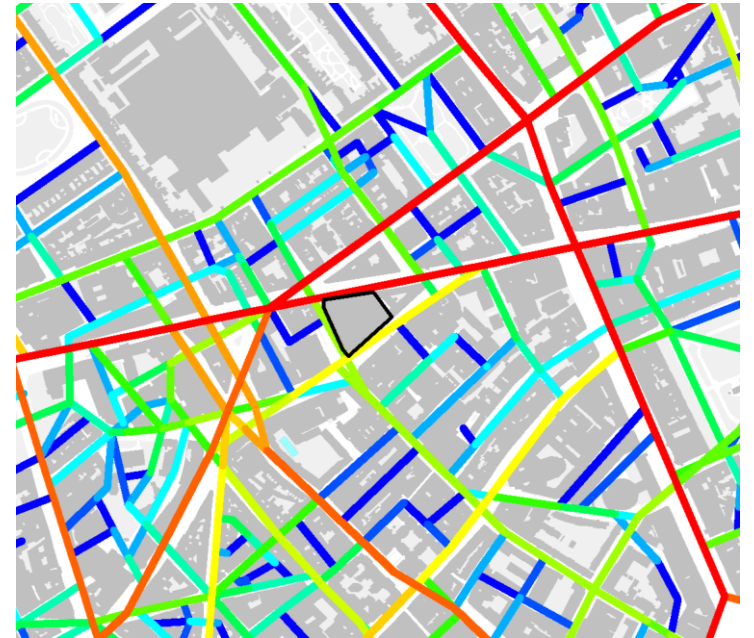


Project LT Holborn
New Oxford Street Limited



Pedestrian Impact Assessment

December 2014

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Executive summary

Introduction

This report is a revised version of the one submitted in May 2014. Tables in page 5 and 6 now show the 2020 future demand scenario rather than the existing levels of movement.

In order to ensure the proposed redevelopment of the New Oxford Street Royal Mail Sorting Office offers adequate footway capacity to accommodate existing and future levels of pedestrian movement, New Oxford Street Limited has commissioned this evaluation of footway Level of Service (LOS). LOS refers to the capacity of footways to accommodate movement flows.

The **Level of Service** of the perimeter pavement of the project site has been assessed for two design options. Option 1, LT Proposal with existing road layout and Option B, LT Proposal with increased footway width and therefore a reduction of the carriageway.

The footway capacity of each scenario has been tested for existing movement and for a 2020 future demand scenario.

Methodology

Level of Service assessment

The level of service assessment is based on Transport for London's Pedestrian Comfort Levels (PCL) assessment methodology (Pedestrian Comfort Level Guidance, Transport for London, 2010).

The narrowest point for each pavement has been used to evaluate the level of service for the peak and the daily average pedestrian movement flows.

The resulting Pedestrian Comfort Level is then calculated as pedestrian density at each footway width, that is people per minute per metre (pmm). The resulting scores are ranked into six ranges from comfortable (A) to very uncomfortable (E).

Pedestrian demand scenarios

The LOS assessment is based on existing and forecast pedestrian demand. Existing pedestrian movement is based on a camera based survey of pedestrian activity along the pavements outside and immediately adjacent to the project site.

The results have been summarised as "pedestrians per hour" figures for average daily flow, distribution throughout the day and peak time periods for weekday data (weekend data has not been used as it is lower than weekday movement).

The future **Pedestrian Demand Model** of the daily peak has been estimated by constructing a pedestrian forecast model that incorporates the following variables: changes to the spatial layout, introduction of Crossrail, and changes to land use patterns resulting from provision of active frontages and building entrances, including the expected occupation of project LT.

Conclusions & Key Findings

The assessment shows that all pavements in the perimeter of the site are currently within A+ or A, well within TfL's recommended ranges for office and retail areas (C+),

The assessment also shows that the pavements can accommodate the projected growth in pedestrian movement in the area. All assessed locations are within level of service B-.

All pavements are within PCL B-, which suggests there will be enough capacity to accommodate additional growth in pedestrian movement.

However, it is important to note that rather than pavement widths, the underlying constraint to the pedestrian movement is the traffic dominated design of public realm. New Oxford Street, Bloomsbury Way and High Holborn are a barrier to pedestrian movement.

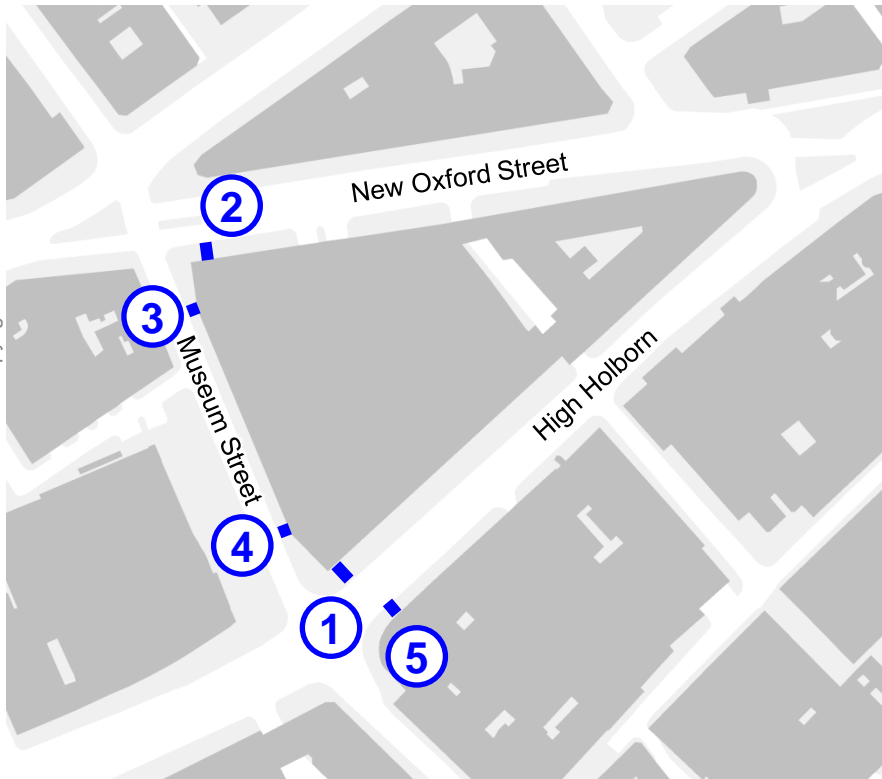
We recommend that, in line with the Princess Circus proposals contained in the West End Plan, proposals for Museum Street, High Holborn and New Oxford Street must provide a pedestrian led environment that facilitates and encourages pedestrian movement.

