MAKING SCHOOL STREETS HEALTHIER:
Learning from temporary and emergency closures

March 2022

ACTIVE TRAVEL ACADEMY
UNIVERSITY OF WESTMINSTER
CROSS RIVER PARTNERSHIP
HEALTHY STREETS EVERYDAY
SUPPORTED BY
MAYOR OF LONDON
Department for Environment Food & Rural Affairs

Information Pages

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Organisational Bios:

Cross River Partnership (CRP) is a non-profit and impartial partnership organisation delivering positive change for London's residents, businesses and visitors for over 25 years. CRP's vision is to address sustainability challenges collaboratively in London and beyond. As a testbed for exciting projects in towns and cities, we will share knowledge, evidence, and best practice for the people who live, work, and visit these places.

Set up in September 2019, the Active Travel Academy (ATA) brings together a broad spectrum of expertise to lead research, teaching and knowledge exchange, with a focus on walking and cycling, use of other 'micromobilities' from e-scooters to electric hand cycles; and reduction in car use. The ATA addresses issues around air pollution, climate breakdown, an inactivity epidemic, road injuries and deaths, unequal access to transport and the loss of independent mobility in childhood and at older ages.

Information Pages

About the Healthy Streets Everyday Programme:

Cross River Partnership's Healthy Streets Everyday Programme is a 3-year cross-sector project funded by the Mayor's Air Quality Fund. The project aims to empower boroughs, businesses and communities across London to deliver pedestrian-priority healthy streets, increase walking rates and reduce emissions and exposure to toxic air pollution. The programme is also helping to supplement London's COVID response by creating streets that can accommodate and encourage increases in sustainable and active travel and that are pleasant, safe places that all Londoners' can safely enjoy. For more information, please visit CRP's Healthy Streets Everyday Webpage.

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Contents

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Executive Summary

The Healthy Streets Everyday (HSE) programme began in 2019 to promote active, safe, and sustainable travel in London. In line with the Mayor's Transport Strategy, this programme emphasises the Healthy Streets approach, which recognises that promoting health on London's streets requires supporting the diverse ways streets are used, including active travel, by making them safer and more accessible to all.

School Streets – the temporary closure of streets in front of schools to motor vehicle traffic at the beginning and end of the school day – have recently emerged as a key intervention in this approach. The connection between streets and broader public health is perhaps nowhere starker than at the school gates. With over 20% of peak-time traffic associated with the school run, traffic and congestion are concentrated at the cramped residential streets that often serve London's schools. This puts children at greater risk from road danger and poor air quality. These challenging conditions have been exacerbated by Covid-19; specifically, the need for physical distancing and concern about the effects of a car-based recovery.

In response, there has been significant growth in School Streets since the beginning of 2020, with more than 400 currently in place across London. The HSE programme played an important part in providing support to 16 of London's boroughs as they implemented their School Streets programmes, often for the first time. As a crucial part of Transport for London's Covid-19 Streetspace scheme many of these recent School Streets have been implemented as temporary or emergency interventions, employing light-touch and low-cost approaches such as mobile traffic camera enforcement or temporary barriers.

This report sets out several key findings from the close observation of two School Streets:

- Significant reductions in motor vehicle traffic both during the closure time and over the whole day.
- Minimal change in pedestrian numbers and use of space, with some evidence of increased cycling.
- Improvements in several Healthy Streets indicators.

Following from these findings and considering more comprehensive academic research, this report also outlines four recommendations for designers and policymakers to consider when making School Streets more permanent or implementing new schemes:

1. Taking a whole school and whole route approach
2. Reducing traffic effectively through enforcement and exemptions
3. Completing a scheme by changing the public realm
4. Designing for and responding to scheme issues through in-depth monitoring and evaluation

Introduction

Background

Although the relationship between the built environment and health has been well studied, the importance of streets and how we experience them have been more recently incorporated into this understanding and underpins the broader Healthy Streets approach of which School Streets are part. This section gives some background to School Streets and other similar policies.

Key Takeaways

1. The Healthy Streets approach is part of a recent more holistic understanding of public health, which incorporates the role of the urban environment and transport behaviour on health.
2. School Streets have been a key part of the pandemic response but can also support the broader agenda of promoting health through transport planning and urban design.

Public Health, Streets, and the Healthy Streets indicators

Urban planning and public health have long been connected. Early social housing developments as well as suburbanisation both responded in part to the unhealthy conditions of cramped tenement or terrace housing and were often justified by the need to contain the spread of communicable diseases [1]. More recently, public health in planning has also focused on the relationship between the built environment and transportation – demonstrating how car-centric environments lead to lower levels of physical activity. Issues of traffic congestion in urban environments and the health impacts associated with the resulting pollution have also become increasingly important in debates around health and planning. This focus on air quality and physical activity highlights the need to shift car trips to active modes of travel – and this goal has been largely internalised in much recent guidance on street design and urban sustainable transport planning.

