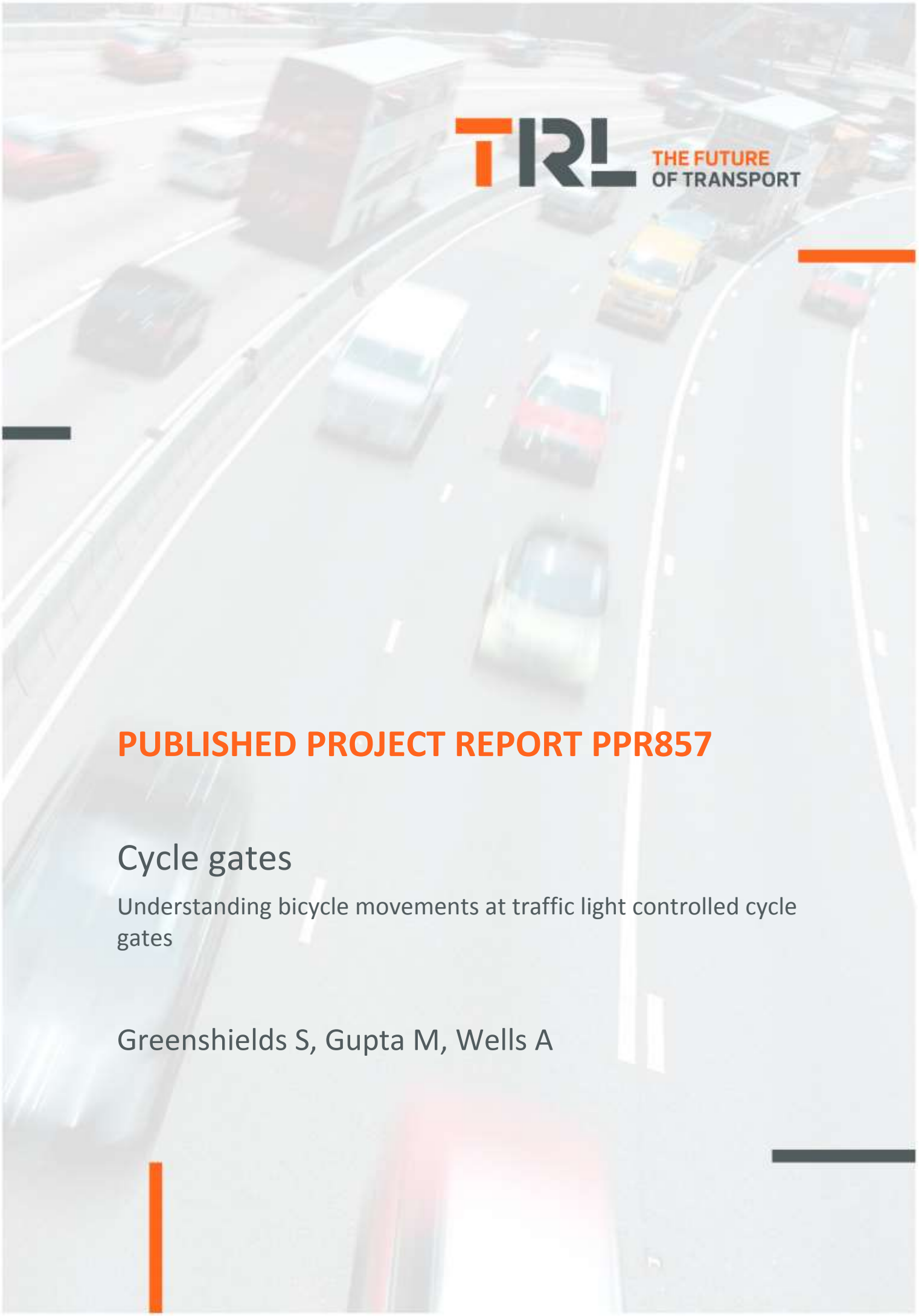

THE FUTURE OF TRANSPORT

PUBLISHED PROJECT REPORT PPR857

Cycle gates

Understanding bicycle movements at traffic light controlled cycle gates

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Report details

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Executive Summary

Cycle gates have recently been introduced in London, as a method of separating cycle traffic and general traffic at signal-controlled junctions where a significant proportion of motor vehicles turn left. This report presents the findings of research into road user behaviour and attitudes at two cycle gates on Cycle Superhighways, these being at Queen Street Place (see picture below) and at Lambeth Road.

Video recordings were made at the two sites and analysed to identify cyclists' choice of route through the junction and motorists' and cyclists' compliance with signals while passing through. The findings are summarised below under the main research questions for the study.

RQ1 What proportion of cyclists use the cycle gate rather than going with the general traffic, and what proportion of these comply with all signal phases?

- 97% of the cyclists at Queen Street Place and 61.5% of cyclists at Lambeth Road proceeded through the junction via the cycle lane and cycle gate rather than the general traffic lane.
- Of the cyclists using the cycle lane and cycle gate, 67% of the cyclists at Queen Street Place and 72% of cyclists at Lambeth Road were fully compliant with all signals.
- Of the cyclists using the cycle lane and cycle gate that were not compliant with all signals, the signals that were passed were as follows:
    - At Queen Street Place: 10% cycle lane green and reservoir red; 22% cycle lane red and reservoir green; and 1% both cycle lane red and

reservoir red.

- At Lambeth Road: 18% cycle lane green and reservoir red; 9% cycle lane red and reservoir green; and 1% cycle lane red and reservoir red.

- Of the cyclists using the general traffic lane, 78% of the cyclists at Queen Street Place and 72% of those at Lambeth Road were fully compliant with all signals.

It is clear that while a majority of cyclists use the cycle gate at both sites there is significant variation in the proportion that do so, suggesting that local factors are very important in cyclists' decisions on how to use the junction.

Although the majority of cyclists comply with traffic signals, a number appeared to take opportunities to progress through red lights. The video analysts noted that this usually occurred during the all-round pedestrian stage or during the inter-green period, which means they are unlikely to conflict with moving motor vehicles.

RQ5 - On what proportion of signal cycles does general traffic fail to clear the reservoir space?

Traffic remaining in the cycle reservoir was observed in only 2.6% of observed signal cycles (across both sites). The primary reason for those instances which did occur was observed to be non-compliance with the red signal at the initial stop line by the general traffic.

Very few vehicles failed to clear the reservoir, suggesting that the design is appropriate for the local conditions. Those instances that did occur were largely related to non-compliant motorist behaviour.

1 Introduction

TfL is committed to improving infrastructure for cyclists across the capital to improve safety and encourage an increased demand for cycling from a wider range of cyclist groups.

The purpose of this report is to present the findings of on-street research on user attitudes and behaviours observed at two cycle gates at junctions on Cycle Superhighways.

The objective of the study was to assess whether and how cyclists used the cycle gate, including their compliance with signals at different stages; and to observe whether motor vehicles were able to clear the cycle reservoir. A set of Research Questions (RQ) were developed to formalise in detail the data collection and analysis requirements in order to meet the objectives (see Appendix A for details).

The two RQs considered in this study can be summarised as:

- RQ1 – What proportion of cyclists use the cycle gate rather than going with the general traffic, and what proportion of these comply with all signal phases?
- RQ5 - On what proportion of signal cycles does general traffic fail to clear the reservoir space?

All observations were made by the use of video cameras which were placed discretely at each location for a period of one week starting 27th March, 2017. This video was then later examined at a desk-top level and data entered in to a spreadsheet by trained video analysts.

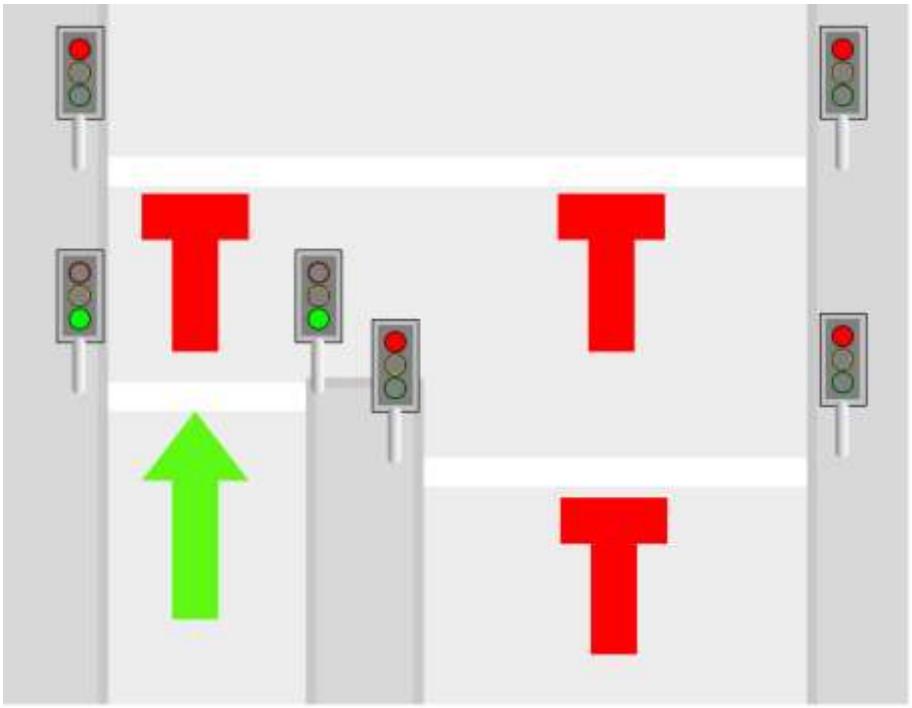
1.1 How cycle gates work

The main purpose of the cycle gates is to eliminate the risk of the “left hook” collision between left-turning motor traffic and cyclists proceeding ahead. This is achieved by separating cyclists in both time and space from motorised vehicles and hence eliminating the conflict point.

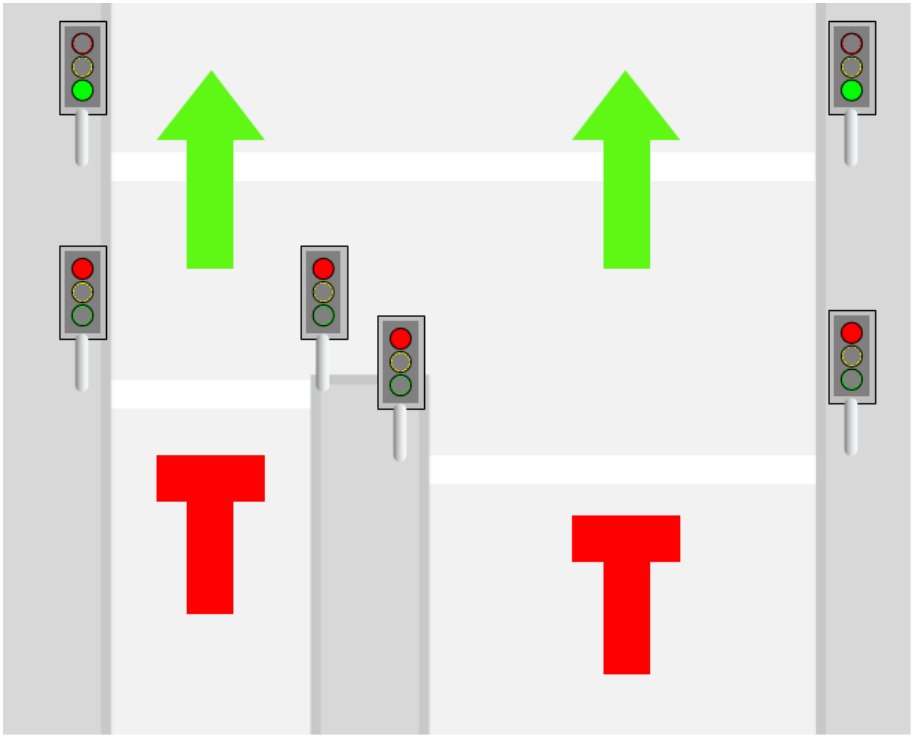
A typical cycle gate arrangement as in the schematics below, separates the cyclist on approach by providing a separate stopline and cycle-specific signals, with a separate stopline for general traffic. The signals never show green to both movements at the same time.