Pedestrian Comfort Level Existing

Pedestrian Comfort Level

Location	Street width (m)		Weekday											
	Total width	Effective width	Movement (pph)				PCL (ppmm)				PCL			
			Average	AM Peak (08:00-10:00)	PM Peak (16:00-19:00)	Peak (Individual gate)	Average	AM Peak (08:00-10:00)	PM Peak (16:00-19:00)	Peak (Individual gate)	Average	AM Peak (08:00-10:00)	PM Peak (16:00-19:00)	Peak (Individual gate)
1	5.20	2.60	160	140	260	260	1	1	2	2	A+	A+	A+	A+
2	4.30	3.90	750	690	1,190	1,270	3	3	5	5	A	A	A	A
3	2.50	2.10	170	220	260	270	1	2	2	2	A+	A+	A+	A+
4	2.00	1.60	190	250	240	270	2	3	2	3	A+	A	A+	A
5	3.00	2.20	1,000	870	1,620	1,670	8	7	12	13	A-	A-	B	B

Level of Service assessment locations



Legend Pedestrian Comfort Levels



Pedestrian Comfort Level is within the recommended minimum at all locations for both daily average and peak flows.

A 20 cm buffer has been deducted from the clear total footway width from kerb edges, guard railings or building edges/walls for all locations.

In addition to this, a 2.20m and 0.4m is deducted from the clear footway width for locations 1 and 5 respectively to account for the cycle hire docking station and bollards.

Project site

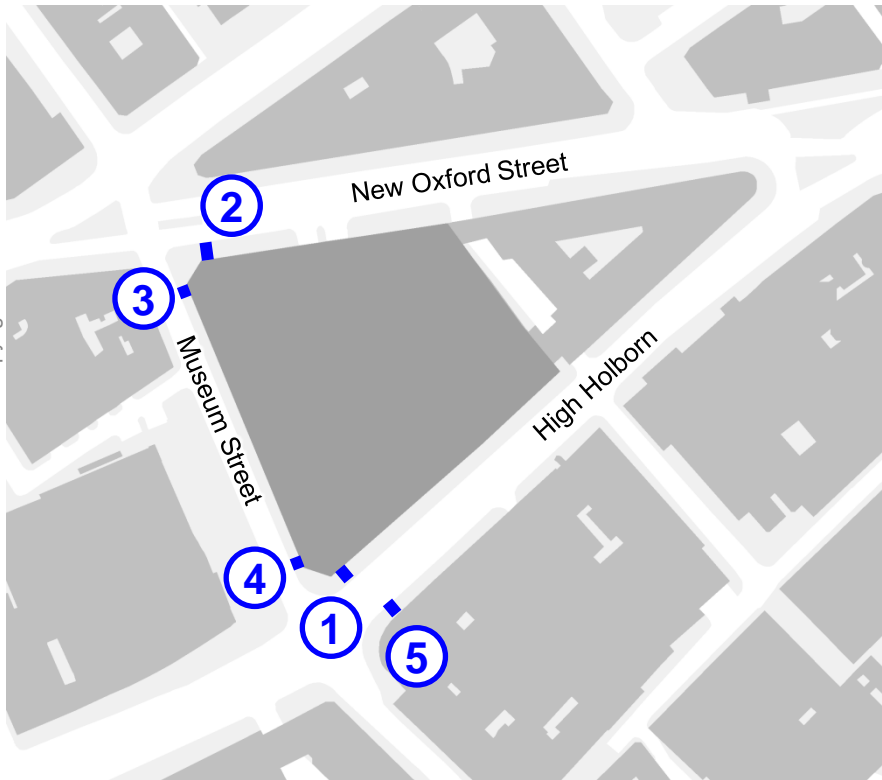
Pedestrian Comfort Level 2020 Baseline Option 1 Project LT with existing footway conditions

Pedestrian Comfort Level

Location	Street width (m)		PM peak (17:00 - 19:00)		
	Total width	Effective width	Movement (pph)	PCL (ppmm)	PCL
1	2.80	2.40	700	5	A
2	4.30	3.90	1,700	7	A-
3	2.50	2.10	1,000	8	A-
4	2.00	1.60	1,000	10	B+
5	3.00	2.20	2,200	17	B-

Level of Service assessment locations

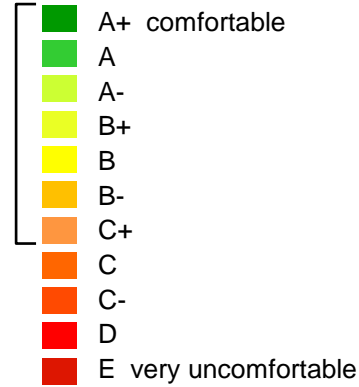
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Project site

Legend Pedestrian Comfort Levels

TfL recommended minimum for Office and Retail areas



Pedestrian Comfort Level is within the recommended minimum at all locations for the peak flows.

A 20 cm buffer is deducted from the clear footway width from kerb edges, guard railings or building edges/walls for all locations.

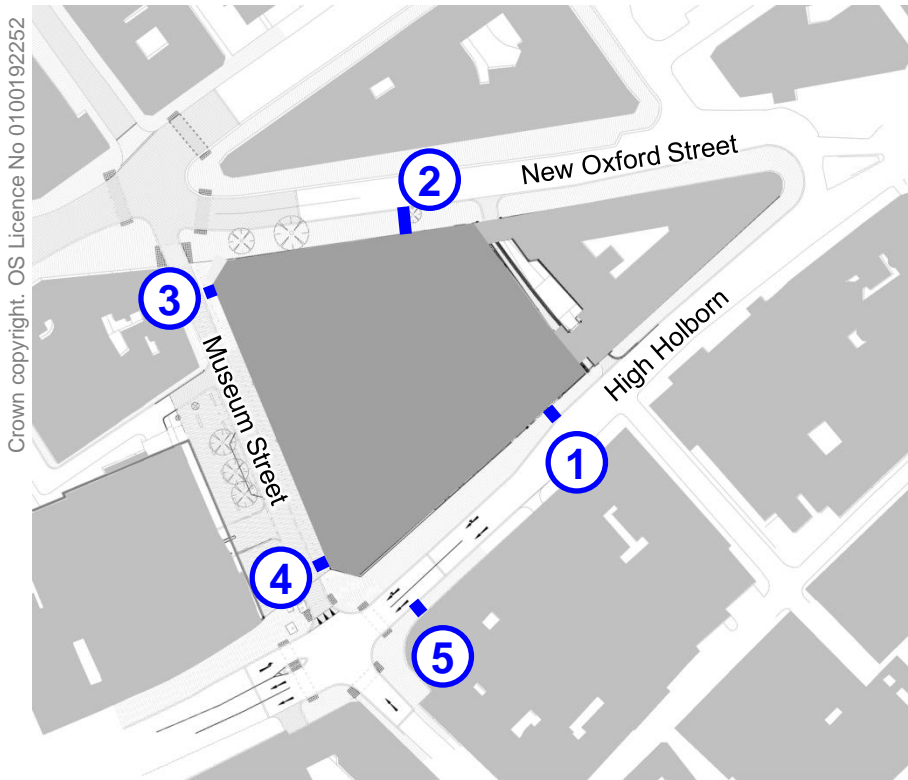
It is assumed that the pavement at the perimeter of the project site will remain clear of obstructions.