Figure 1: Healthy Streets Indicators

The importance of health in planning has recent history in the UK context. It is elaborated extensively in the 2008 NICE Guidelines Promoting and Creating Built or Natural Environments that Encourage and Support Physical Activity (2008)[2] and more specifically in terms of street design in Manual for Streets (2007)[3], which sets out national guidance for residential street design. More recently, London has been at the forefront of thinking on health and streets, with TfL's Healthy Streets[4] approach setting out more general principles for the design of London's streets.

The Healthy Streets approach has been central to the Mayor's Transport Strategy (2018) and the new London Plan (2021). With £2.3bn of funding earmarked for Healthy Streets projects, the approach is central to achieving the Mayor's goal of having 80% of trips in London made by walking, cycling, or public transport by 2041. Although much of the headline Healthy Streets projects have focused on high streets and busy junctions, they have also supported area-wide interventions through the TfL Liveable Neighbourhoods fund and residential streets specifically as part of the London Streetspace emergency response to Covid-19. The Healthy Streets approach also sits within the Mayor's broader goal of improving air quality under the remit of Deputy Mayor for Environment and Energy, Shirley Rodriguez. Consequently, several Healthy Streets projects, including School Streets schemes, have been supported through the Mayor's Air Quality Fund.

The Healthy Streets approach is based on ten indicators (figure 1) that range from physical features of the street (shade, shelter, ease of crossing) to elements of experiencing the street (people feel relaxed, not too noisy), as well as emphasising the use of active modes of travel (people choose to walk, cycle, and use public transport).

This emphasis on the relationship between street design, street experience, and how people move around acknowledges the complex relationship between streets and people's health. This, in turn, resonates with a broader shift in public health towards a more holistic understanding of which factors determine health, including social and environmental factors. Planners and designers have called for balancing the 'place' and 'movement' needs of streets[5] – something which is reflected here in the 'things to see and do' indicator but also the emphasis in Healthy Streets on improving mental as well as physical health of Londoners through street design[6].

School Streets

Although School Streets have been mainly discussed in terms of improvements to air quality, road danger, and active travel, they also resonate with the more holistic transport planning represented by the Healthy Streets approach. By closing streets or restricting traffic at the beginning and end of the day, they improve several Healthy Streets indicators. For example, the ease and safety of crossing the street or the quality of its air, but also by ideally reclaiming the street they can in some cases provide space for parents to socialise more easily and hopefully also for children to play at pick-up and drop-off times.

The GLA's report on Making London Child Friendly[7] makes a case for designing public spaces and streets to be safe for children and allow for independent play in contexts that are integrated into their everyday lives. By reasserting the 'place' element of these streets, School Streets can play a part in these broader goals of independent mobility and unstructured play in the urban environment and the more apparent benefits of air quality, active travel, and road safety. Not all Local Authorities emphasise every one of these goals in their policies. Some Local Authorities, Hackney included, do not state the more flexible use of the carriageway through play, social distancing, or parental socialising as a policy goal – focusing instead on the other benefits of School Streets.

Key Benefits of School Streets

- Increasing levels of active travel leads to more physical activity, which has health benefits and can improve concentration in class.
- Traffic reduced streets, or in some cases even traffic free streets, also lead to improved road safety and better air quality directly in front of the school gates.
- Increasing the usable space for pedestrians allows for greater physical distancing and potentially space for play and socialising when risk of Covid-19 infection is lower.
- Emphasising the 'place' functions of a school's street over and above the 'movement' functions; allowing for multiple uses of the space.

In the 400+ School Streets that have been implemented in London, several different scheme designs have been used to achieve these goals. Many Local Authorities, such as Hackney where this report is focused, have used ANPR cameras to issue fines to unregistered drivers who enter the street during a closure, others have used temporary barriers and stewards or folding bollards to block the street during the closure period. Each of these designs have trade-offs and may help to achieve improvements for certain Healthy Streets indicators and policy goals over others. Some School Streets, notably at a handful of sites in Southwark, have closed short stretches entirely using 'modal filters' that are in place at all times and prevent through-traffic throughout the day – similarly to Low Traffic Neighbourhoods. However, a key consideration with most School Street designs is the management of exemptions for the vehicles of the residents who live within the closure or for those with a specific need to . This is not possible with more permanent closures, which has led to many Local Authorities favouring the use of more flexible methods, allowing them to accommodate more easily the unique needs of specific schools and neighbourhoods.

The rapid rollout of School Streets in 2020 and 2021 as part of the Covid 19 pandemic response (see figure 2) has also influenced their implementation. An emphasis on flexibility and more temporary solutions has characterised many of these emergency School Streets. In some cases, lighter touch approaches like temporary barriers or mobile ANPR – where a camera is only in place some days and can be shared between sites – have allowed Local Authorities to implement schemes more quickly and spread resources further.

Schemes installed under TfL's Streetspace plan were prioritised at schools with the most urgent need for social distancing, for example, those with the narrowest pavement widths[8]. In a way, this brings urban planning and public health back to their earliest common concern; containing the spread of communicable diseases through decreasing crowding.