This allows cyclists to enter the large reservoir ahead of the other traffic (when this is held on red) and the cyclists are then held at the second stopline positioned at the junction itself.

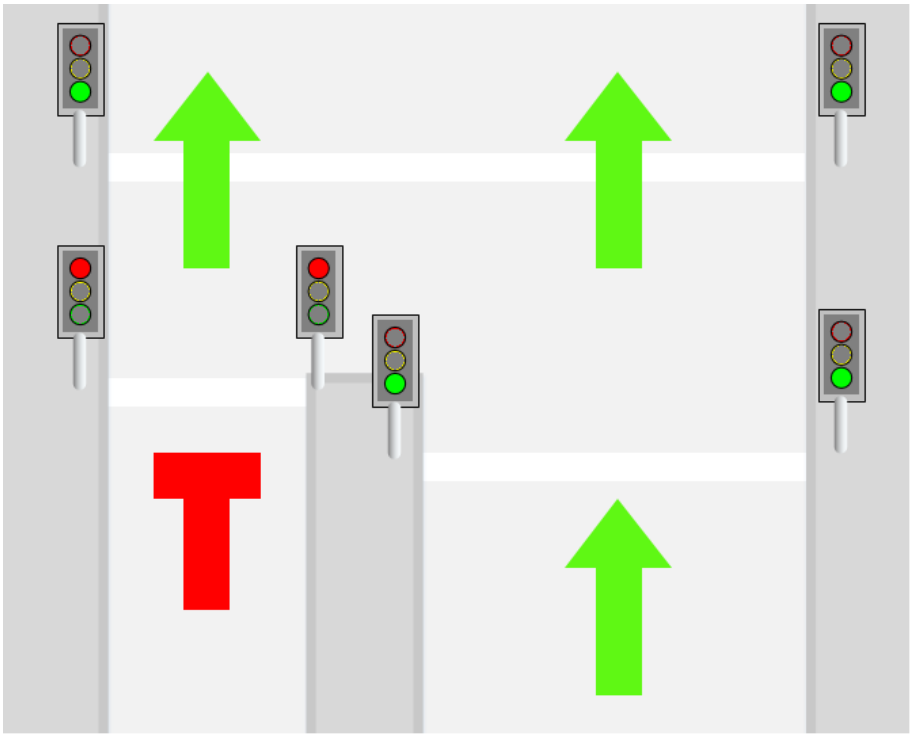
When the green is illuminated at the second stopline, the cycle gate will display a red, preventing any other cyclists from entering the reservoir. This green is shown a few seconds before the general traffic is released into the reservoir, ensuring that those cyclists in the reservoir have proceeded past the left turn conflict before the general traffic.



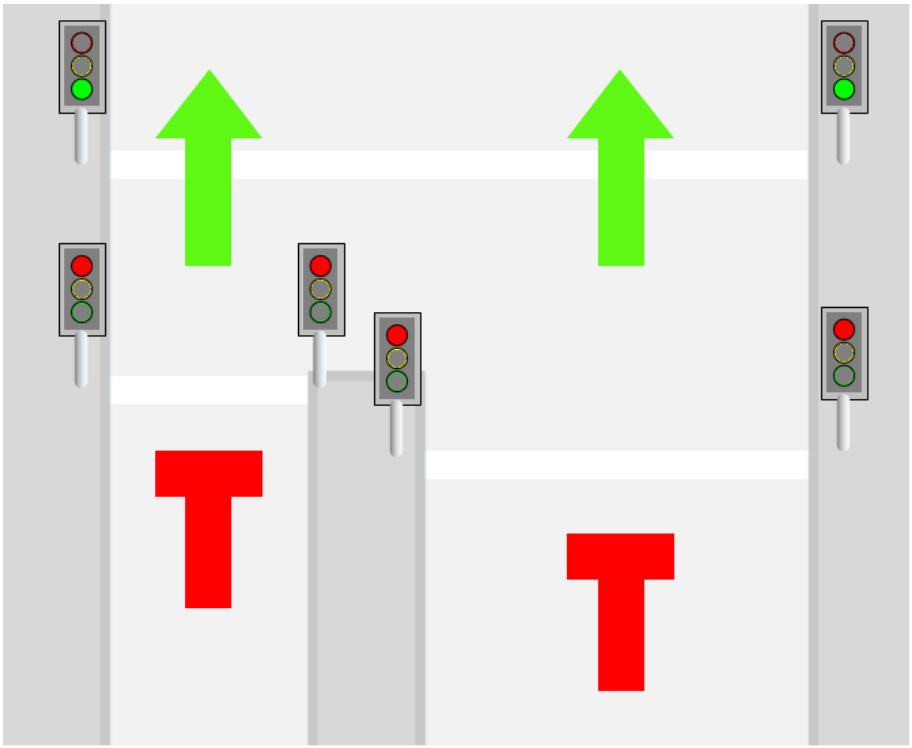
Stage 1 – Cyclists enter the reservoir



Stage 2 – cyclists (and trapped vehicles) enter junction from Reservoir



Stage 3 – Cyclists in reservoir held and traffic enters junction (through both stoplines)



Stage 4 – Traffic clears reservoir (nothing can enter reservoir)

1.2 Site locations

The two study cycle gates were located at the junctions of:

- Queen Street Place at Upper Thames St at a junction with Cycle Superhighway 3 ('East-West'); and
- Lambeth Road and St George's Road (at a junction with Cycle Superhighway 6 ('North-South').

The map in Figure 1 shows their locations. Video stills of the sites are shown in Figure 2 (Queen Street Place) and Figure 3 (Lambeth Road and St George's Road).

