simulation



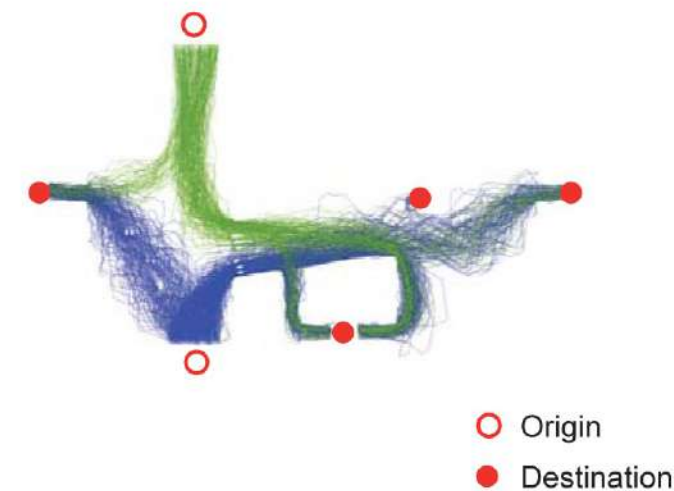
## Origins and destinations programmed agent simulation [OD agent]

There is another type of agent simulation model, in which agents can be programmed to move between certain points in a defined space. The model can be used to identify preferred routes under certain scenarios.

In addition to the rules for the standard agent simulation, there are additional rules for the OD agents as follows.

- The agents are assigned to the origins and the destinations according to the ratio programmed prior to the analysis.
- Once the agents are in the system, they choose the route that is easiest to navigate through as long as that route takes them nearer to their destination.

3 Agent paths (OD agent simulation)



## Agent paths

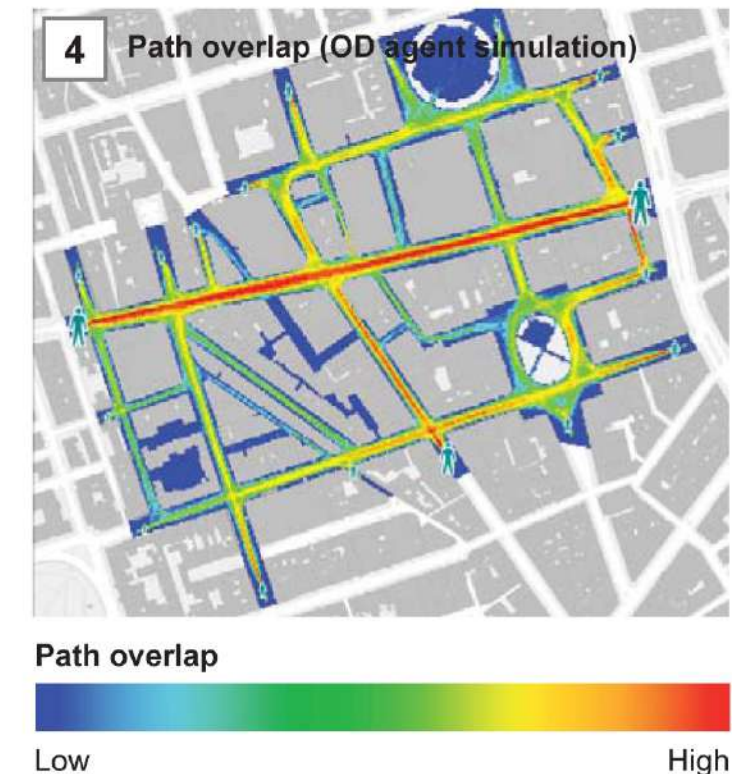
The results of either type of agent simulation can be visualised in two different ways: agent paths (image 3) and path overlap (image 4).

The lines in the image above represents paths of individual agents entering from the points that are indicated by dots. This type of presentation is useful to analyse different routes taken by individual agents.

As seen above, subsets of paths can be isolated to identify issues, which are specific to journeys involving a certain origin or destination or certain routes.

Level of Service can also be calculated using the agent paths data to evaluate the level of safety and comfort at selected points.

4 Path overlap (OD agent simulation)



## Path overlap

The image above demonstrates an overlap of agent paths.