In terms of other scheme goals, research commissioned by the GLA estimated a 5% improvement in NO2 concentration at schools with School Streets[9], whilst there have also been promising findings on parental perception of schemes from a TfL report[10]. However, thoroughly assessing the success of School Streets as a public health measure should also consider their use within a more holistic conception of public health represented by the Healthy Streets approach. School Streets seek to improve health in part by encouraging active travel and improving air quality, but within the Healthy Streets framework this is tied to the experience of the street itself. Social distancing, socialisation, safer play, and the general 'place' elements of the streets in front of schools will be reflected only in part by other indicators of health like air quality or mode share for school travel, and more in the way the street itself is used, which is the focus of this research.

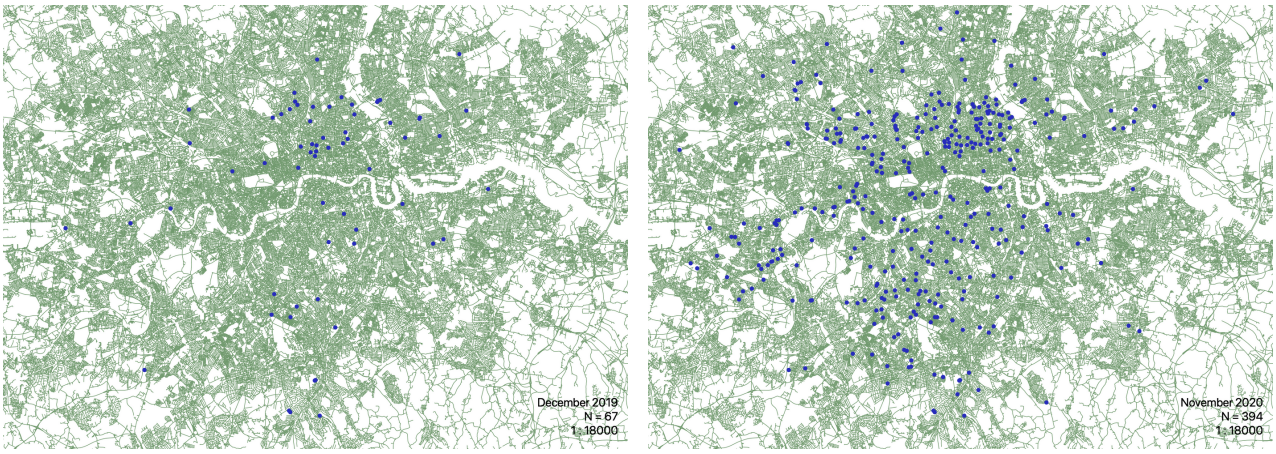


Figure 2: The extent of School Streets in London before Jan-2020 (above), and then up to and including November 2020 (below). Data compiled from Local Authority records by Mums for Lungs, Basemap: Crown copyright and database rights 2021 Ordnance Survey (100025252)

Case Study Context

This research was conducted on two schools in the London Borough of Hackney. Prior to 2020, Hackney already had one of London's most extensive School Street programmes which was ambitiously expanded during the early stages of the Covid 19 pandemic now with over 80% of all primary schools treated. The two sites studied were part of a later tranche of this programme that were installed during the 2020/21 School Year. The Rendlesham Road scheme began in November 2020, however Fairholt Road was part of a later tranche and did not commence until June 2021.

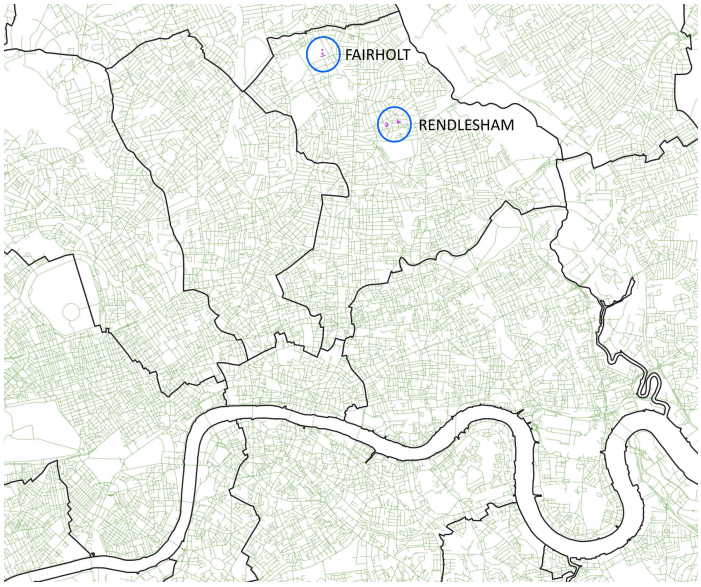


Figure 3: Map showing location of case study sites. Crown copyright and database rights 2021 Ordnance Survey (100025252)

Data was collected using automatic sensors provided by the company Vivacity. These sensors count pedestrians, vehicles, and cyclists as they pass the school entrance. They also provide data on the speeds of motor vehicles and the different paths that pedestrians have taken across a street. Data from before and after the School Street installation was collected on both sites, although the staggered timing of the two schemes means that the observation did not occur concurrently. The Rendlesham Road site 'after' period was also interrupted by the Christmas holidays and the January lockdown, with only two weeks captured immediately following the School Street launch.