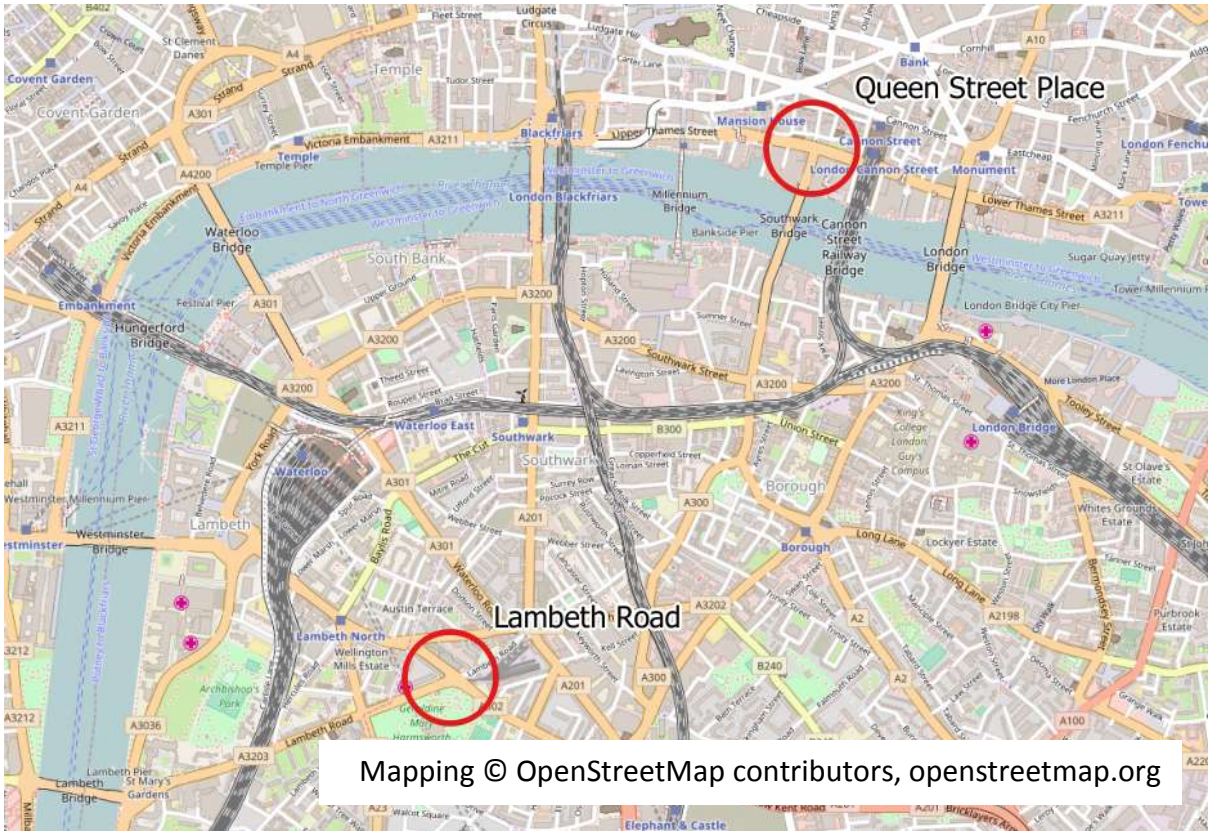


Figure 1 Map of cycle gate study sites

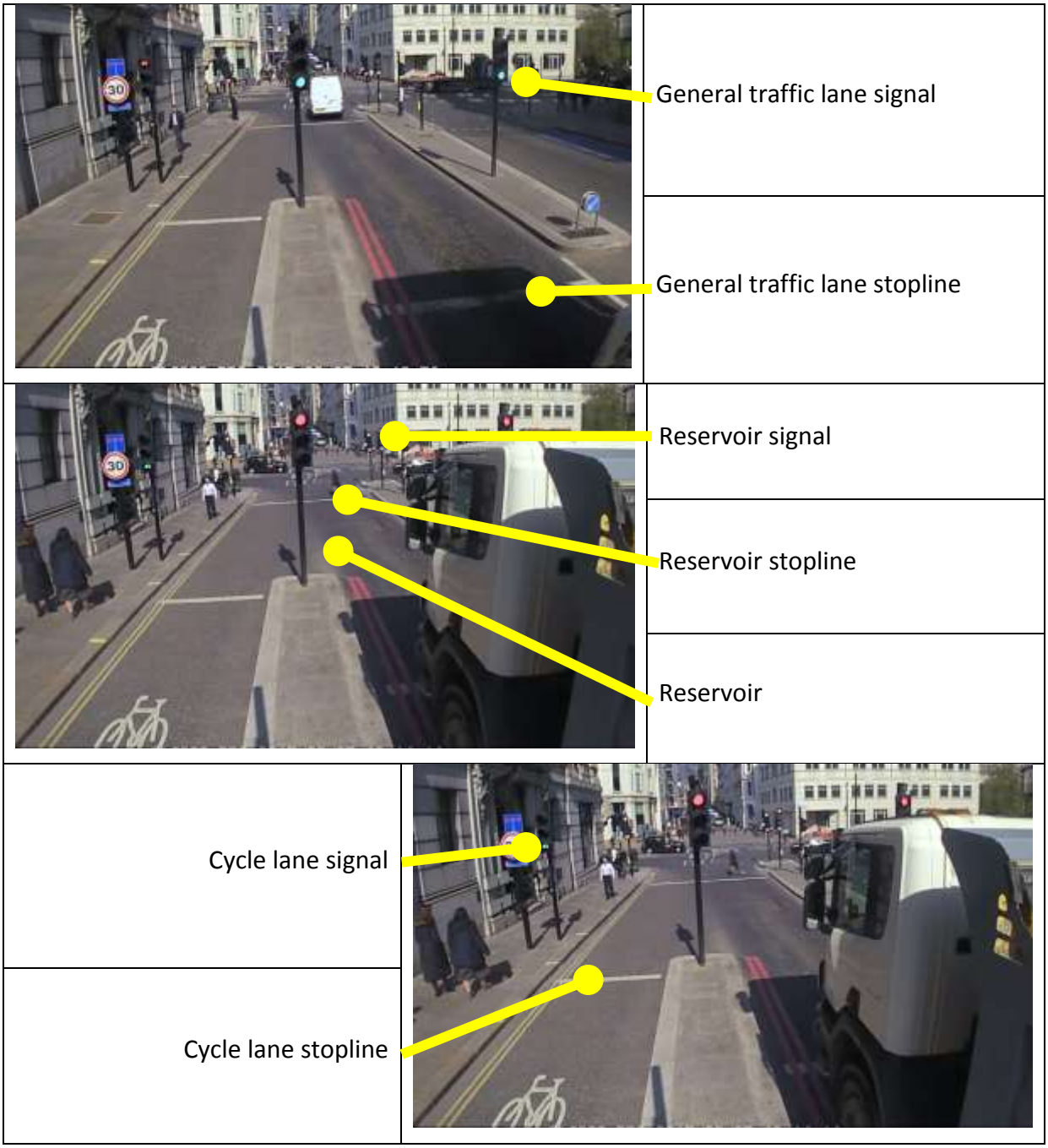


Figure 2 Annotated view of cycle gate from Queen Street Place

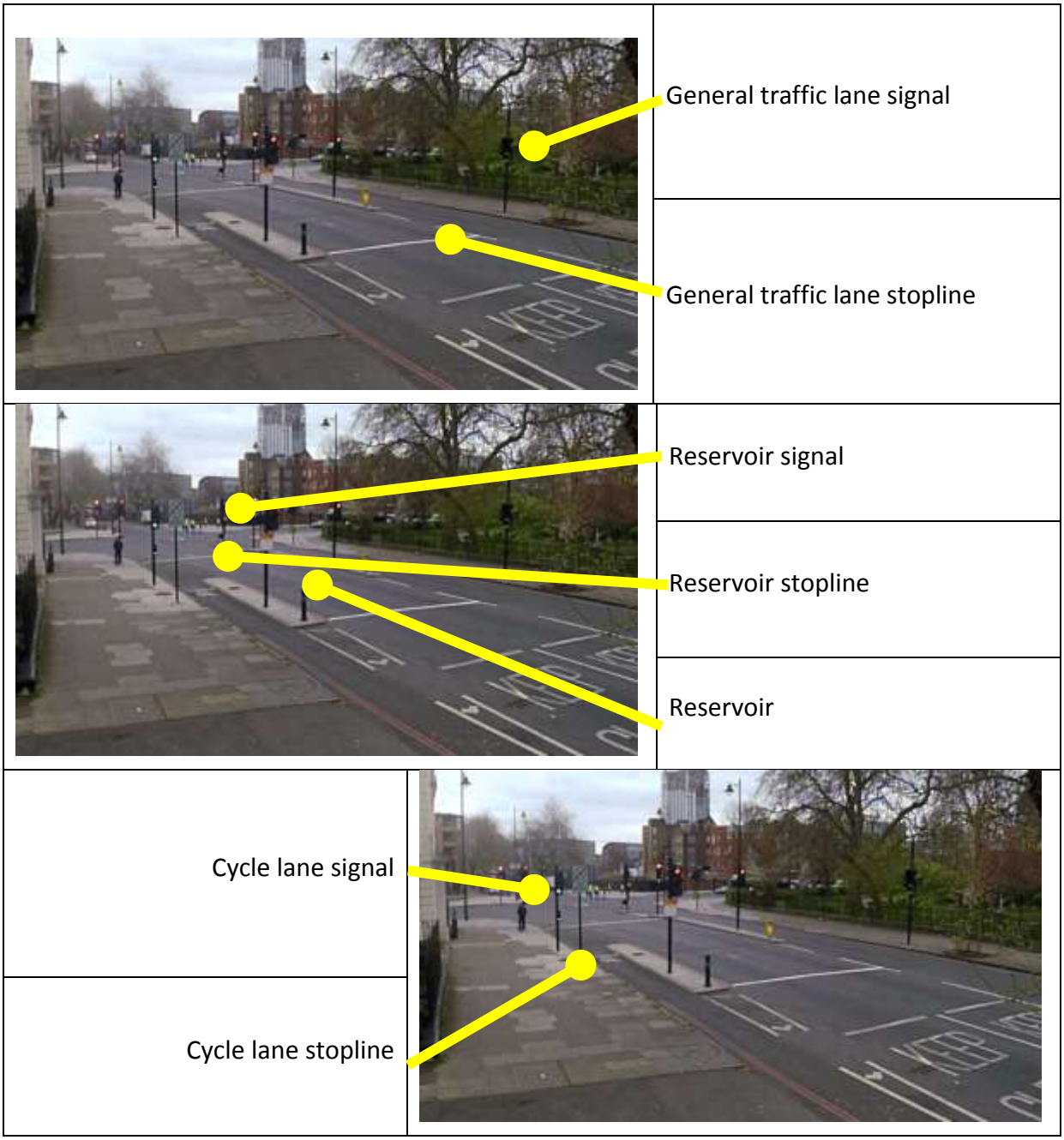


Figure 3 Annotated view of cycle gate from Lambeth Road

2 RQ1 – Cyclists entering the junction

This question is primarily concerned with whether cyclists choose to use the cycle lane and reservoir or stay in the main carriageway, and whether they comply with the signals. This will help to determine whether the design has been understood by cyclists. Cyclists have a choice of using the cycle lane or main carriageway stop lines before reaching the cycle gate and they were observed for their choice of route and the colour of traffic signals at the time of passing any given traffic light.

Whilst the intention of the cycle gate design is to offer cyclists a dedicated facility that eliminates the left-turn hook, cyclists are not restricted from using the general traffic lane and associated stop line.

Cyclist movements were recorded according to which of the eight possible permutations of route and signal phase they used; these are summarised in Table 1 below. Note that to simplify the signal observations, amber before the change to green was treated as green, while amber before red was treated as red.

Table 1 Cycle movements via cycle gate junction

Lane	Signal Phase at Cycle Stop Line	Signal Phase at Advanced Stop Line	Description
Via Cycle Stop Line	**Green**	**Green**	Cyclist enters the reservoir via the cycle lane when the cycle stop signal is green, waits in the reservoir space and then enters the junction when the signal phase at the Reservoir Stop line is green*.
	Green	**Red**	Cyclist enters the reservoir via the cycle lane when the cycle stop signal is green, but enters the junction when the signal phase at the Reservoir Stop Line is red.
	Red	**Green**	Cyclist enters the reservoir via the cycle lane when the cycle stop signal is red, and enters the junction from the Reservoir stopline on a green signal.
	Red	**Red**	Cyclist enters the reservoir via the cycle lane when the cycle stop signal is red and enters the junction when the signal at the Reservoir Stop Line are also on red.
Via General Traffic Stop Line	**Green**	**Green**	Cyclist enters the reservoir via the general traffic lane when the traffic signal is green, and subsequently enters the junction when the signal phase at the Advanced Stop Line is green. *
	Green	**Red**	Cyclist enters the reservoir via the general traffic lane when the signal is green, and enters the junction from the Reservoir Stop Line when the signal phase is red.
	Red	**Green**	Cyclist enters the reservoir via the general traffic stop line when the signal is red, and enter the junction from the reservoir Stop Line when the signal Phase is green.
	Red	**Red**	Cyclist enters the reservoir via the general traffic stop line when the signal is red and enter the junction from the reservoir Stop Line when the red signal phase is red.
			* These are the legally compliant movements

More detailed observation was given to those cyclists who passed through red signals and then interacted with cyclists and pedestrians.

Observations were made in each phase of the first 6 complete traffic signal cycles from the start of each hour from 7am to 8pm (14 hours) for 7 consecutive days starting on the 27th March 2017. This method of sampling was chosen as it was likely to capture sufficient numbers of cyclists for analysis, ensured a spread of cyclist behaviour at all times of the day, and defined the data extraction task. The observations captured 1,993 bicycles on Queen Street Place and 758 bicycles on Lambeth Road.

2.1 Cyclist route choice

Of the 1,993 cyclists recorded on Queen Street Place site, it was observed that 1,934 (97%) proceeded into the reservoir via the cycle lane (and cycle gate), while the remaining 59 (3%) used the general traffic lane. In comparison, on Lambeth Road 466 (61.5%) of the sample of 758 cyclists were observed to proceed via the cycle lane and gate, while the remaining 292 (38.5%) used the general traffic lane (see Figure 4).

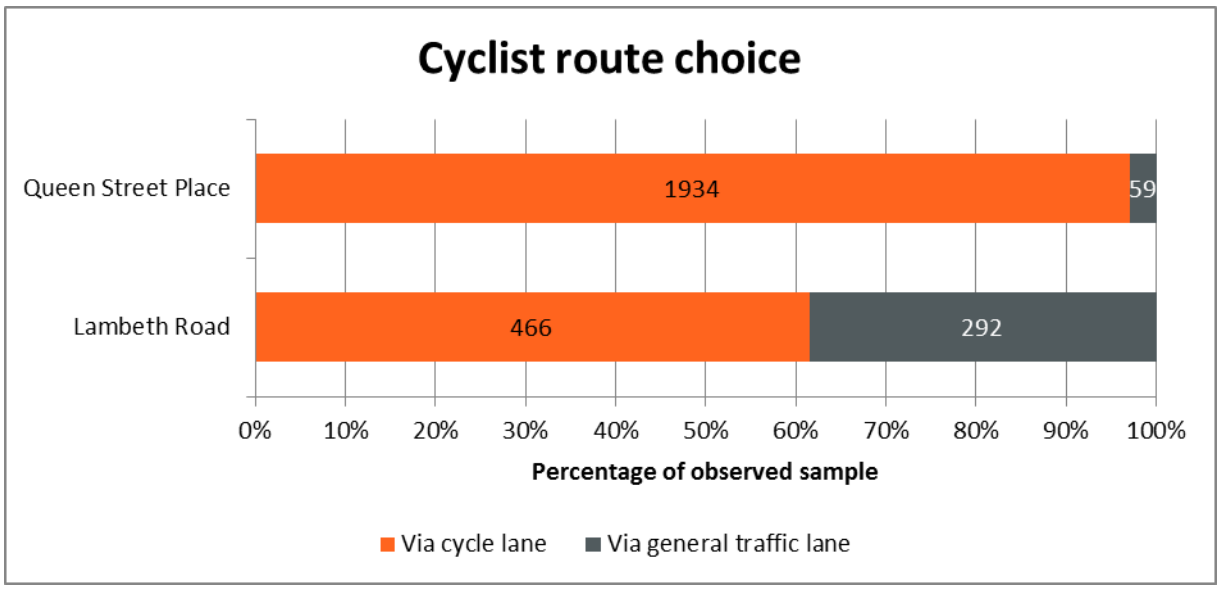


Figure 4 Cyclist route choice

As cyclists were only observed and not spoken to, the reasons for the differences in choice of route seen between Queen Street Place and Lambeth Road are not known. Differences in the cycle infrastructure on the approach are a likely factor. Cyclists approach the Queen Street Place junction from a segregated cycle track and the Lambeth Road junction from a bus lane.

2.2 Variations in cyclist behaviour

The cycle counts were analysed by day of the week and time of day, as these factors may have implications for the findings relating to the actions of cyclists.

Note that all figures shown are observations from a sample of signal phases, therefore are not the total number of cyclists per day at these sites. They are however likely to be a representative sample of cyclists on each day.

Far fewer cyclists were observed at Queen Street Place at the weekend than during the week (see Figure 5), with the weekday average 374, and the weekend average being 60 (16% of the average weekday cyclist number). The highest number of cyclists through any given phase was 32. On Lambeth Road similar observations were made (see Figure 6), and the overall number of cyclists was far lower than at Queen Street Place. The number of cyclists counted at Lambeth Road during a week day were far more than were observed during the weekends; with the weekday average being 137 cyclists and weekend cyclists count being 38 (27% of the average weekday cyclist number). The highest number of cyclists as observed through any given phase was 12.