Pedestrian Comfort Level 2020 Baseline Option 2 Project LT with footway widening scheme

Pedestrian Comfort Level

Location	Street width (m)		PM peak (17:00 - 19:00)		
	Total width	Effective width	Movement (pph)	PCL (ppmm)	PCL
1	3.10	2.70	700	4	A
2	5.70	5.30	1,700	5	A
3	3.50	3.10	1,000	5	A
4	3.40	3.00	1,000	6	A-
5	3.00	2.20	2,200	17	B-

Level of Service assessment locations

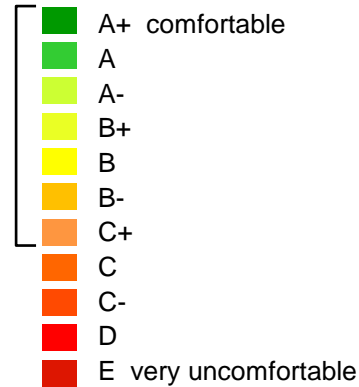


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Project site

Legend Pedestrian Comfort Levels

TfL recommended minimum for Office and Retail areas

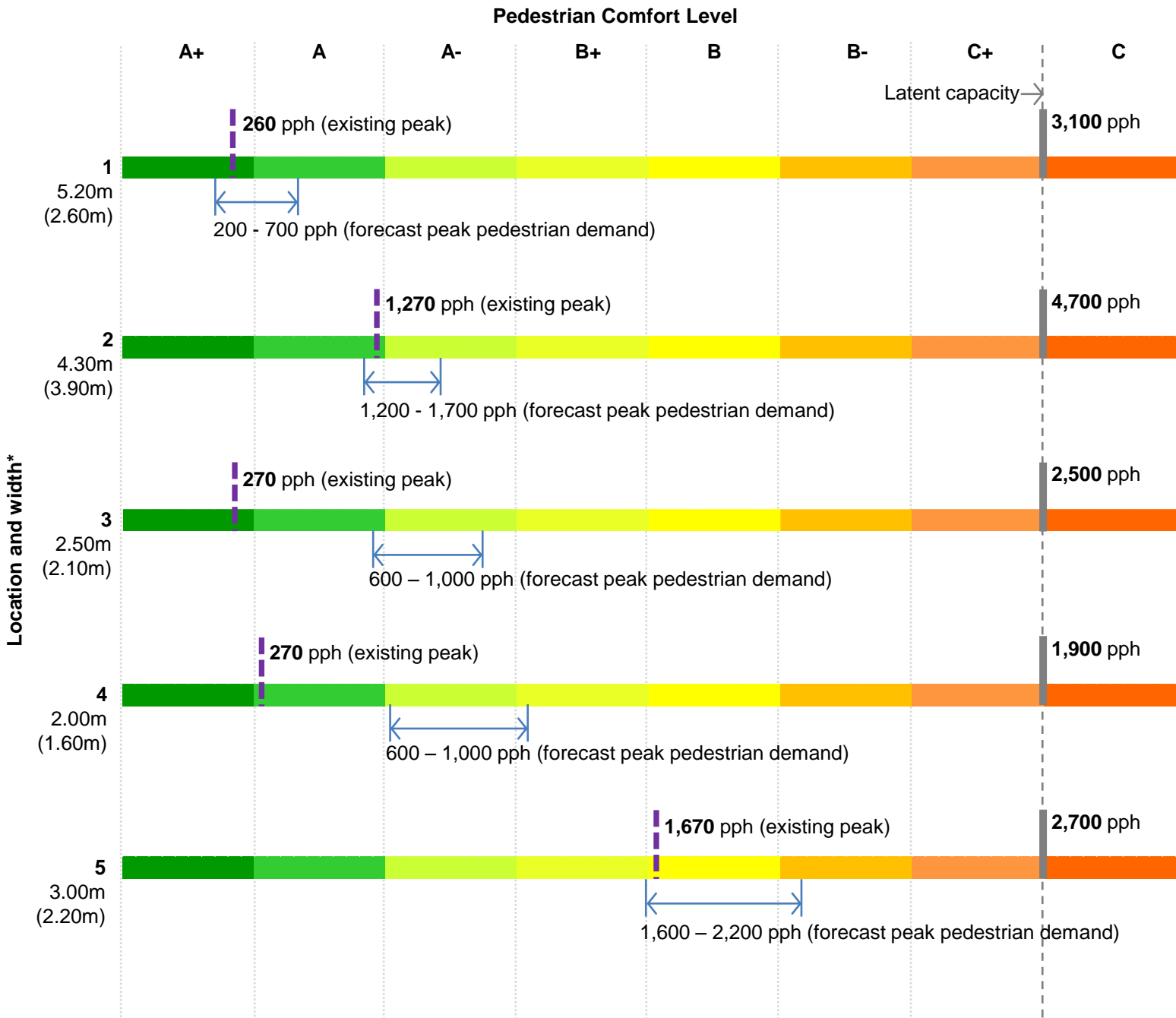


Pedestrian Comfort Level is within the recommended minimum at all locations for the peak flows.

A 20 cm buffer is deducted from the clear footway width from kerb edges, guard railings or building edges/walls for all locations.

It is assumed that the pavement at the perimeter of the project site will remain clear of obstructions.