The two sites are just over a mile apart and are located in predominantly Victorian terraced residential areas. However, there are critical differences between the sites. Rendlesham Road is home to a smaller school within one of Hackney's new Low Traffic Neighbourhoods. The street is notably quieter than Fairholt Road, which despite also being predominantly residential, is located at a busy intersection – something reflected in the traffic flow data presented below. In both cases, the road closed by the School Street is a perpendicular intersecting road to a busier road not affected by the scheme, which also has a separate entrance to the school. Mode share data from 2016/17 indicates that at both schools most students arrive by active means of travel. Rendlesham road has a smaller active travel mode share, but this is mostly accounted for by the higher public transport use as opposed to significantly higher driving.

Both sites were initially enforced by mobile ANPR, which means the cameras are stationed occasionally issuing fines to any vehicle which transgresses, aside from

those which are exempt from the scheme and have a permit. These cameras are not always in place, and when they are not, drivers are still expected to observe the closure. The Rendlesham Road School Street closure at the time of writing is still enforced in this way. Fairholt Road, although initially only enforced intermittently, had a permanent fixed-ANPR camera installed in September 2021, which automatically issues fines to every transgressing vehicle. There is an initial period where only warning notices are issued, this is so drivers become accustomed to the restrictions. Both School Streets are marked by folding signage at their entrances which indicates the timing of the closure but can also be easily obscured when not in use over the school holidays.

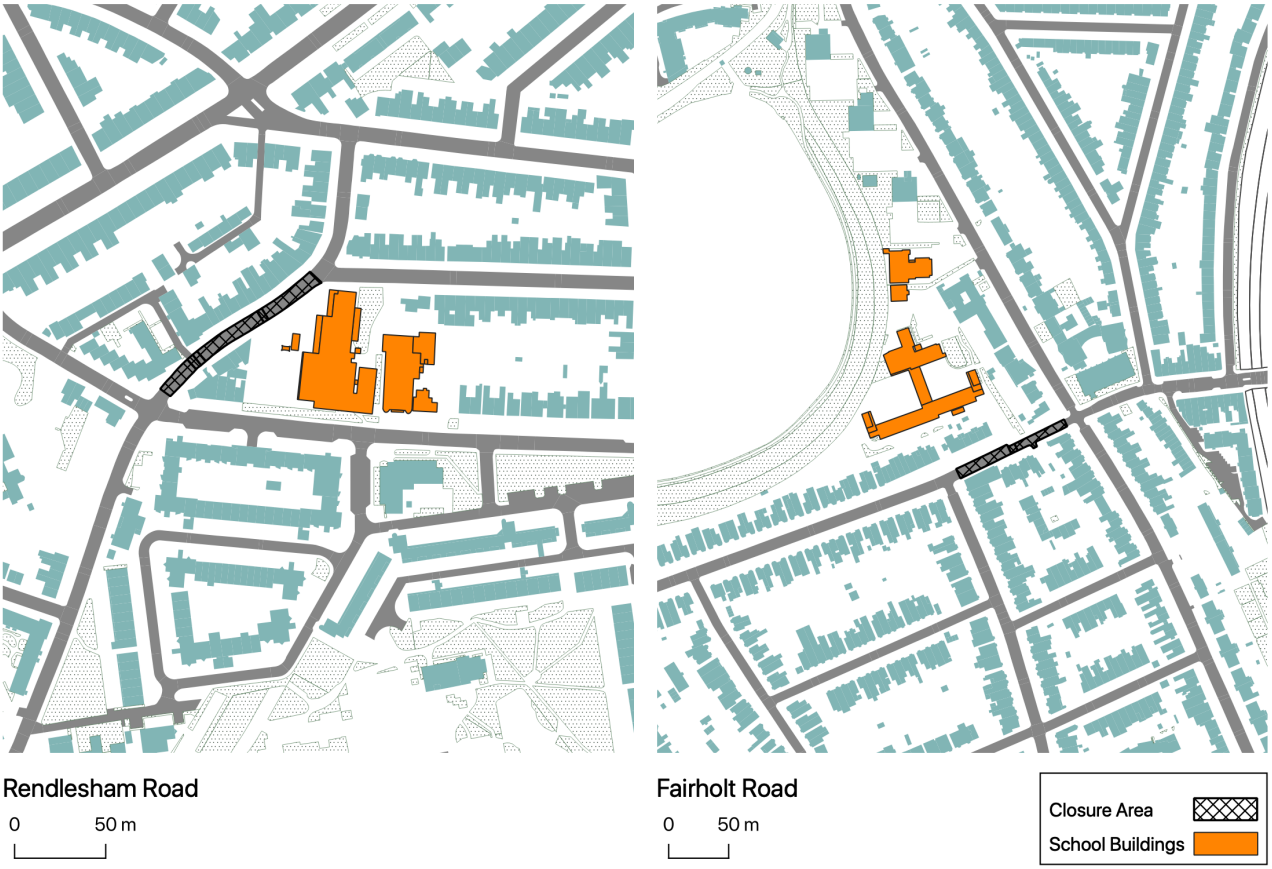


Figure 4: Map showing layout of both case study sites. Crown copyright and database rights 2021 Ordnance Survey (100025252)