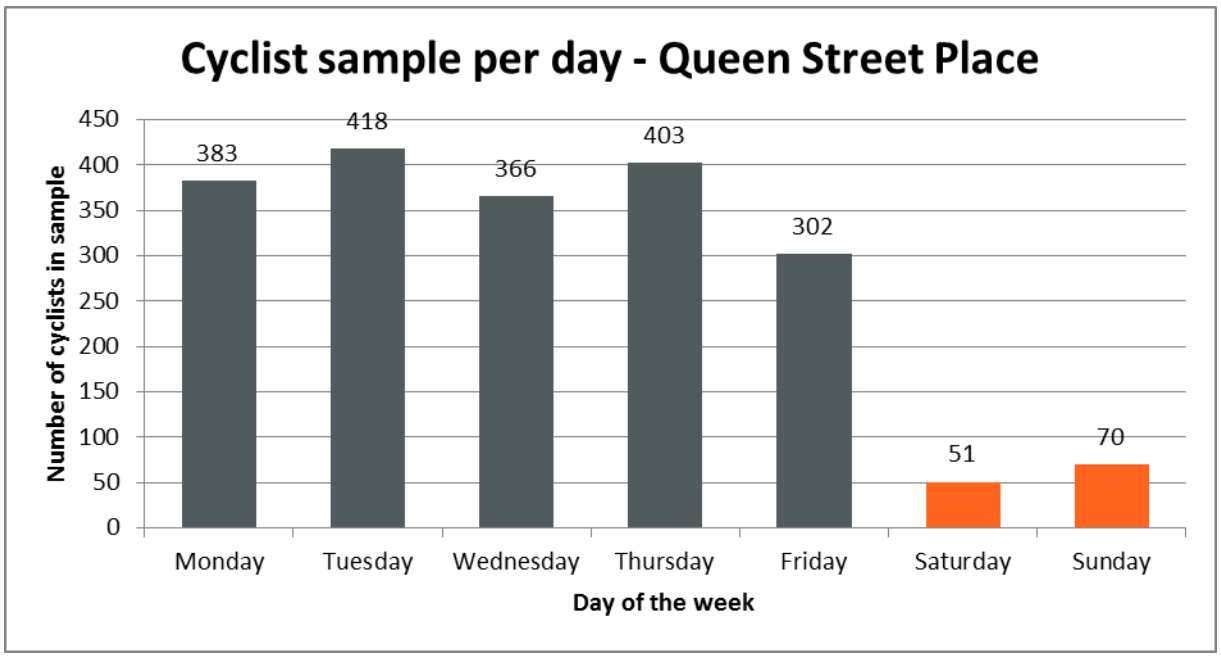


Figure 5 Cyclist sample per day at Queen Street Place

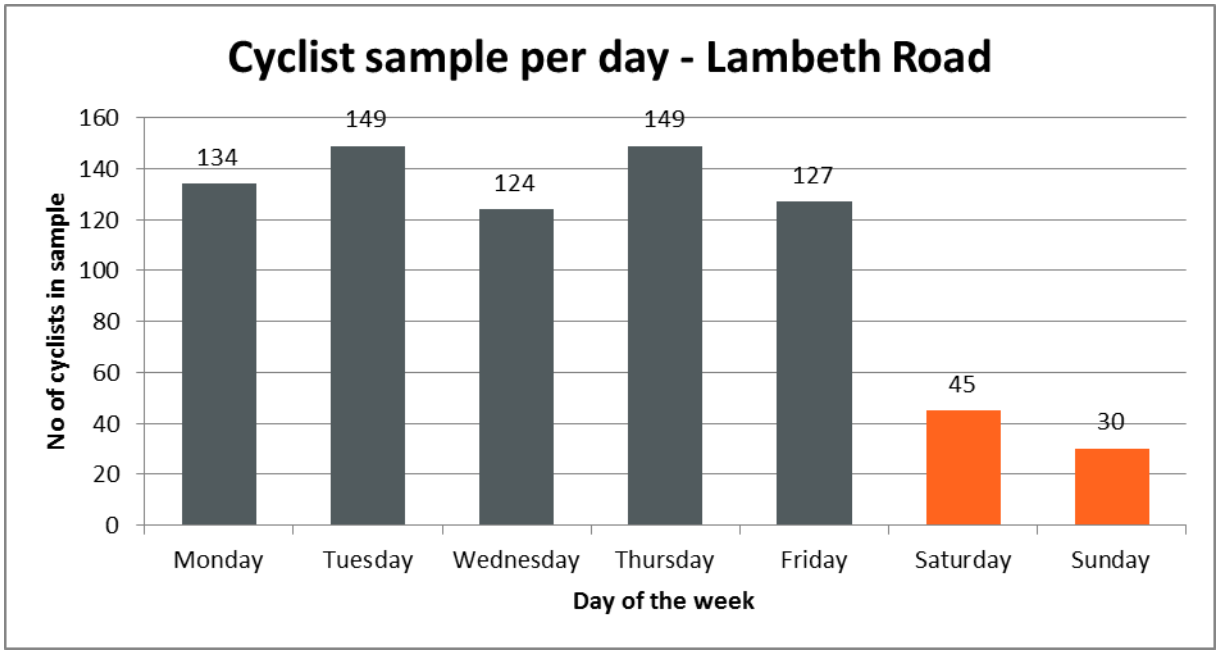


Figure 6 Cyclist sample per day at Lambeth Road

2.3 Cycle counts by time of day

Although hourly flow rates were not measured directly, an indicator of hourly flow rate is provided by the number of cyclists counted in the first 6 signal cycles in each hour. This was calculated as an average of the counts in each hour for all days so that variations in flow by time of day could be investigated.

On Queen Street Place, cycle flows - to a great degree - peaked in the morning between 8am and 10am with around 100 cyclists counted in the first 6 signal cycles during each of these two hours on all working weekdays (see Figure 7). A smaller evening peak was also observed in the 6pm sample. No obvious peak hour was observed for weekends on Queen Street Place, which suggests that the primary users of the cycle gate in this location are commuters, the morning peak being those cyclists heading in to central London.

On Lambeth Road, cycle flows again primarily peaked during morning between 8am to 10 am during the working weekdays, with an average number of 33 cyclists counted in the first 6 signal cycles in each of these 2 hours (see Figure 8). The evening peak for cyclists is observed at 6 pm, with an average of 14 cyclists being observed on each working weekday in the first 6 signal cycles of the hour. Again this suggests the junction is used by commuting cyclists.

The mid-day period, regardless of day of the week, was broadly similar for every day of the week at both sites.

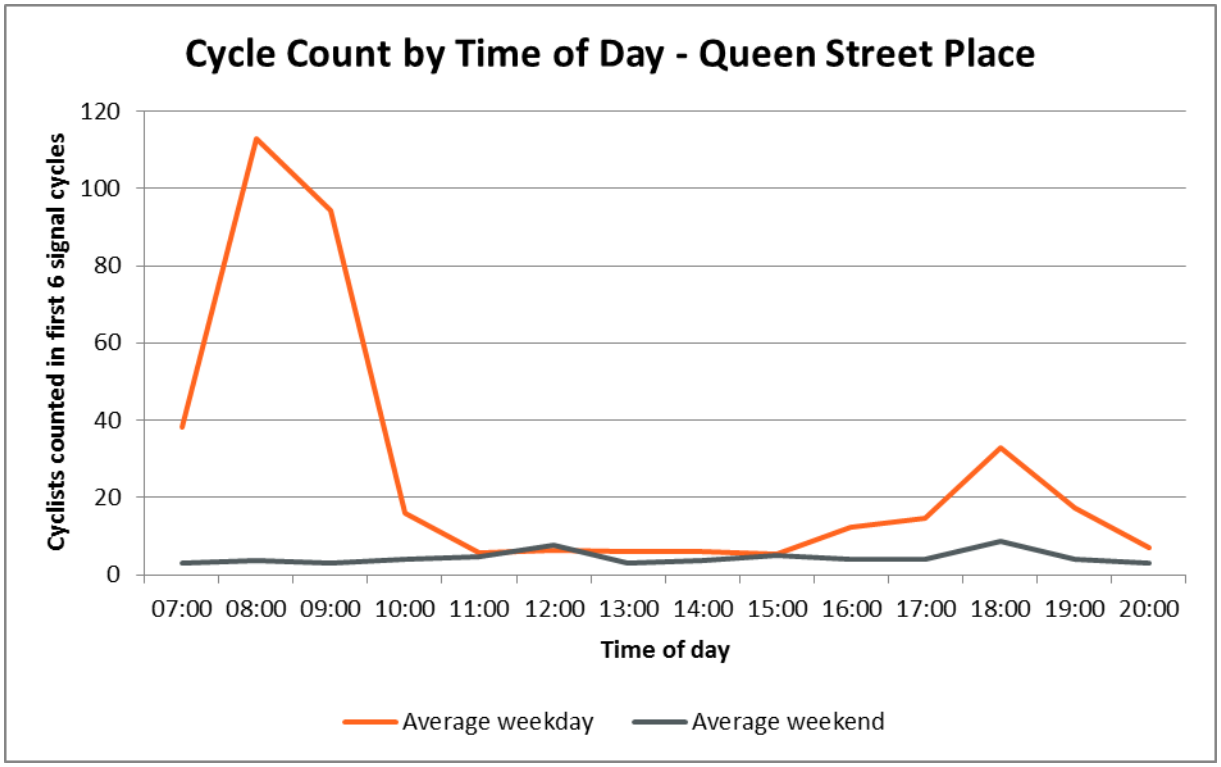


Figure 7 Cycle count by time of day at Queen Street Place

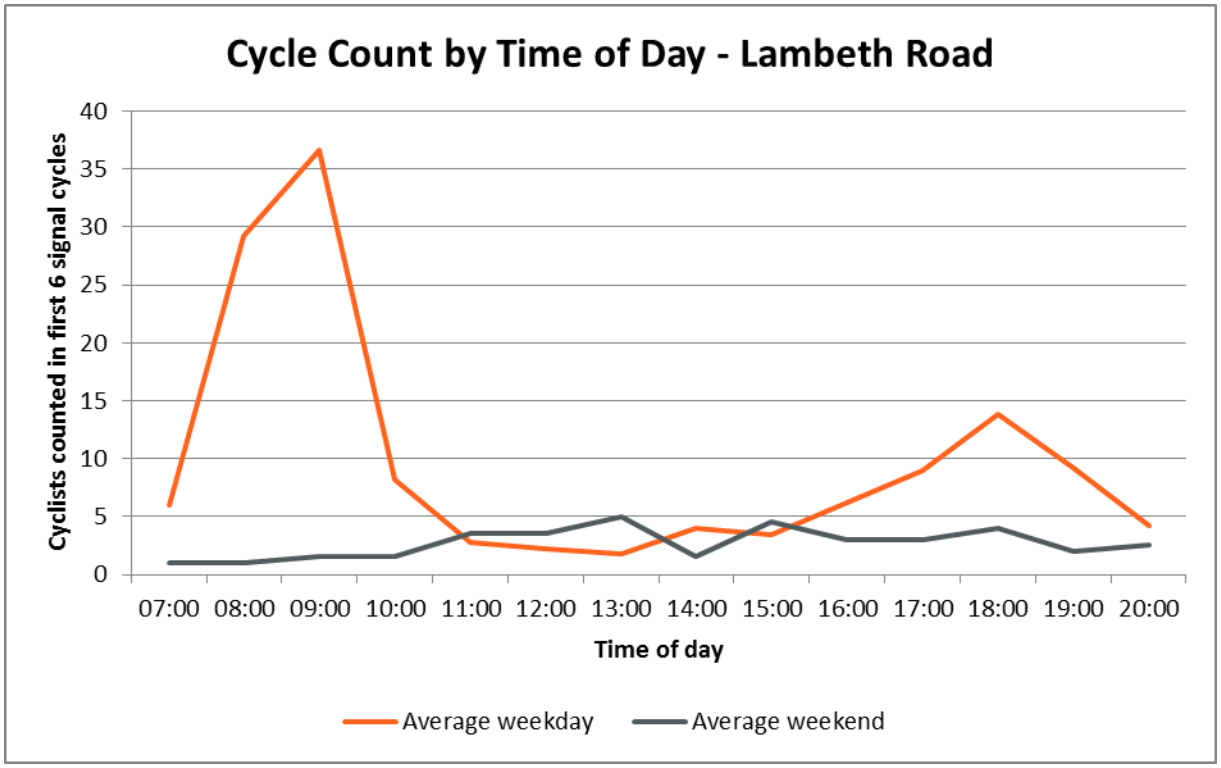


Figure 8 Hourly average sample size at Lambeth Road

2.4 Cyclist behaviour by time of day

Analysis was undertaken to understand if certain cyclist behaviours, such as passing a red signal, were related to time of day or number of cyclists.