Pedestrian Comfort Level Existing



The chart on the left Pedestrian Comfort Level bars and flow capacity for each pavement width in the study.

Each bar shows existing peak movement, forecast peak pedestrian movement and maximum pedestrian flow within TfL's recommended threshold for Retail and Office areas.

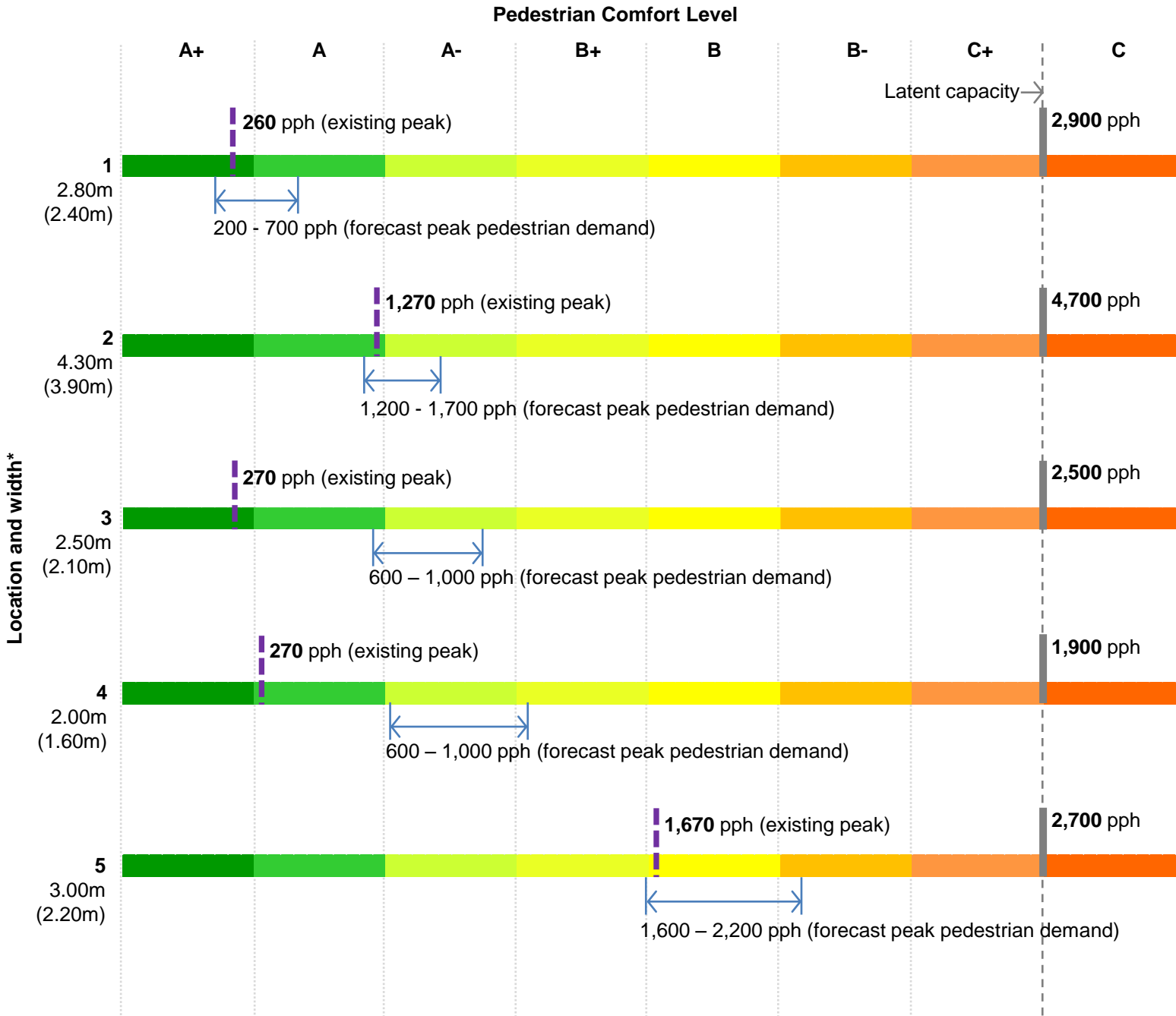
The results show that all pavements around the project site have enough capacity to accommodate an increase in pedestrian movement.

* Total footway width, clear footway width shown in brackets.

- Existing footway demand (peak flow for individual gate)
- Latent capacity to comply with TfL's acceptable threshold PCL

- Pedestrian Comfort Levels**
- A+ comfortable
 - A
 - A- B+ B B- C+ C C- D E very uncomfortable
- TfL recommended minimum for Office and Retail areas

Pedestrian Comfort Level **Option 1** Project LT with existing footway conditions



The chart on the left Pedestrian Comfort Level bars and flow capacity for each pavement width in the study.

Each bar shows existing peak movement, forecast peak pedestrian movement and maximum pedestrian flow within TfL's recommended threshold for Retail and Office areas.

The results show that all pavements around the project site have enough capacity to accommodate an increase in pedestrian movement.

* Total footway width, clear footway width shown in brackets.