Findings

This section outlines in more detail how the use of these two streets has changed following the introduction of a School Street scheme. This analysis will give a sense of whether lighter-touch School Streets have successfully changed elements of how the street is experienced and highlight some areas that practitioners may consider when designing future schemes. This section will also consider how these changes might be quantified in terms of the Healthy Streets indicators. Three major takeaways are emphasised:

Takeaways

1. The benefits of School Streets are most significant when traffic is effectively reduced. For schools on busier roads, this is best achieved through continuous enforcement methods such as fixed ANPR.
2. Reduction in traffic did not lead to pedestrians using the carriageway for movement. Even when the School Street is in place, people tend to stick to the pavement.
3. These School Streets notably improved the Healthy Streets Score for the streets. However, this was not evenly distributed across all indicators, especially as these schemes did not improve the public realm with physical measures.

Traffic Volume and Enforcement Methods

Section Key Findings

1. Significant reduction in traffic at peak times on these streets during the closure time.
2. 'After glow effect' – an overall reduction in traffic outside of closure times as well.
3. Reduction is even greater when full fixed ANPR enforcement is implemented.

<u>Overall Trends</u>

The main objective of a School Street is to remove or reduce vehicle numbers on the segment of street outside of a school. We should expect to see significant declines in the number of vehicles using the street during the closure period, which in the case of these sites is 2 hours a day (split into two 1-hour periods). However, given that there are resident vehicles with exemptions on both streets, and that in the case of Rendlesham Road and the early stages of Fairholt Road the enforcement is only in place occasionally, residual traffic should also be expected. The below chart shows the before (grey) and after (blue) patterns of motor vehicle traffic on Rendlesham Road. The previous peaks coincided with the closure time, which are now significantly lower, even without continuous enforcement. For both sites the decline in traffic during the closure time is between 54% and 64% when enforced with mobile ANPR.

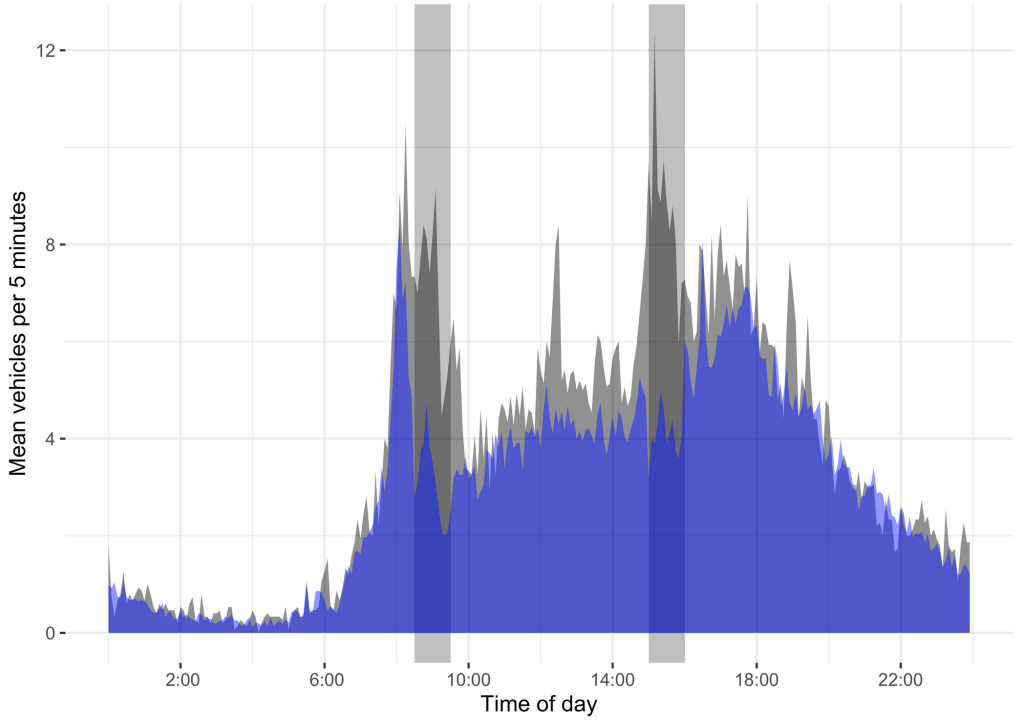


Figure 5: Chart showing daily average traffic pattern before and after the introduction of a School Street (Rendlesham Road)

This chart also shows a general decline in traffic outside of the School Street closure time. It has been speculated by some that School Streets might also result in a traffic reduction outside of the closure period as drivers choose to avoid it altogether to ensure that there is no chance that they will receive a penalty; what could be described as an 'afterglow' effect of the temporary closure. However, there is the alternative possibility that drivers might delay trips that would have taken place during the closure period and a School Street might see an increase outside of the closure. Of the two, it is the 'afterglow' effect that is somewhat supported by this data. After the introduction of a School Street there has been traffic reduction over the full 24 hours and if we focus only on the hours outside of the closure period. This pattern is observed at both sites. Table 1 demonstrates this in more detail.