It was found that at both the Queen Street Place (Figure 9) and Lambeth Road (Figure 10 and Figure 11) cycle gate sites the total number of cyclists using the cycle lane and then passing any signal at red was generally higher during peak times; however as a proportion of all cyclists it was actually lower than at off peak times. The reasons for this are not known, however it could simply be that fewer vehicles and other cyclists in the off peak provide more opportunity for passing through signals on red.

This behaviour was not seen to the same extent at the general traffic lane. However, cyclist numbers were too low at the general traffic lane at Queen Street Place for analysis to be worthwhile.

It should be noted that the numbers of cyclists counted were taken from figures for the first 6 traffic signal cycles of every hour, so are not the hourly flows. However it is expected that the behaviour and patterns of flow will be similar for the remaining parts of any given hour.

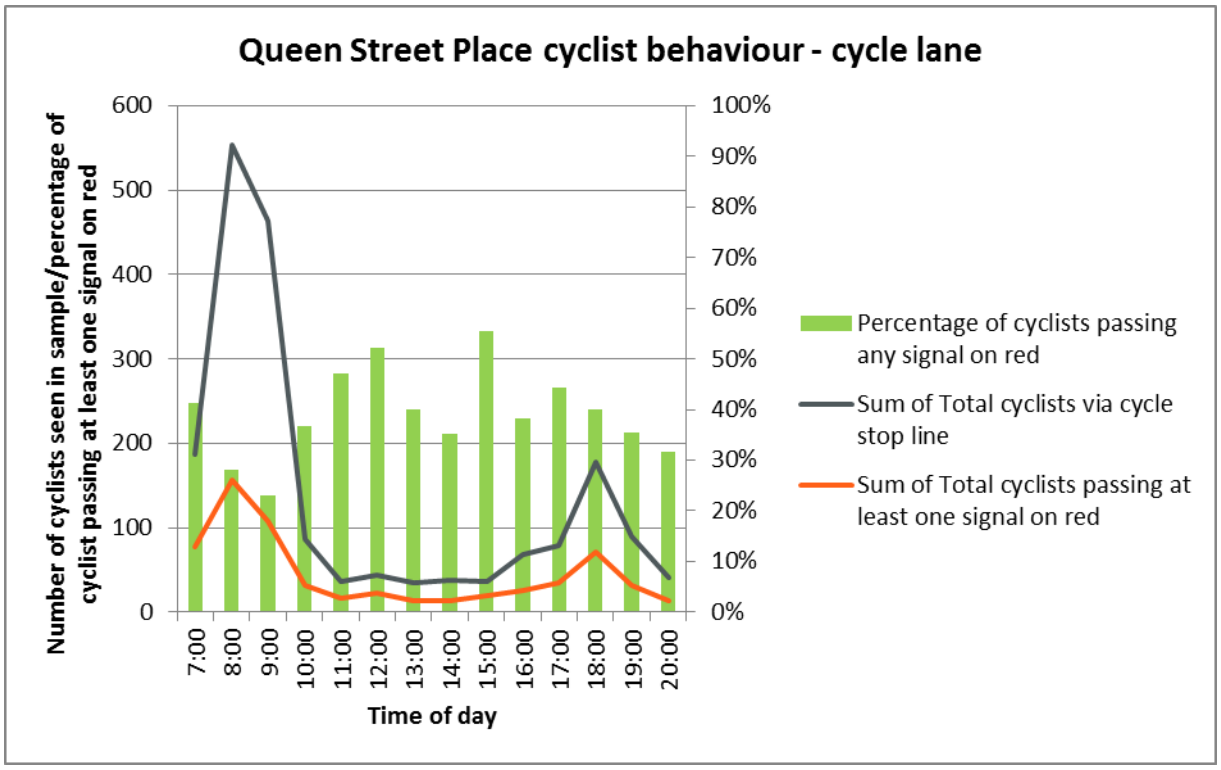


Figure 9 Cyclist compliance with signals through cycle lane at Queen Street Place

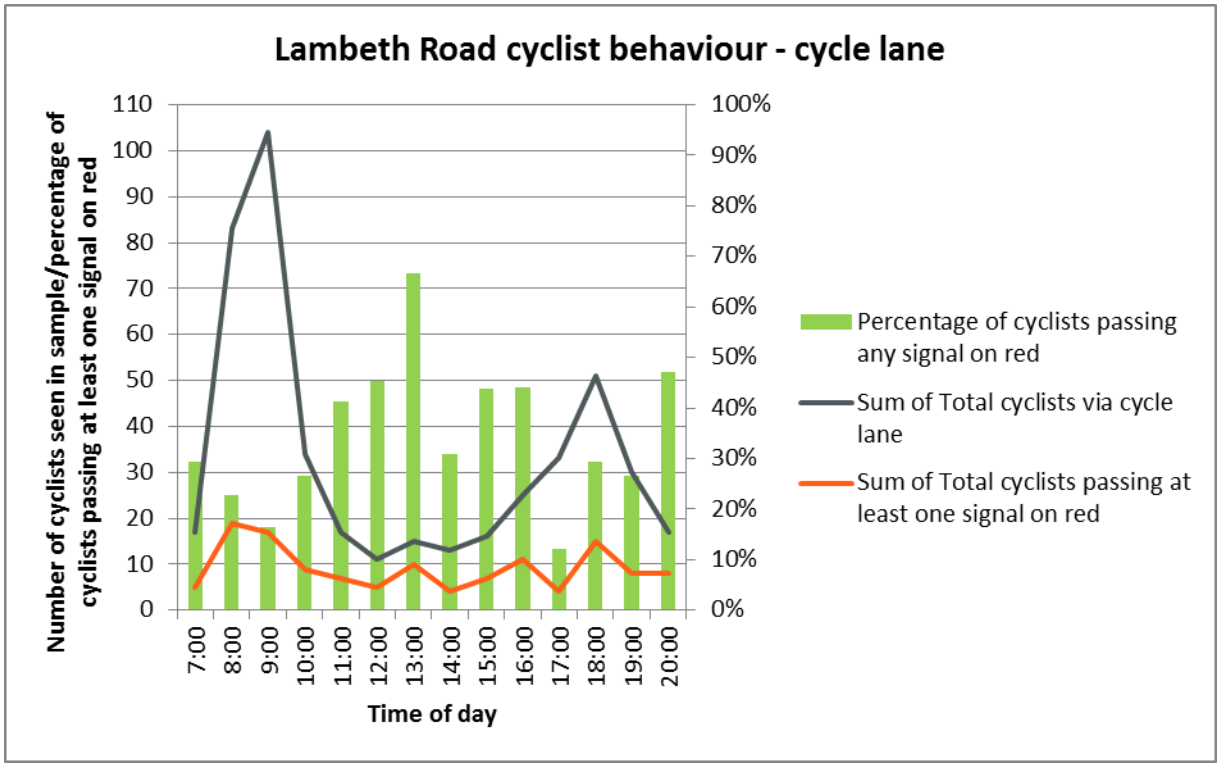


Figure 10 Cyclist compliance with signals through cycle lane at Lambeth Road

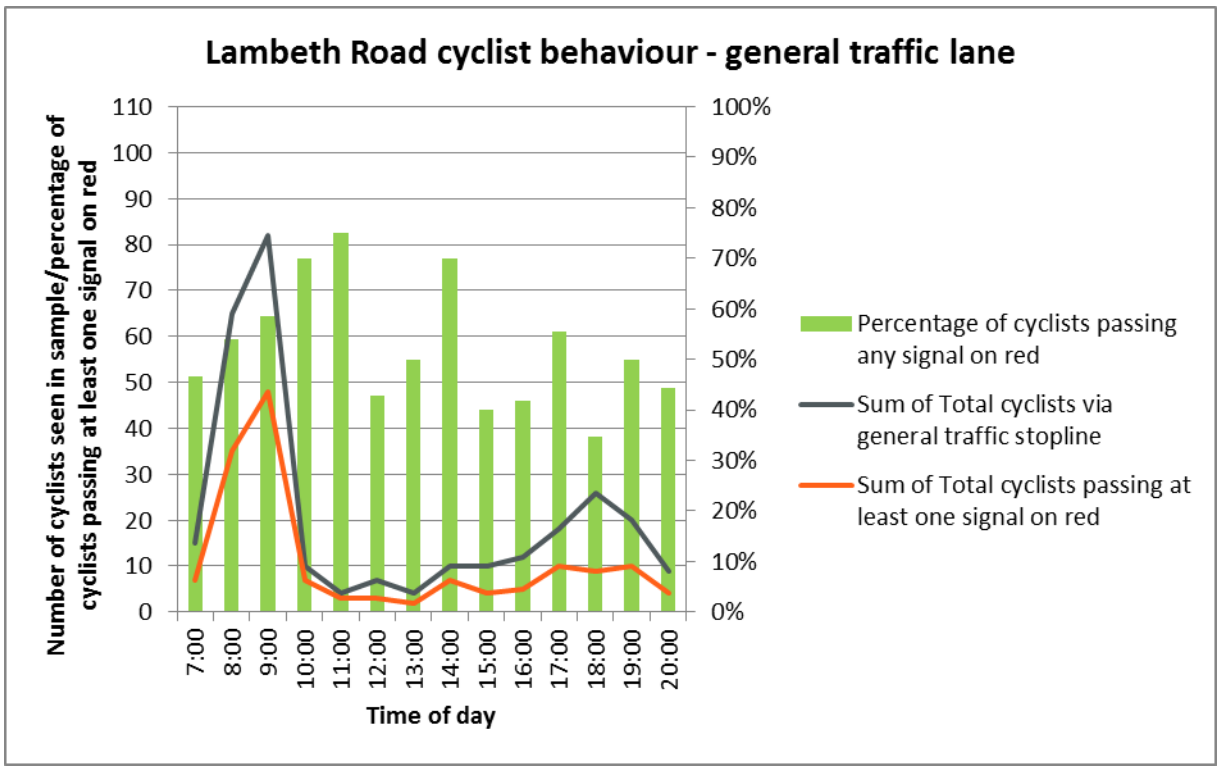


Figure 11 Cyclist compliance with signals through general traffic lane at Lambeth Road

An analysis of compliance with each signal depending upon how many cyclists are present in

any given signal cycle was undertaken. The number of cyclists in any given signal cycle are given in Table 2.

Table 2 Maximum number of cyclists seen in any given signal cycle

	Via cycle lane	Via general traffic lane
Queen Street Place	32	3
Lambeth Road	8	8

At Queen Street Place, the number of cyclists passing the cycle stopline on green and the reservoir stopline on red (the red bars in Figure 12) remains relatively static regardless of the number of cyclists in any given signal cycle. However, the number of cyclists who pass the cycle stopline on red and the reservoir stopline on green (grey bars) appears to rise with increasing numbers of cyclists, until there are between 5 and 10 doing so. This suggests a finite number of cyclists can or will pass the reservoir stopline on red, but there is less restriction on the number who will pass the cycle stopline on red but then wait in the reservoir for a green signal. The number of cyclists passing through the general traffic lane at Queen Street Place was too small to provide a reasonable summary.