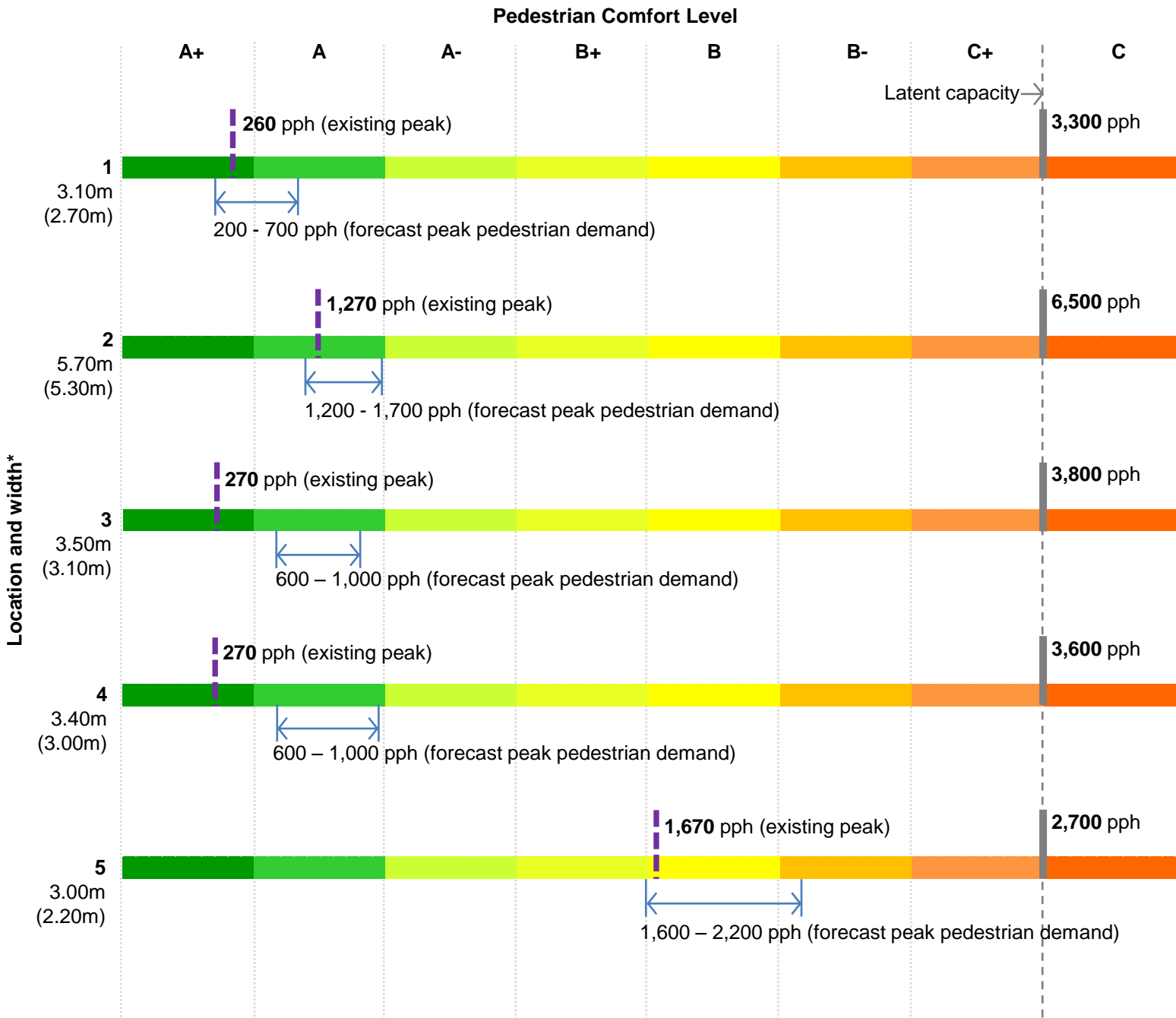
- Existing footway demand (peak flow for individual gate)
- Latent capacity to comply with TfL's acceptable threshold PCL

Pedestrian Comfort Levels

- A+ comfortable
- A
- A-
- B+
- B
- B-
- C+
- C
- C-
- D
- E very uncomfortable

TfL recommended minimum for Office and Retail areas

Pedestrian Comfort Level **Option 2** Project LT with footway widening scheme



The chart on the left Pedestrian Comfort Level bars and flow capacity for each pavement width in the study.

The increase in footway width provides additional capacity and therefore increases the comfort levels around the site's perimeter for the existing and forecast pedestrian demand.

* Total footway width, clear footway width shown in brackets.

Pedestrian Demand Pedestrian Movement Model

The Pedestrian Movement Model explains existing movement patterns in the area by describing the respective influence on movement from the different urban components.

The three urban components used in the model were: Spatial layout attraction, Land use attraction and Transport attraction.

The three types of attraction are combined to create a final Pedestrian Movement Model that explains the actual patterns of pedestrian movement to a statistically significant and robust degree. This then allows the design proposals to be evaluated using the model to forecast their impact on future pedestrian flows.

1. Spatial layout attraction

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.

Key design factor

Lines of sight and movement, which create a "layout geometry" for which properties of spatial accessibility and intelligibility can be measured through spatial layout analysis.



1. Spatial layout attraction

2. Land use attraction

The strength of attraction of movement-sensitive land uses, especially retail.

Key design factors

Land use location.

Retail and catering attraction.