Table 1 - Average per day vehicle counts, by closure period and time outside of closure period

Period	Closure times		Outside of closure	
Sites	R	F	R	F
Before	190	718	902	4427
After	86.1	260	754	3950
% Change	-55%	-64%	-16%	-11%

The effect of more permanent enforcement

The Rendlesham Road site only had mobile/temporary enforcement throughout the observation period. However, in September 2021, Fairholt Road switched to a permanently fixed ANPR camera, which would issue fines to transgressing vehicles every time the closure period was in effect. The different enforcement methods on each road allow for a comparison of their impact. The chart below shows the daily pattern for the baseline, mobile ANPR, and full enforcement periods. It shows that at Fairholt Road, the fixed ANPR has been more effective, showing a 75% decrease in traffic from the pre-School Street baseline for the closure hours compared to the 63% for the mobile ANPR (see appendix for the full breakdown).

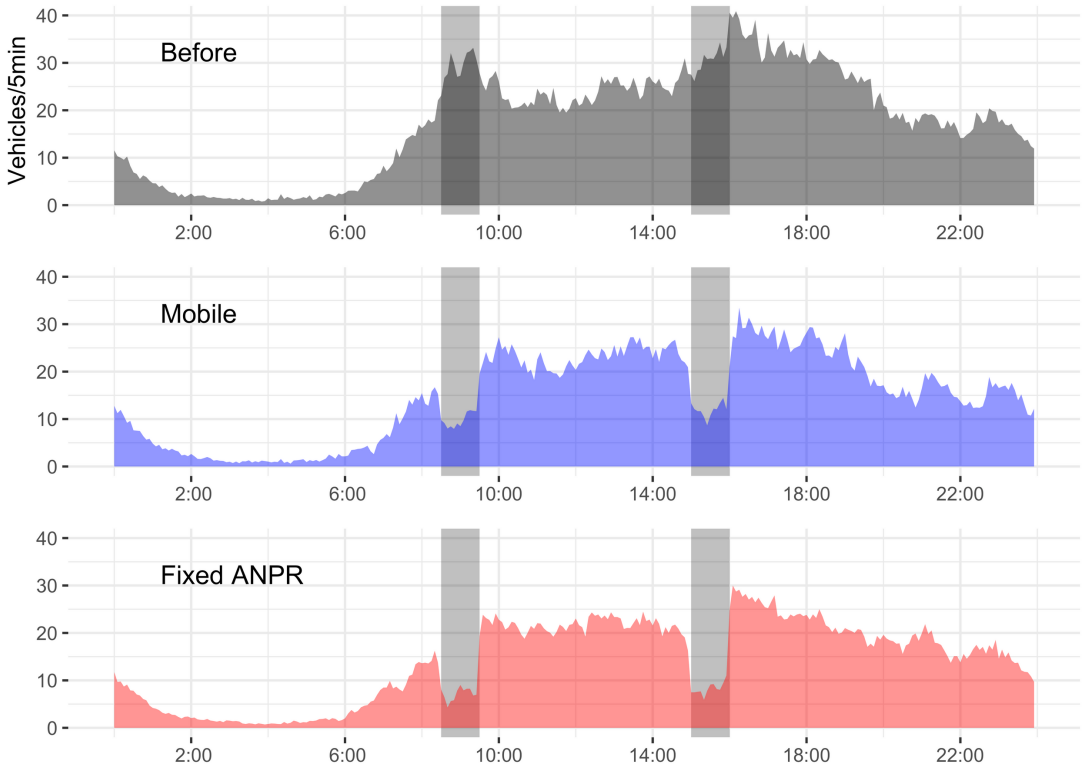


Figure 6: Chart showing the average daily traffic pattern before as School Street and with two different forms of enforcement (Fairholt Road).

A note on vehicle size and class

The class of vehicle was also collected by the sensors, so the changes in the numbers of vehicles of different kinds can also be tracked. In general, these results show that as would be expected the number of large vehicles decreased along with the overall decline in traffic during the School Street restriction periods. However, as a proportion of the remaining vehicles they increased on Fairholt Road, with this effect even greater after the introduction of full ANPR. This could be due to the specific circumstances of the area, here some local minibuses from nearby Jewish schools have been granted exemptions to the closure.