The analysis represents the density of movement according to the number of times an agent 'steps' on a specific point. The warmer colours represent higher density of path overlap.

The path overlap can illustrate the density of agent movement clearly. It represents a hierarchy of the space from users' perspectives.

# Appendix 4

TfL Pedestrian Comfort Level on Footways

# TfL Pedestrian Comfort Level on Footways **Ranges**

Comfortable

## PCL A

## COMFORTABLE FOR ALL AREAS



A+ < 3ppmm  
< 3% Restricted Movement



A 3 to 5 ppmm  
13% Restricted Movement



A- 6 to 8 ppmm  
22% Restricted Movement

The pedestrian environment is very comfortable at PCL A+ to A- with plenty of space for people to walk at the speed and the route that they choose.

## PCL B

## B+ RECOMMENDED MINIMUM FOR ALL AREAS



B+ 9 to 11ppmm  
31% Restricted Movement



B 12 to 14ppmm  
41% Restricted Movement



B- 15 to 17 ppmm  
50% Restricted Movement

**PCL B+ is the recommended level of comfort for all area types.** This level provides enough space for normal walking speed and some choice in routes taken.  
At PCL B and PCL B- normal walking speed is still possible but conflicts are becoming more frequent and, in retail areas, people start to consider avoiding the area.

# TfL Pedestrian Comfort Level on Footways Ranges

TfL Transport for London, 2010. Pedestrian Comfort Guidance for London, p.13

Uncomfortable

## PCL C

## INCREASINGLY UNCOMFORTABLE



C+ 18 to 20ppmm  
59% Restricted Movement



C 21 to 23 ppmm  
69% Restricted Movement



C- 24 to 26 ppmm  
78% Restricted Movement

The pedestrian environment is becoming increasingly uncomfortable, with the majority of people experiencing conflict or closeness with other pedestrians and bi-directional movement becoming difficult.

## PCL D or E

## VERY UNCOMFORTABLE



D 27 to 35ppmm  
100% Restricted Movement



E >35 ppmm  
100% Restricted Movement

At PCL D walking speeds are restricted and reduced and there are difficulties in bypassing slower pedestrians or moving in reverse flows.

At PCL E people have very little personal space and speed and movement is very restricted. Extreme difficulties are experienced if moving in reverse flows.

# Appendix 5

Detailed data:

Spatial layout attraction-Future baseline scenario

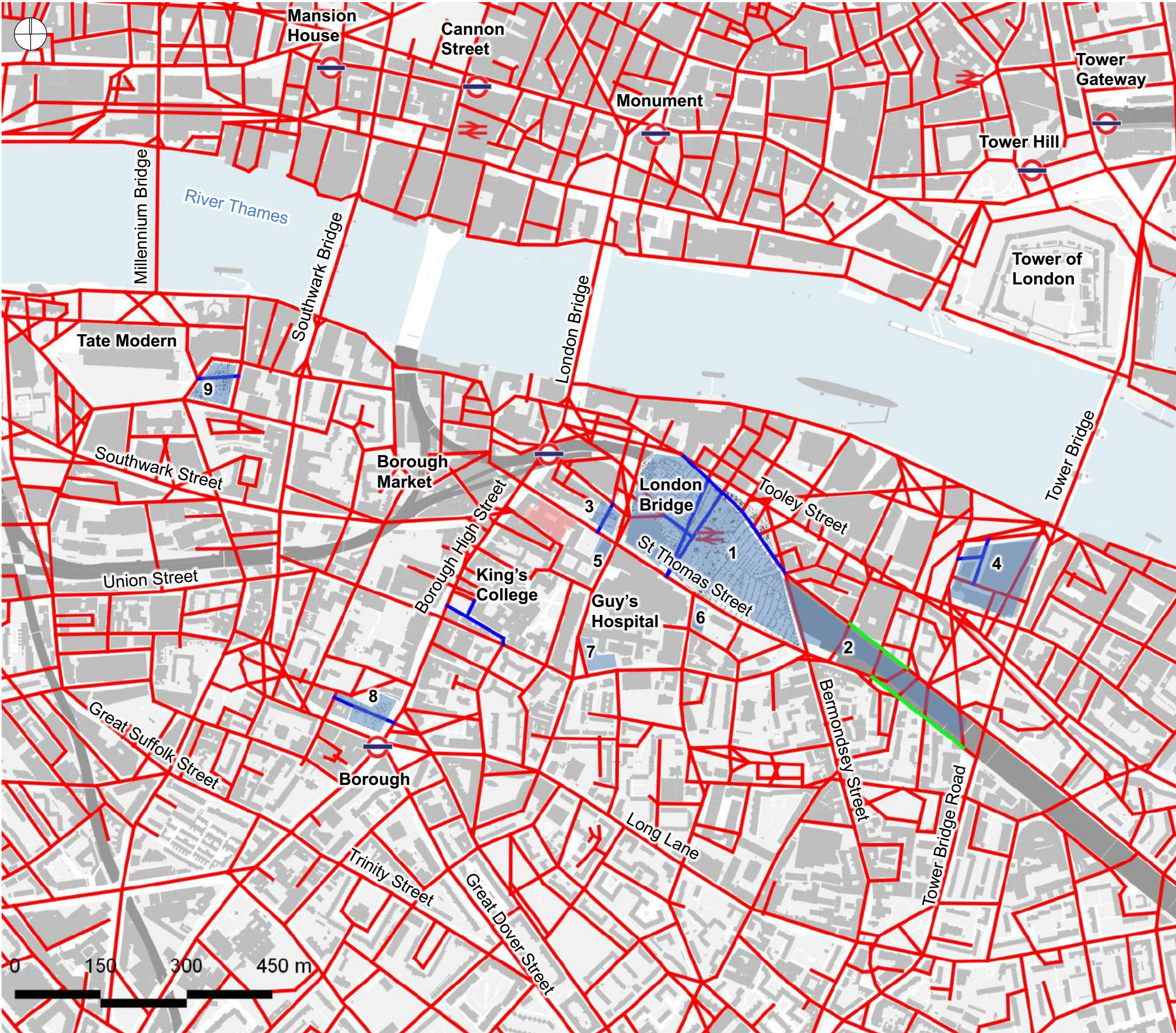
Transport attraction - Existing and Future transport growth

Land use attraction - NCC trip generation and mode split

Spatial layout attraction **Future baseline scenario** Spatial layout changes

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NACH 1200



The future baseline model will include a selected number of planned developments which propose changes to the street network connectivity. These include:

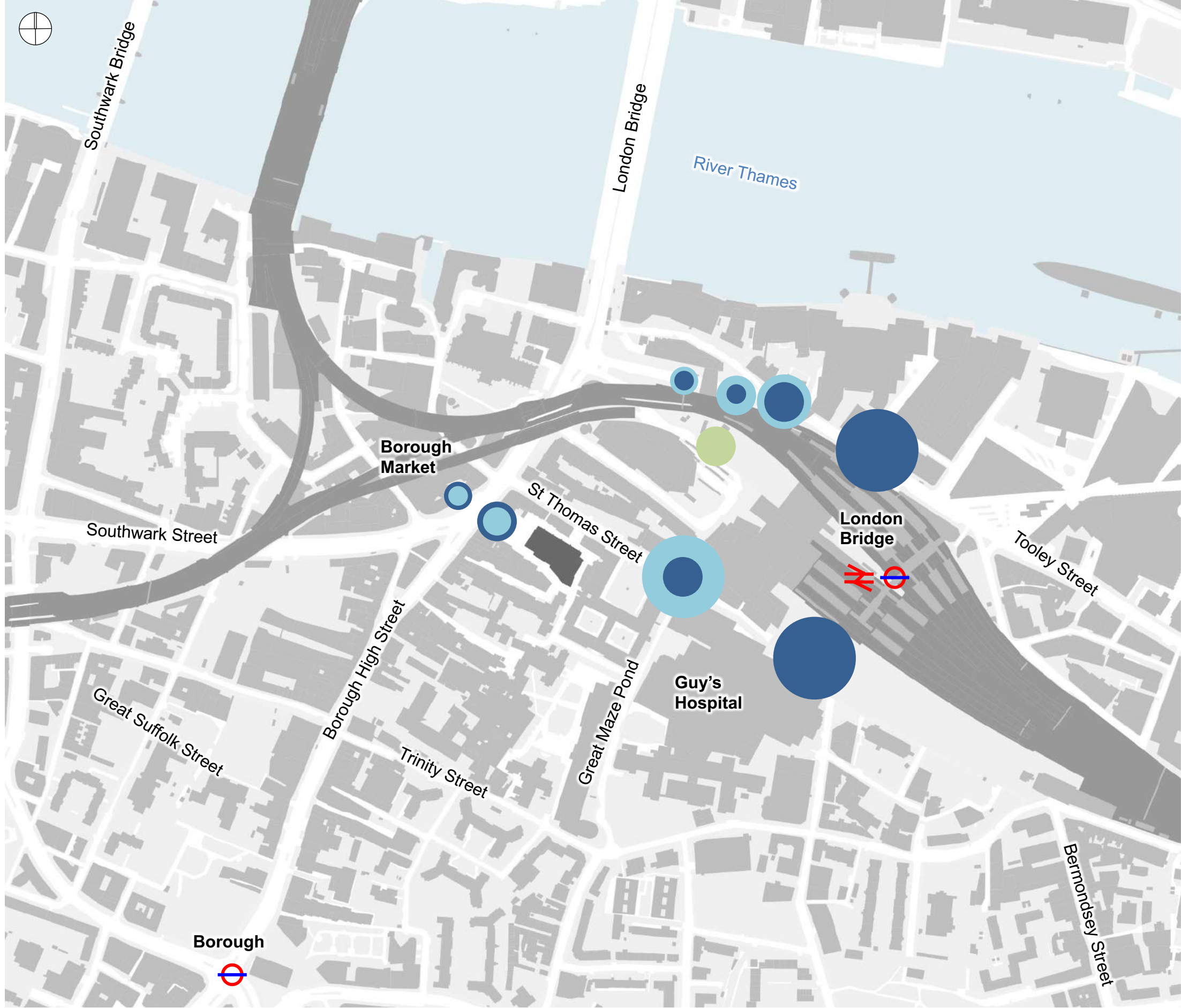
- 1. London Bridge
- 2. Low Line
- 3. Fielden House apartments
- 4. 1 Tower Bridge apartments
- 5. KCL Science Gallery
- 6. The Quill apartments
- 7. Guy's Cancer Centre
- 8. Brandon House
- 9. 185 Park Street

Other future developments can be added upon discussion and agreement with the team.

- Existing spatial network
- Future baseline spatial network
- Long term scenario spatial network
- Underground
- Railway station
- Project site

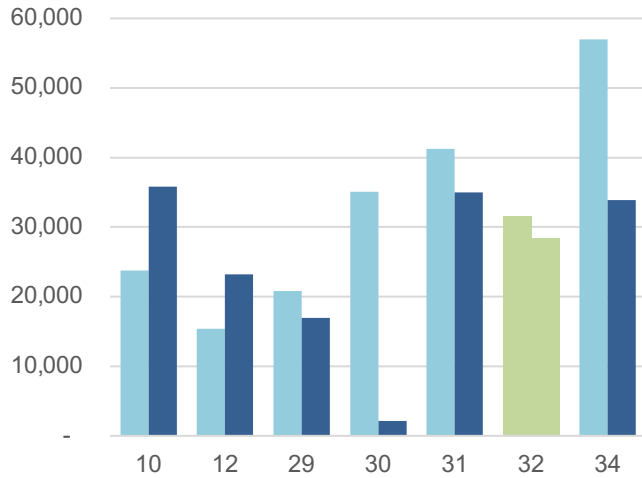
# Transport attraction Existing and Future transport growth Comparison

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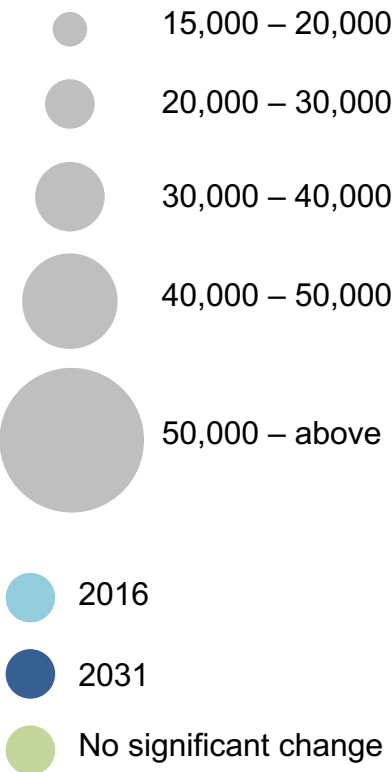