2. Land use attraction

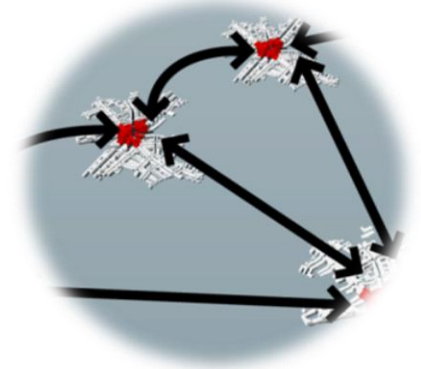
3. Transport attraction

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

Key design factors

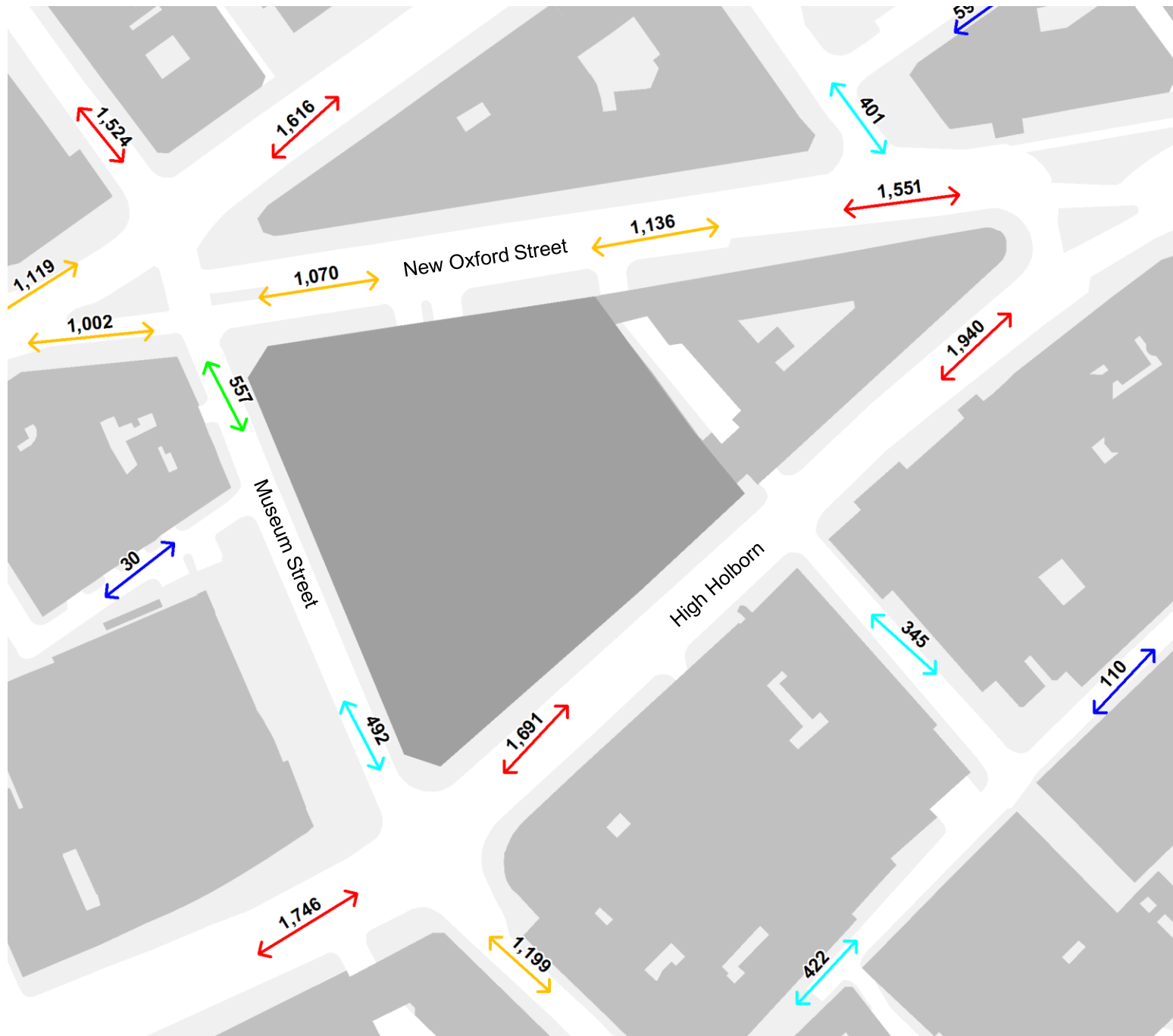
Transport node location.

Linear volume distance decay from Tottenham Court Road, Holborn and Covent Garden Stations.



3. Transport attraction

Existing movement **PM Peak (17:00-19:00)**

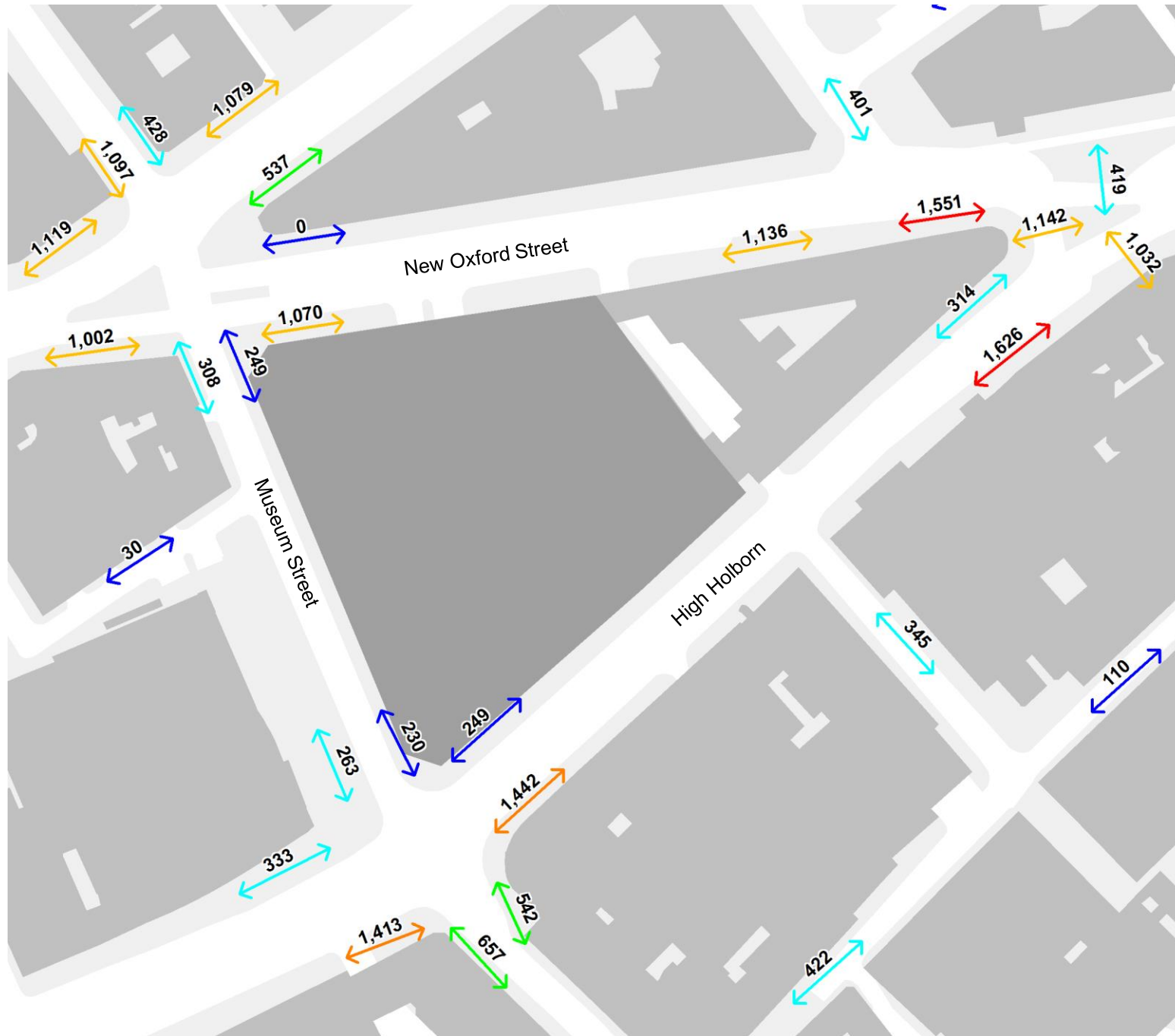


People per hour (pph)