The speed data shows that during the closure times the average speed of the

remaining vehicles has remained relatively stable on both sites, and still well below the speed limit. However, Rendlesham has seen an increase in the 75th percentile and maximum speed. This implies that while many drivers are slowing down some are possibly responding to the decreased volume of traffic by increasing their speed. A full breakdown of the presence of large vehicles during the closure time, and of the changing pattern of vehicle speeds is presented in the Appendix.

Pedestrians and Cyclists

Key Findings

1. The lower traffic did not attract significant additional pedestrians to the street itself.
2. There appears to have been increased cycling at one site during the school peak, specifically when full fixed ANPR enforcement was implemented.

By reducing or eliminating traffic, School Streets create safer conditions for walking and cycling. School Streets also decrease the convenience of driving – potentially incentivising active travel. Shifting from driving to walking and cycling is a key goal of many School Street projects, but it is difficult to determine from this data. A 'hands up' or mode of travel survey amongst pupils is more suited to this purpose. Nevertheless, given the improved conditions we may see an increase in walking and cycling on the street from people altering their routes to take advantage of the closures, or as a by-product of a shift to active modes of travel to school.

<u>Pedestrians</u>

The general pedestrian traffic pattern on both streets shows two significant peaks during the School Street closure times. Examining the changes with the School Street shows a more ambiguous pattern than for motor vehicle traffic, with both sites showing slight decreases (Rendlesham: -5% Fairholt: -9%) during the closure periods after the introduction of the School Street and an inconsistent pattern over 24 hours. Decreases may be due to parents who still drive to school rerouting to other school entrances. Previously, many vehicle drop-offs on the School Street section would also have been counted as pedestrians as they walked from the car to school at that entrance. Despite the decreases, the chart below shows the pedestrian flow maintained a similar general pattern at both sites before and after the introduction of the School Street, although with slightly 'squashed' peaks. Not shown in the plot is that Fairholt Road's numbers rebounded to baseline levels with the introduction of full ANPR enforcement in September. It is difficult to interpret these results as the data does not necessarily tell us whether more or fewer children are walking to school. However, it does imply that, overall, new pedestrian trips have not been attracted to this newly quieter stretch of street.

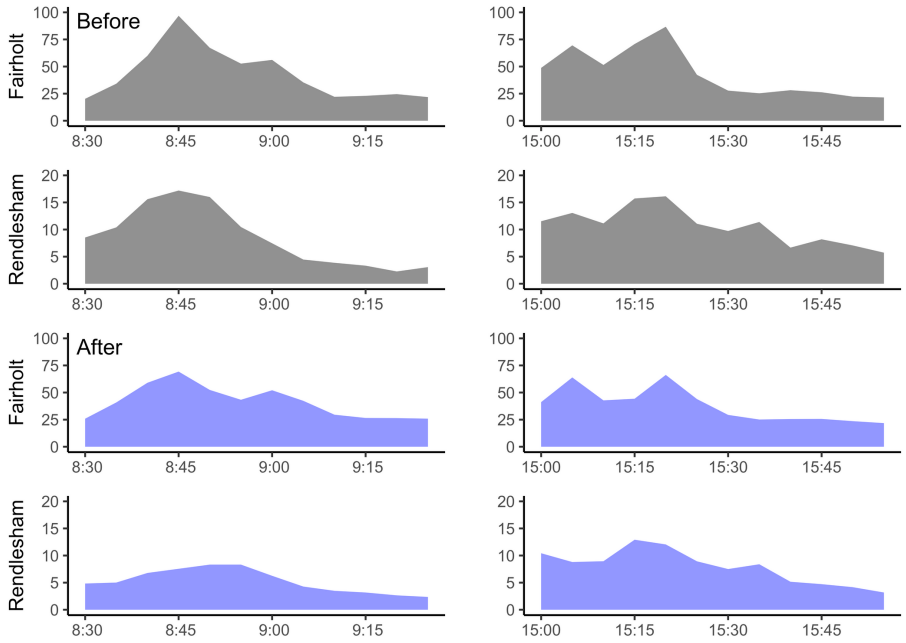


Figure 7: Chart showing the average pattern of pedestrian traffic during the School Street closure times (before and after its introduction – both sites)

Cyclists

The pattern of cycle traffic was notably different, with broader peaks that encompass both the commute and school run. Overall, there was a pattern of increased cycle traffic at these two sites. However, the School Streets appear to have impacted cycling differently. Rendlesham saw no change in cycling during the closure periods, though it witnessed an increase outside of the closure time (14%). As can be seen in the chart below, Fairholt by comparison shows a sharp secondary peak during the closure time. This peak also increased both with the initial introduction of the School Street (14%, average increase of 23 cyclists per day), and to an even greater degree after the introduction of fixed ANPR (40%, average increase of 64 cyclists per day). This is very promising. There was also a background trend of increased cycle traffic over the full 24-hour period (16%), but the increase during the closure far out-strips this, implying that there has been a significant increase in school-related cycling at the Fairholt Road site. Although it is difficult to directly attribute a cause to this change, this pattern does provide more tentative evidence that the use of stricter enforcement may lead to greater benefits from the School Street.