There is an increase of movement at the exits along Borough High Street, in close proximity to the site. However, the opening of two new exits of London Bridge station to the east reduces movement at the other exits.

Predicted numbers based on TfL's commuter forecast for 2031. TfL's prediction based on RODS 2016 and Railplan 2031 combined Standard Forecasting approach.



Pedestrian daily footfall difference in existing station exits



# Transport attraction Network Rail London Bridge Station application

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Network Rail Observed movement 2010<sup>1</sup>

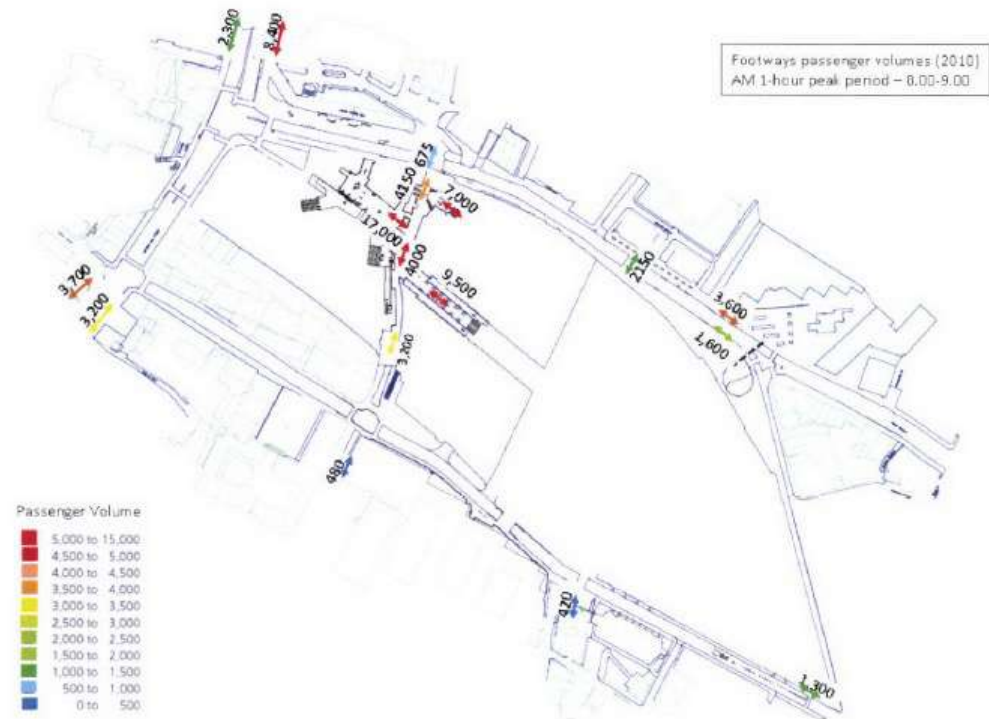


Figure 13: Peak hour magnitude of flows - Street level (8:00-9:00)

The Space Syntax forecast has used the observed movement data from the baseline (2016) as well as the NR data on the London Bridge entrance distribution. The passenger forecasts in the NR submission were used to inform the increase in transport capacity for the 2031 scenario, however, the NR approach to the distribution of movement into the context is based on a number of assumptions which now appear to have been superseded, particularly in terms of how people are distributed into the street network as shown in the Space Syntax movement survey.

Space Syntax AM Peak baseline movement data 2016<sup>2</sup>



As shown in the diagram from the existing (Space Syntax 2016 baseline), movement is higher towards the eastern sections of St Thomas Street (east of Great Maze Pond/London Bridge Street, towards Bermondsey) with less movement at the western section of St Thomas St.