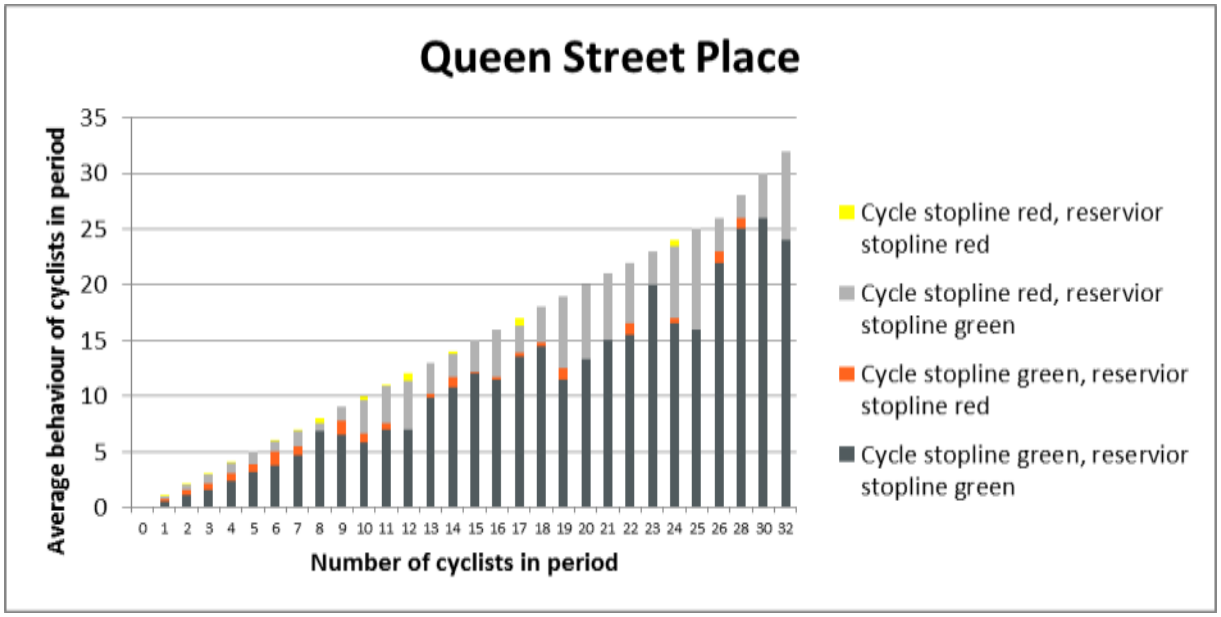


Figure 12 Average compliance with signals of cyclists at Queen Street Place cycle lane, based upon number of cyclists in any given signal cycle

At Lambeth Road it was found that the number of cyclists passing through a red signal did not proportionally increase with the number of cyclists, and that it remained largely static at around half a cyclist per signal cycle on average either passing the cycle lane signal on red, or the reservoir signal on red (see Figure 13). It may be hypothesised that this is a result of opportunistic behaviour, with limited opportunities to pass the reservoir red for a limited number of cyclists at any given signal cycle.

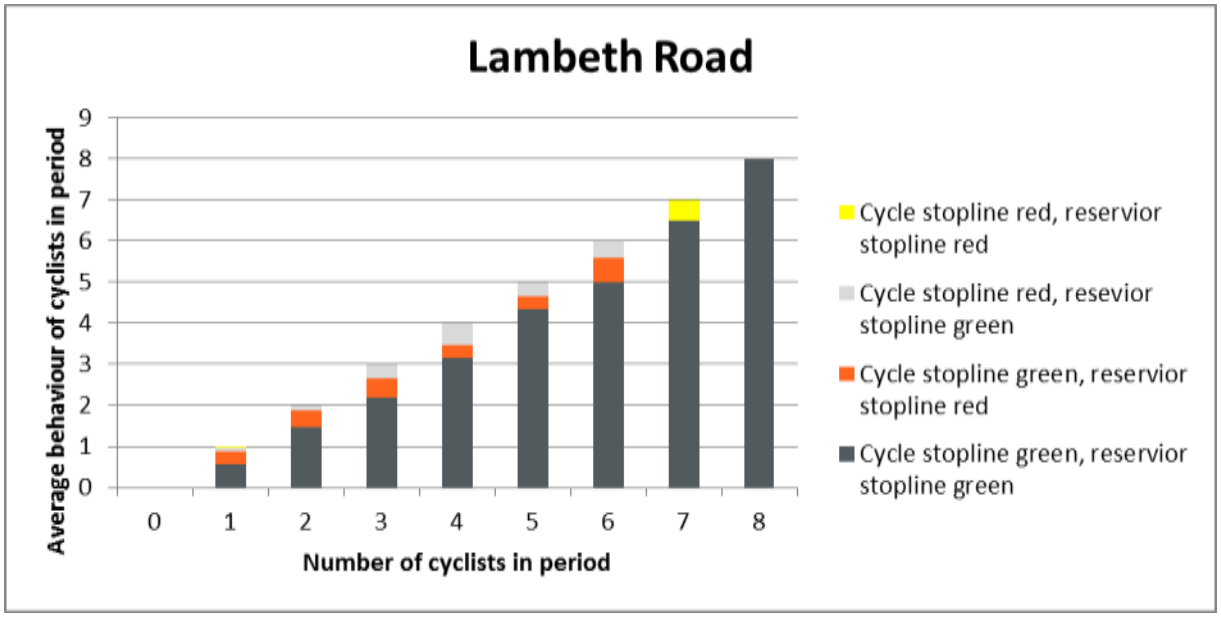


Figure 13 Average behaviour of cyclists at Lambeth Road cycle lane, based upon number of cyclists in any given signal cycle

This pattern is not repeated for cyclists passing through the general traffic lane at Lambeth Road, with the average number of cyclists passing the general traffic line on red and the reservoir signal on green rising with the number of cyclists in any given sample (see Figure 14, grey bars).

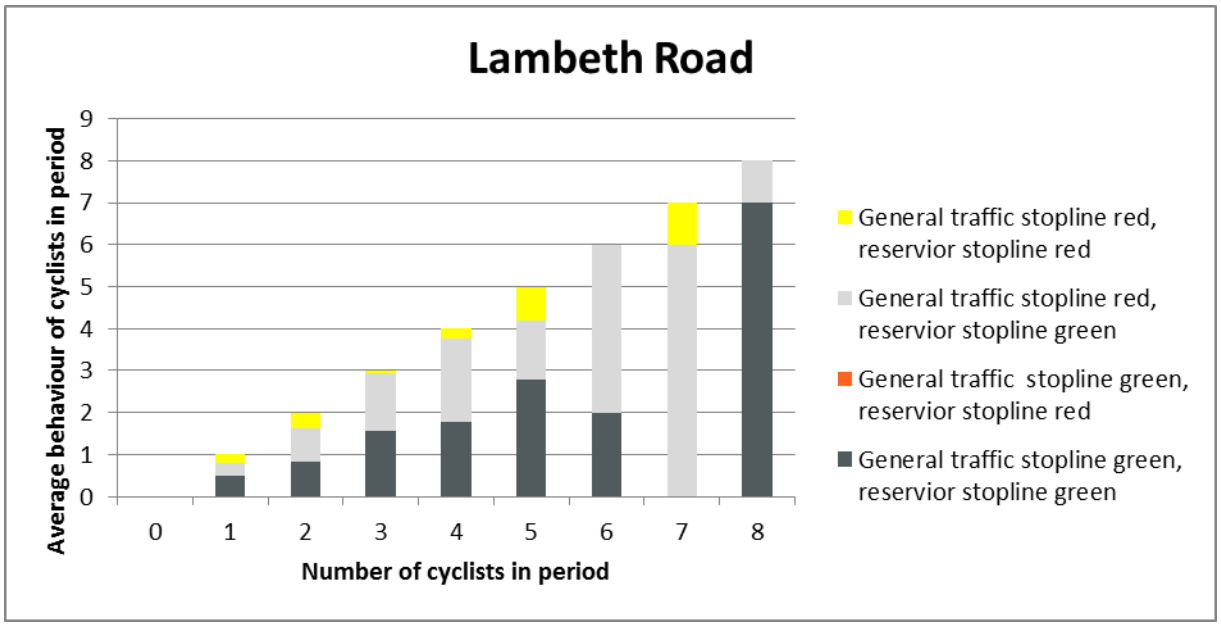


Figure 14 Average compliance with signals of cyclists at Lambeth Road general traffic lane, based upon number of cyclists in any given signal cycle

2.5 Cyclists choice of route and signal phase

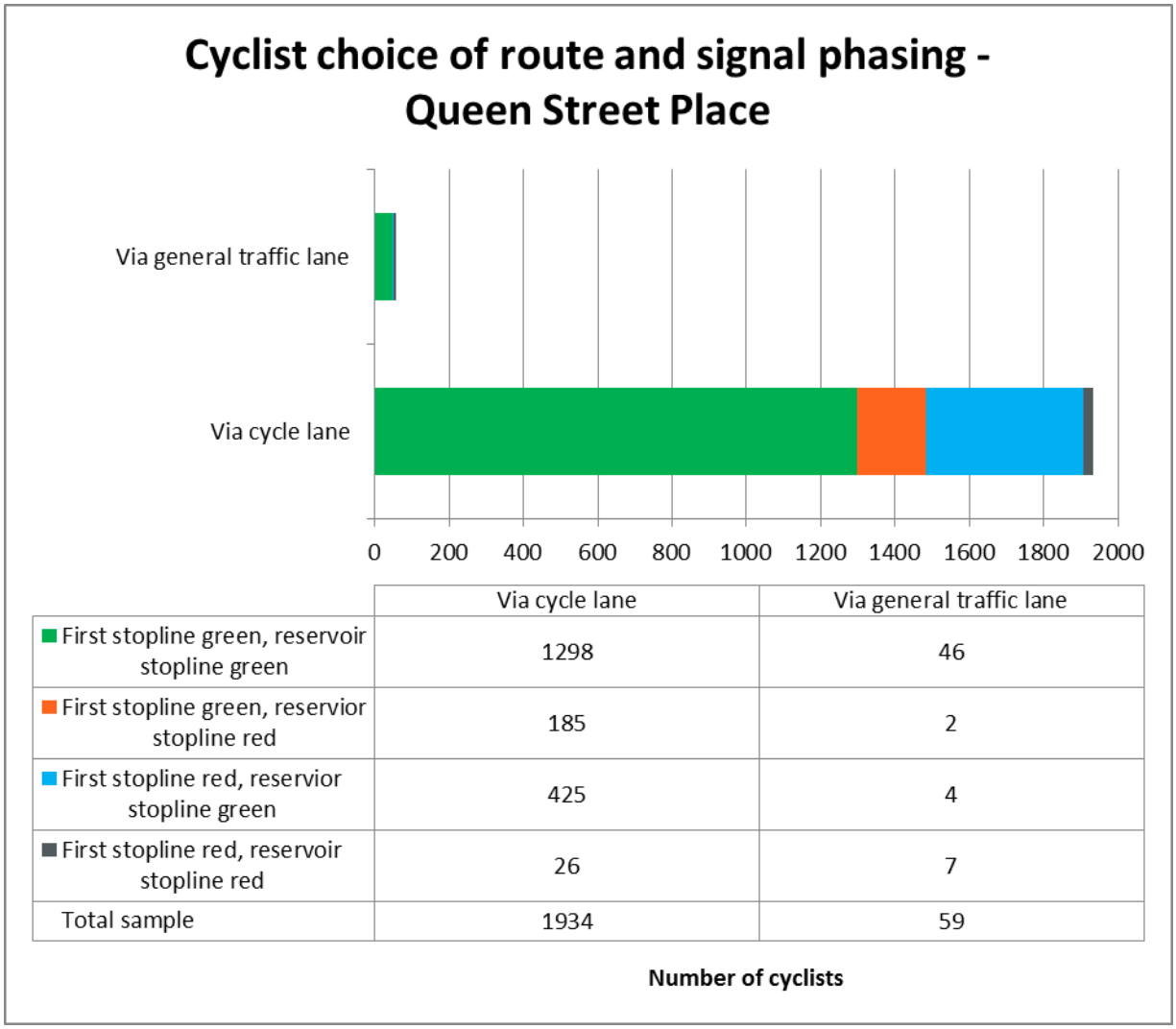
2.5.1 Queen Street Place

As explained at the start of Section 2 a count was made of the number of cyclists proceeding through the junction according to their chosen route and the signal phase at which they passed the associated stop lines. This breakdown is shown in Figure 15.