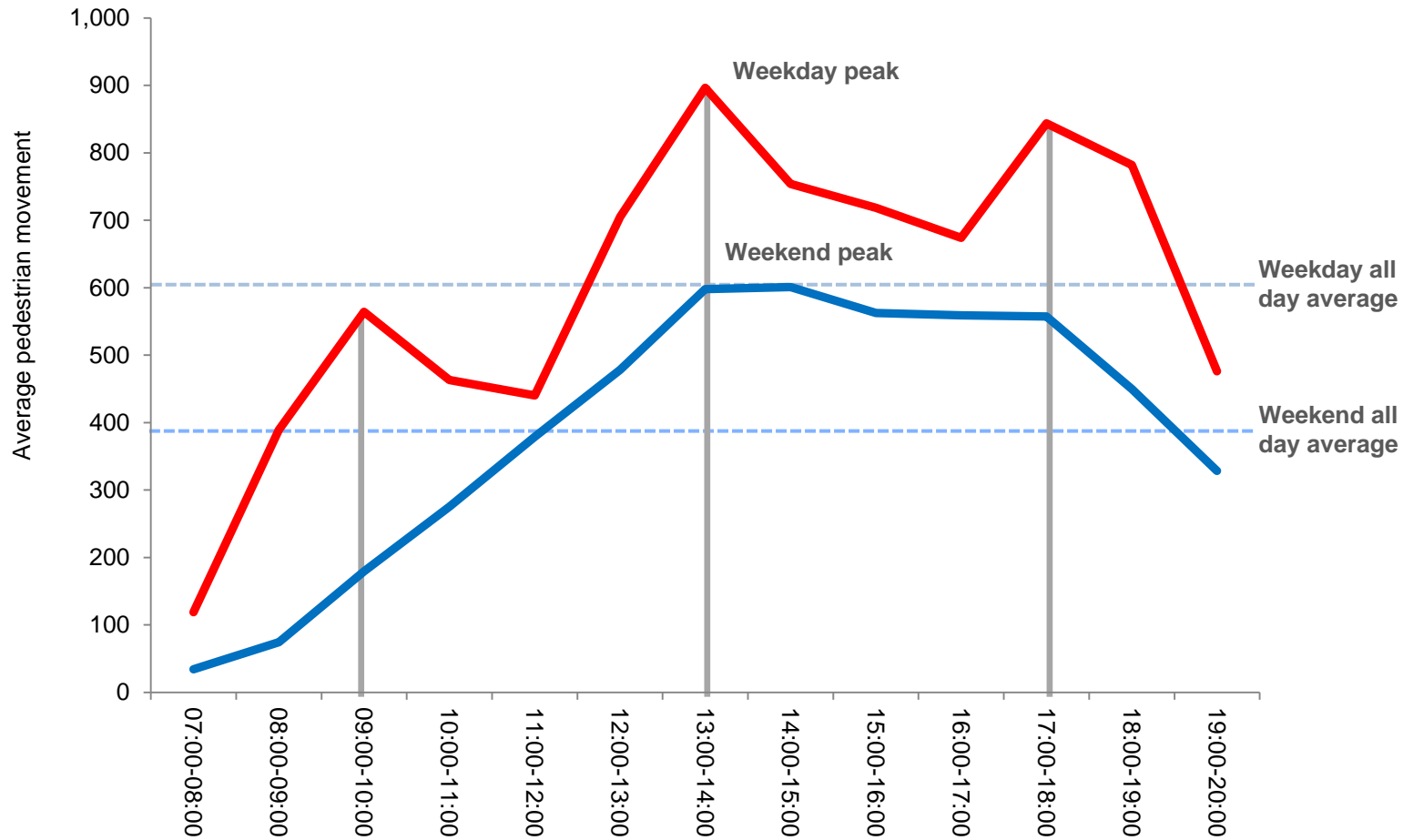
- 1,500 or above
- 1,250 to 1,500
- 1,000 to 1,250
- 750 to 1,000
- 500 to 750
- 250 to 500
- 0 to 250

Site boundary

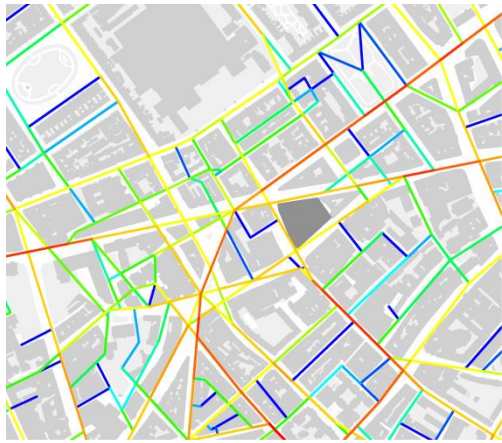
Existing movement **PM Peak (17:00-19:00)** Detailed



Existing movement Average daily movement patterns across the survey area



Pedestrian Movement Model **Multivariable model** PM Peak (17:00-19:00)



Spatial layout attraction
800m

PM Peak R² percentage = 57%



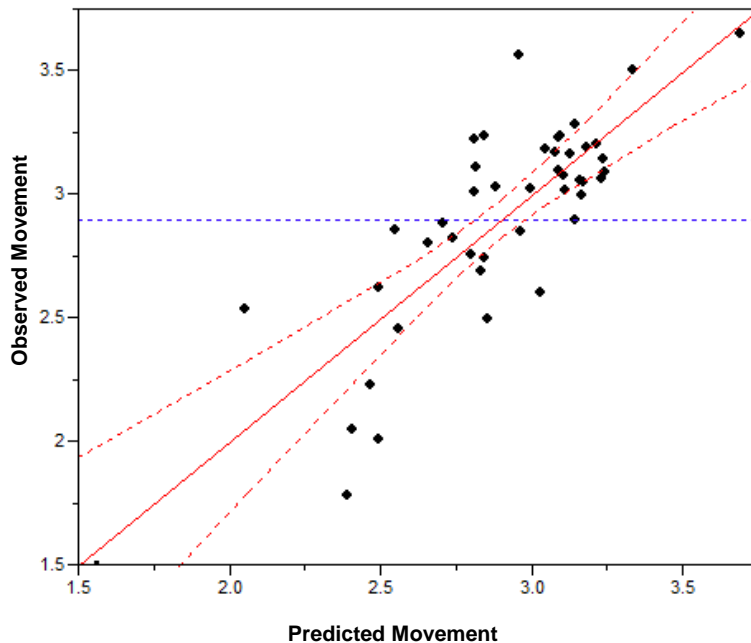
Public transport attraction
Volume distance decay from TCR,
Holborn, Covent Garden Stations
PM Peak R² percentage = 11%



Land use attraction
Retail/Catering

PM Peak R² percentage = 25%

PM Peak RSquare= 69%



$$(-1.07289685178348) + (1.46241880531424 * NACH800) + (0.737473569962396 * \log_2_DD_Sum) + (RetailCater * 0.273542955337675)$$

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	-1.072897	1.020844	-1.05	0.2994
NACH800	1.4624188	0.213076	6.86	<.0001
log2_DD_Sum	0.7374736	0.364039	2.03	0.0493
RetailCater[1-0]	0.273543	0.083595	3.27	0.0022

A linear multivariable regression model has been established that best explains observed movement in the study area.