This condition is likely to grow as a result of opening of the new station concourse. This shift of movement to the eastern entrance along St Thomas Street is already assumed in the NR model. Recent site visits seem to confirm this, at least from a qualitative point of view.

The distribution of movement between the north and south pavements of St Thomas is also a result of using the existing distribution.

<sup>1</sup>Appendix 10 Pedestrian modelling of local streetscape and crossings, Network Rail Infrastructure Investment Thameslink Programme, June 2011

<sup>2</sup> Space Syntax survey data, September 2016

# Transport attraction Network Rail London Bridge Station application

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NR Forecast 2031<sup>1</sup>

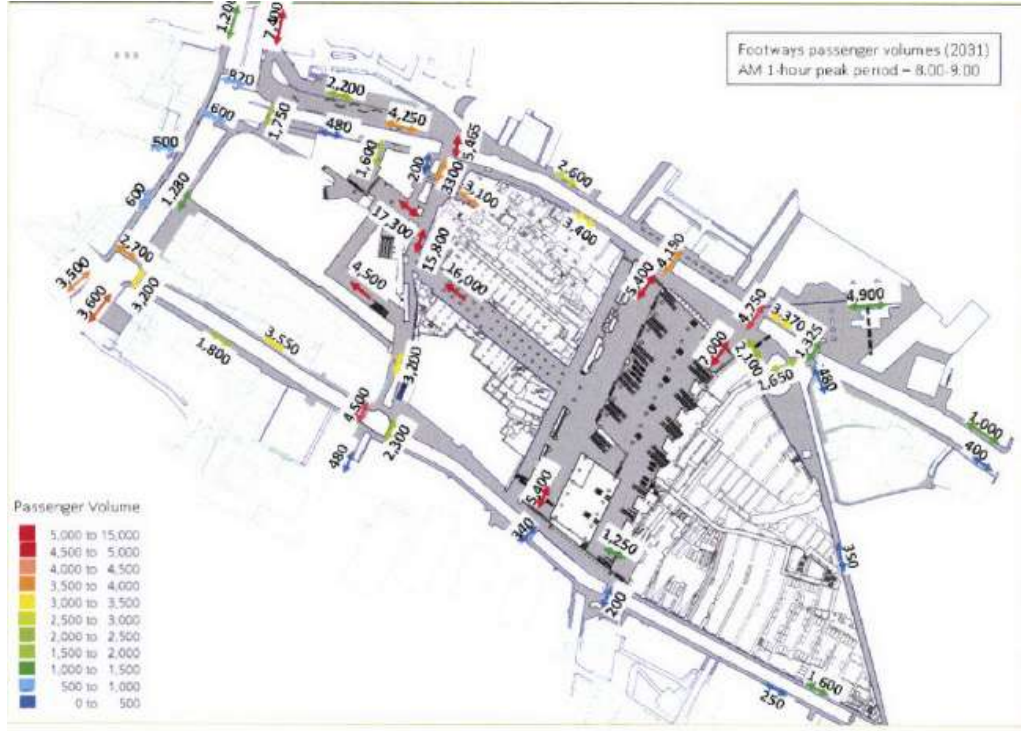


Figure 17: Peak hour magnitude of flows

Space Syntax AM Peak forecast



<sup>1</sup>Appendix 10 Pedestrian modelling of local streetscape and crossings, Network Rail Infrastructure Investment Thameslink Programme, June 2011

# Land use attraction    **New City Court trip generation and modal split**

Mode	AM Peak			PM Peak			Split	All day average		
	In	Out	Total	In	Out	Total	%	In	Out	Total
Walking to/from Underground	350	21	371	35	318	352	31%	267	16	283
Walking to/from Underground (having used train as main mode)	156	9	166	16	142	157	14%	120	7	127
Walking to/from London Bridge Station*	445	27	471	44	403	448	39%	339	20	359
Walking to from bus stops	127	8	134	13	115	128	11%	97	6	102
Walking to from Other (River Taxi)	4	0	4	0	3	4	0%	3	0	3
Solely on Foot	63	4	67	6	58	64	6%	48	3	51
Total	1145	68	1213	114	1038	1152	100%	874	52	926

**<sup>1</sup> Note**  
Trip generation and modal split provided by TPP.