A large majority (1,934, 97%) of cyclists proceeding through the junction used the cycle lane (and hence cycle gate) in preference to the general traffic lane (59, 3%).

At the Queen Street Place junction, it was observed that:

- Of the cyclists using the cycle gate, 67% crossed both stop lines on green.
- Of the 59 cyclists using the general carriageway, 78% (46) crossed both stop lines on green.



	Via cycle lane	Via general traffic lane
First stopline green, reservoir stopline green	1298	46
First stopline green, reservior stopline red	185	2
First stopline red, reservior stopline green	425	4
First stopline red, reservoir stopline red	26	7
Total sample	1934	59

Figure 15 Cyclist choice of route and signal phasing – Queen Street Place (Via cycle lane N = 1934. Via general traffic lane N = 59)

425 of the cyclists (22%) using the cycle gate at Queen Street Place were observed to disregard the initial red signal on the cycle gate and then use the green signal at the reservoir stop line. The Queen Street Place video footage revealed only one instance of this resulting in a conflict (see Figure 16 below). This cyclist is indicated in the red circle in the image, where the cyclist passed the cycle lane signal at red and nearly came in to contact with the white van turning left (which had passed the general traffic signal on green). The cyclist was travelling straight ahead.

Figure 16 Cyclist crossing cycle stop line on red conflicts with turning vehicle at Queen Street Place

Further, a total of 220 cyclists (11%) at Queen Street Place were noted to proceed past the reservoir stop line on a red signal. The video analysts noted that this usually occurred during the all-round pedestrian stage or during the inter-green period. 1.3% of cyclists (26 cyclists) using the cycle gate and 11.9% of the cyclists (7 cyclists) using the general traffic lane were observed to cross both stop lines on red signals.

2.5.2 Lambeth Road Junction

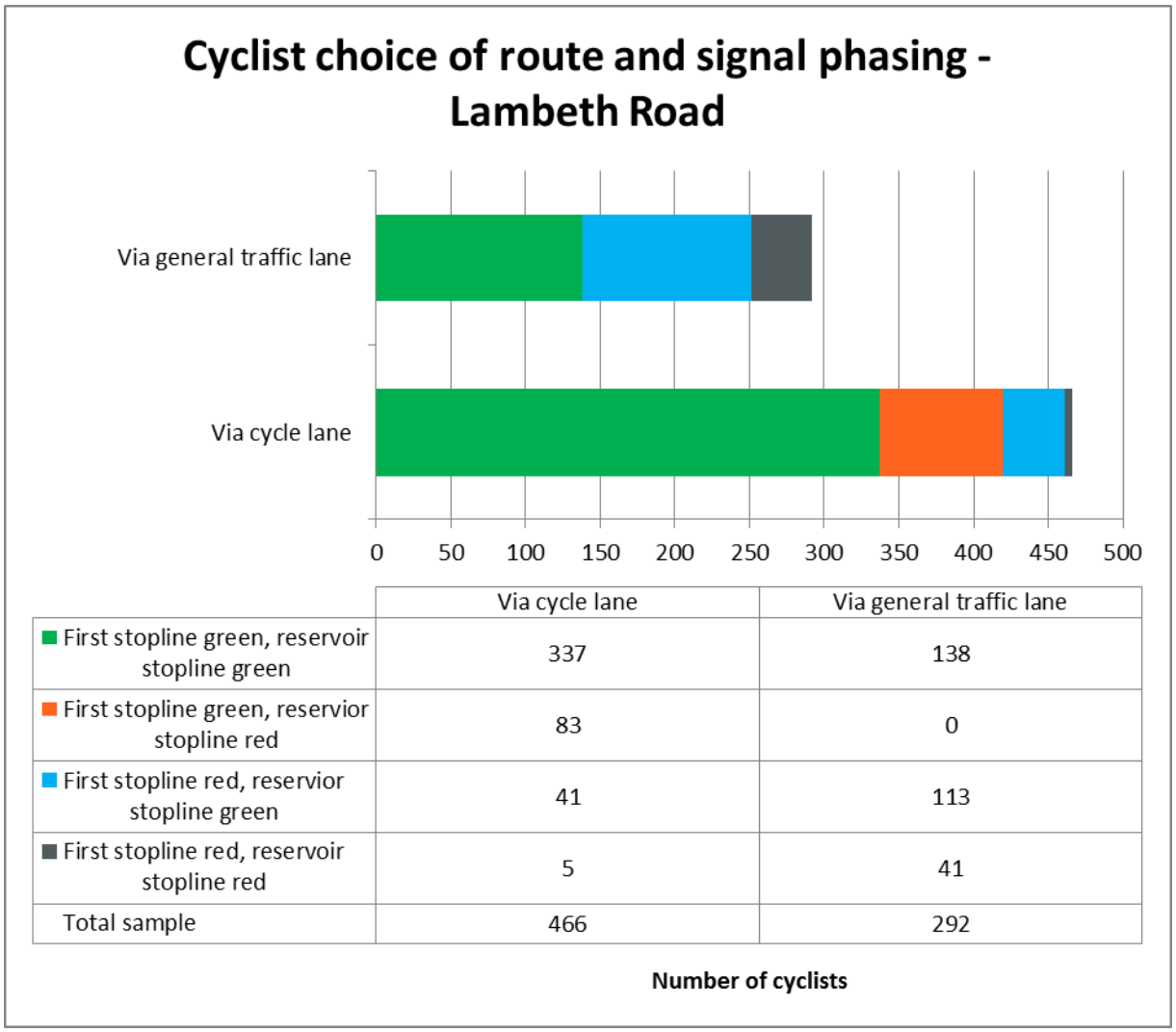
For the Lambeth Road site, Figure 17 provides the breakdown of the number of cyclists proceeding through the junction according to their chosen route and the signal phase at which they passed the associated stop lines.

At the Lambeth Road junction of the total of 758 cyclists observed:

- 466 (61%) of the cyclists used the cycle lane and gate
- 292 (39%) use the general carriageway

Of the cyclists using the cycle gate 72% crossed the cycle stop line during the green signal phase and then crossed the reservoir stop line at a green signal as well

Of the cyclists using the general carriageway, 47% crossed both general traffic and reservoir stop lines on green.



	Via cycle lane	Via general traffic lane
First stopline green, reservoir stopline green	337	138
First stopline green, reservior stopline red	83	0
First stopline red, reservior stopline green	41	113
First stopline red, reservoir stopline red	5	41
Total sample	466	292

Figure 17 Cyclist choice of route and signal phasing – Lambeth Road (Via cycle lane N = 466. Via general traffic lane N = 292)

83 (17.8%) cyclists using the cycle gate proceeded via the cycle lane at a green signal then proceeded through the reservoir stop line on a red signal. The Lambeth Road video footage revealed that this resulted in conflict (i.e. involving action to avoid collision) with motor vehicles on three occasions. An example is depicted in Figure 18 below, whereby the cyclist

did not comply with the red signal at the reservoir stopline and came in to conflict with traffic. No actions observed within this study appeared to result in collision between any parties.

Figure 18 Cyclist in conflict with traffic after passing advanced stop line on red signal

Figure 19 shows a cyclist passing the cycle stop line on red and then coming in to conflict with general traffic turning left. 8.8% of the cyclists (41 cyclists) using the cycle gate proceeded at a red signal through the initial red signal and then through the reservoir stop line on a green signal. 38.7% of the cyclists (113 cyclists) using the general traffic lane proceeded at a red signal through the traffic stop line and then at a green signal through the reservoir stop line.

Figure 19 Cyclist conflict with general traffic after passing cycle lane signal at red

6.1% of the total cyclists were observed to pass both stop lines at red, and most of these were cyclists who had arrived via the general traffic lane. It was casually noted that such instances happened generally during the inter-green period or the all-round pedestrian stage.

2.6 RQ1 Summary

- 97% of the cyclists on Queen Street Place and 61.5% of cyclists on Lambeth Road proceeded through the junction via the cycle lane and cycle gate rather than the general traffic lane.
- 67.1% of the cyclists using cycle lane and 78% of the cyclists using the general traffic lane on Queen Street Place crossed the first stop line as well as the reservoir stop line at green signal.
- 72.3% of the cyclists using the cycle lane and 47.3% of the cyclists using the general traffic lane on Lambeth Road crossed the first stop line as well as reservoir stop line at a green signal.
- 22% of the cyclists using the cycle lane and 6.8% of the cyclists using the general traffic lane observed on Queen Street Place ignored the red signal at the first stop line if the reservoir signal was green (this signal is a short time, around 3 or 4 seconds).
- 8.8% of the cyclists using the cycle lane and 38.7% of the cyclist using the general traffic lane observed on Lambeth Road ignored the red signal at the first stop line if the reservoir signal was green.
- 1.7% of the cyclists on Queen Street Place and 6.1% of the cyclists on Lambeth Road were observed to disregard the red signals at both stoplines.
- Significant differences were observed between the two sites:
    - A much higher proportion of cyclists used the cycle gate at Queen Street Place; and
    - Compliance with signals was lower at Lambeth Road in terms of using the cycle gate in a proper manner, i.e. crossing the cycle gate stop line at green signal via the cycle lane and then crossing the reservoir stop line at green signal as well.

3 RQ5 – General traffic failing to clear the reservoir

This research question concerns whether motor vehicles were observed to clear the cycle reservoir and what happened if they did not. The following issues were considered:

- Does general traffic fail to clear the reservoir, i.e. the space between the first stop line for general traffic and the reservoir stop line?
- What factors appeared to contribute to these instances and what interactions with cyclists resulted from them?

The sample size was 588 traffic cycles, which were chosen as the first 6 complete signal cycles from the start of each hour from 7am to 8pm (14 hours) for 7 consecutive days starting on the 27th March 2017. This ensured a spread of examples for increased representativeness of vehicle actions at all times of the day.

3.1.1 Research results

At both Queen Street Place and Lambeth Road, very few instances were observed of general traffic failing to clear the reservoir space. Of the total 588 signal cycles observed from the video surveys at each site, general traffic was noted to occupy the reservoir space in 22 signal cycles (3.7%) on Queen Street Place and in 8 signal cycles (1.4%) on Lambeth Road. These results are shown in Figure 20.