69% of observed pedestrian movement can be explained by the this model.

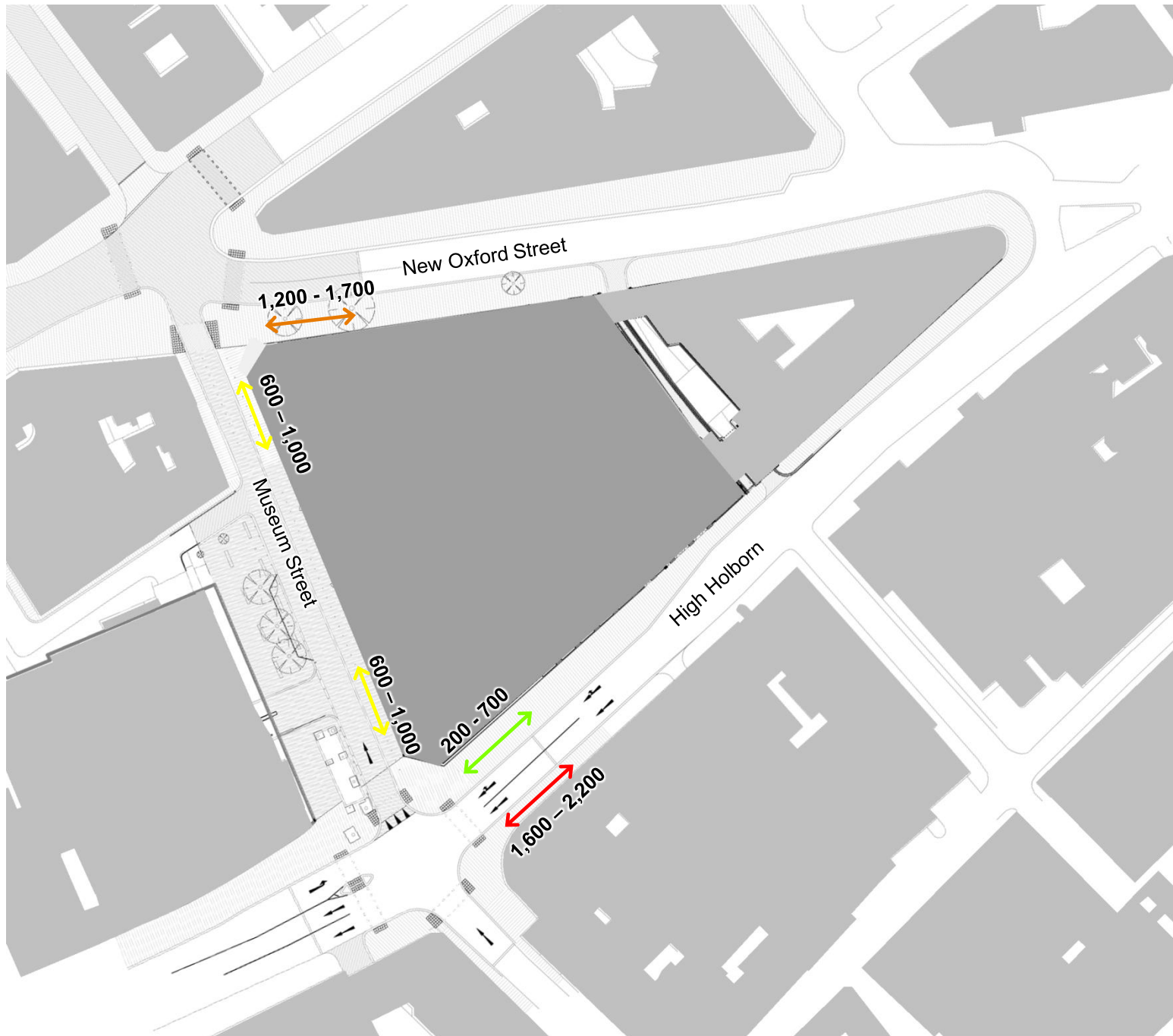
The following variables are included in the model through a linear regression equation.

1. Spatial accessibility at 800m
2. Linear volume distance decay from public transport*
3. Retail and catering land uses.

These conditions were then included in the pedestrian demand forecast for the evening peak (17:00 – 19:00). This is based on the fact that the introduction of Crossrail will have highest impact during commuting hours - morning and evening. The evening peak is higher than morning for an average weekday based on the pedestrian movement data collected by Space Syntax around the site, as well as for the Crossrail Tottenham Court Road Station. In addition the expected population of Project LT, along an overall population increase of 10% was included in the modelling assumptions.

• *Data Source:*
2012 Underground passenger figures:
TfL LUL_Passenger_Counts COUNTS - 2012 - entries & exits, London Underground Limited, 2013.

Proposed predicted movement **PM Peak (17:00-19:00)** Detailed



Appendices

Appendix Methodology TfL Pedestrian Comfort Level on Footways

Pedestrian Comfort Level

Level of Service 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. The resulting scores are ranked into six ranges from comfortable (A) to very uncomfortable (E) as shown below.

TfL recommends a minimum standard of C+ for Office and Retail Areas.

Pavement width

PCL can be applied to different footway conditions found in urban environments. Effective width is estimated by reducing gross width as a result of unusable spaces related to street furniture and/or obstructions as follows:












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

Pedestrian movement flows

PCL in this report was assessed for the following existing footway demand:

- daily average flow;
- AM peak flow: the hourly peak flow between 08:00-10:00 for the individual gate;
- PM peak flow: the hourly peak flow between 16:00-19:00 for the individual gate;
- the all day peak for the individual date.

Pedestrian Comfort Levels

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

Appendix 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.

Appendix TfL Pedestrian Comfort Level on Footways Ranges

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.

Uncomfortable