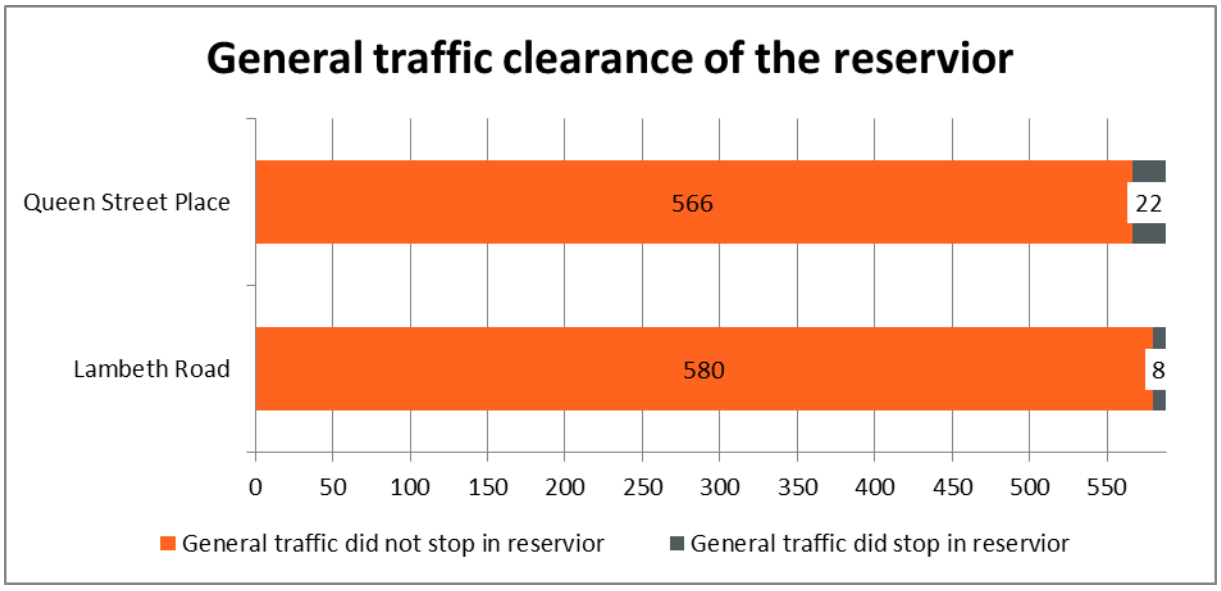


Figure 20 General traffic clearance of the reservoir

The major reasons observed for general traffic to fail to clear the reservoir space were:

i. Non-compliance with red signal at initial stop line by the general traffic;

ii. Queueing of traffic on the intersecting road (from traffic which enters the junction but cannot fully exit on to the intersecting road because of traffic on it);

iii. Use of the cycle lane by powered two-wheelers; and

iv. Other reasons – including taxi waiting picking-up/dropping-off passengers, or heavy traffic from Queen Street Place moving slowly through the junction and the following vehicles entering the junction but failing to clear it before the signals changed.

The numbers in each of these categories are show in Figure 21 and Figure 22.

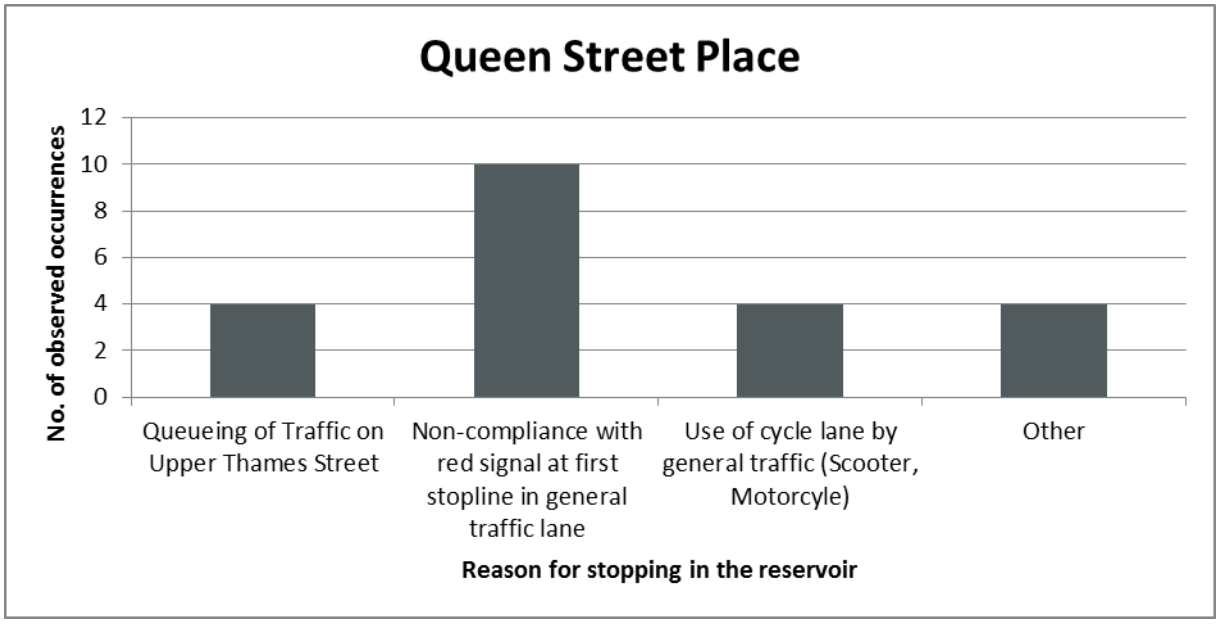


Figure 21 Reasons for vehicles stopping in reservoir space – Queen Street Place

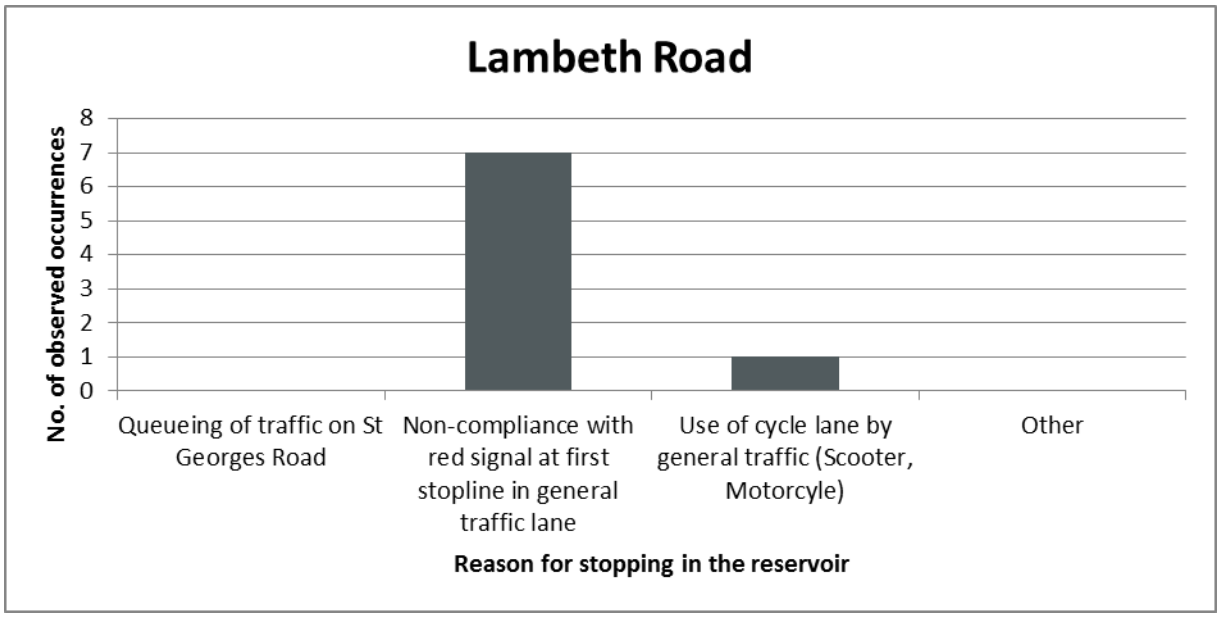


Figure 22 Reasons for vehicles stopping in reservoir space – Lambeth Road

Interaction between cyclists and general traffic waiting in the reservoir space was only observed once as can be seen in Figure 23, where the car did not comply with the general traffic stopline red signal and stopped in the reservoir.

Figure 23 Car stopped in the reservoir space – Queen Street Place

Four instances of traffic failing to clear the Queen Street Place reservoir because of queuing traffic on Upper Thames Street were observed, however of these three occurred when temporary diversions were introduced for the westbound traffic on Upper Thames Street on 29th March, 2017 (Wednesday) between 1:30 pm to 3:30 pm. No such instances were observed on Lambeth Road / St Georges Road.

3.1.2 RQ5 Summary

- 22 instances on Queen Street Place and 8 instances on Lambeth Road were observed when general traffic failed to clear the reservoir space.
- The main reasons why motor vehicles stopped in the reservoir space include: non-compliance of red signal at the initial stop line by the general traffic and queueing of traffic on the intersecting road.

4 Conclusions

The key findings for each of the Research Questions are summarised below.

For RQ1, the majority of cyclists routed themselves through the cycle gate as intended. This was particularly the case at Queen Street Place, where almost all cyclists (97%) approached the cycle stop line from a segregated cycle lane, 67% of whom proceeded on green signals. Use of the facility and compliance with signals was lower at Lambeth Road (61.5%), 72% of whom proceeded on green signals. At this location cyclists have not been in a dedicated nearside facility on the approach.

For RQ5, across both sites, general traffic only failed to clear the reservoir on 2.6% of the observed signal cycles. Motor vehicles therefore rarely undermine the intended operation of the cycle gate by getting stuck in the reservoir. Where they did so, the main factor was non-compliance with signals by motorists.

Appendix A Cycle gate Research Questions

ID	Research Question	Contextual issues to consider or 'observation only' issues	Data source	Methodology	Sample	Expected outcome
RQ1 & RQ2	How many cyclists enter the junction: - via cycle stop line, on cycle green, then (after waiting), reservoir stop line green? - via cycle stop line, on cycle green and reservoir stop line red? - via cycle stop line, on cycle red and reservoir stop line green? - via general traffic stop line, on green (with reservoir stop line green)? - via general traffic stop line, on red (with reservoir stop line red)? Note that only the first of these is the 'proper' way of using the cycle gate.	Note any interactions arising from cyclists progressing through a red signal	Video	Need to watch each cyclist through the junction. Assumes 1 or 2 cameras as there is a need to capture interactions too.	Use first 6 signal cycles seen from each start of 14 hours each day (7am start) with cyclists making this manoeuvre, giving a sample of 588, split evenly across both arms. Note there is a risk that this depends upon cyclist numbers which may not materialise.	An understanding of cyclists' accordance with signal aspects and control mechanisms.
RQ5	On what proportion of signal cycles does general traffic fail to clear the reservoir, i.e. the space between the first stop line for general traffic and the reservoir stop line?	What factors appeared to contribute to these instances and what interactions with cyclists resulted from them?	Video	Camera needs to cover reservoir.	Use first 6 signal cycles seen from each start of 14 hours each day (7am start), giving a sample of 588.	An understanding of the capacity impact of junction from having a cycle gate.

Cycle gates

Cycle gates have recently been introduced in London, as a method of separating cycle traffic and general traffic at signal-controlled junctions where a significant proportion of motor vehicles turn left. This report presents the findings of research into road user behaviour and attitudes at two cycle gates on Cycle Superhighways, these being at Queen Street Place and at Lambeth Road.

Video recordings were made at the two sites and analysed to identify cyclists' choice of route through the junction and motorists' and cyclists' compliance with signals while passing through. Two key research questions were addressed:

RQ1 What proportion of cyclists use the cycle gate rather than going with the general traffic, and what proportion of these comply with all signal phases?

Whilst the majority of cyclists use the cycle gate at both sites there is significant variation in the proportion that do so, suggesting that local factors are very important in cyclists' decisions on how to use the junction.

Although the majority of cyclists comply with traffic signals, a number appeared to take opportunities to progress through red lights. The video analysts noted that this usually occurred during the all-round pedestrian stage or during the inter-green period, which means they are unlikely to conflict with moving motor vehicles.

RQ5 - On what proportion of signal cycles does general traffic fail to clear the reservoir space?

Traffic remaining in the cycle reservoir was observed in only 2.6% of observed signal cycles (across both sites). The primary reason for those instances which did occur was observed to be non-compliance with the red signal at the initial stop line by the general traffic.

Very few vehicles failed to clear the reservoir, suggesting that the design is appropriate for the local conditions. Those instances that did occur were largely related to non-compliant motorist behaviour.

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