Table 2 - Change in cycling at Fairholt Road with different enforcement methods.

Period	Before	Signage	Fixed ANPR
Closure	162.79	185.63	227.23
% Change		14%	40%
24hr	1135.55	1166.36	1319.86
% Change		3%	16%

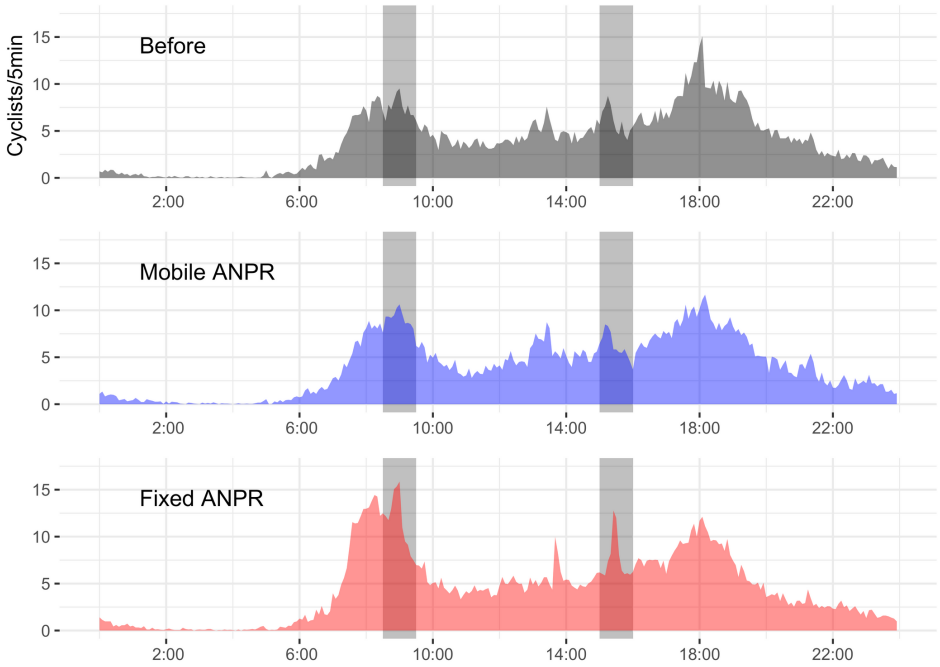


Figure 8: Chart showing the average daily cycle traffic pattern before a School Street and with two different forms of enforcement (Fairholt Road)

Pedestrian Movement

Key Findings

1. The proportion of pedestrians using the carriageway instead of the pavement changes over the closure period. It is much higher in the morning than in the afternoon.
2. There was no significant change in the proportion of pedestrian movement in the carriageway after the introduction of a School Street. Heatmaps show that most carriageway activity is dominated by crossing the street.

The Vivacity sensors used in this project can also record lines that represent a simplified version of the paths different road users take when navigating the street. Analysing these paths could demonstrate how the movement of pedestrians has changed with the introduction of the School Street. Two of the ten Healthy Streets indicators are 'easy to cross' and 'people feel relaxed'. Both indicators imply a change in the relationship between the pavement and the road, with pedestrians feeling more comfortable using the roadway to cross or even linger there. Providing space for physical distancing at the school gates has also been a goal of School Street designs. To ensure adequate space, this implies that pedestrians should also be able to use the roadway instead of only the pavement during the closure time. A way of assessing this is to ask whether more people are crossing the street informally or perhaps walking in the roadway as measured by the pedestrian track lines recorded by the sensor.

The data created by the Vivacity sensor is a highly simplified version of each movement, and it is impossible to attribute each path to one individual. However, taken as a whole, it can be used to estimate what proportion of the total pedestrian movement recorded by the sensor takes place in the carriageway as opposed to the

pavement. A full before and after analysis was only possible at Fairholt Road as the sensor at Rendlesham was repositioned during recording. Based on this analysis, we can determine that during the entire observation period, 563,171 pedestrian movements were recorded, of which 11,836 (2.1%) intersected with or took place entirely within the roadway. Before implementing the School Street, 3.8% of the total recorded walking distance took place on the road. After implementing the School Street, this was reduced very slightly to 3.2%. After introducing the full ANPR, there was a slight increase to 4.2%. These statistics follow the general pattern of pedestrian flows over the entire analysis period. However, changes in the number of pedestrians using the roadway throughout the day did not show significant peaks during or outside the closure time.

Although a before and after comparison could not be made for Rendlesham Road, 16% of the total pedestrian distance took place in the carriageway during the introduction of the School Street. A significantly greater figure than for the Fairholt Road site. When the analysis includes an hour on either side of the closure period, this does not show significant change, implying that, as with Fairholt Road, this use of the space is not necessarily associated with the School Street closure but perhaps reflects the more general characteristics of the street. It is worth noting that traffic levels on Rendlesham Road are significantly lower than on Fairholt, even outside of the closure period. Therefore, levels of traffic flow may still be a factor in the difference between the two sites.

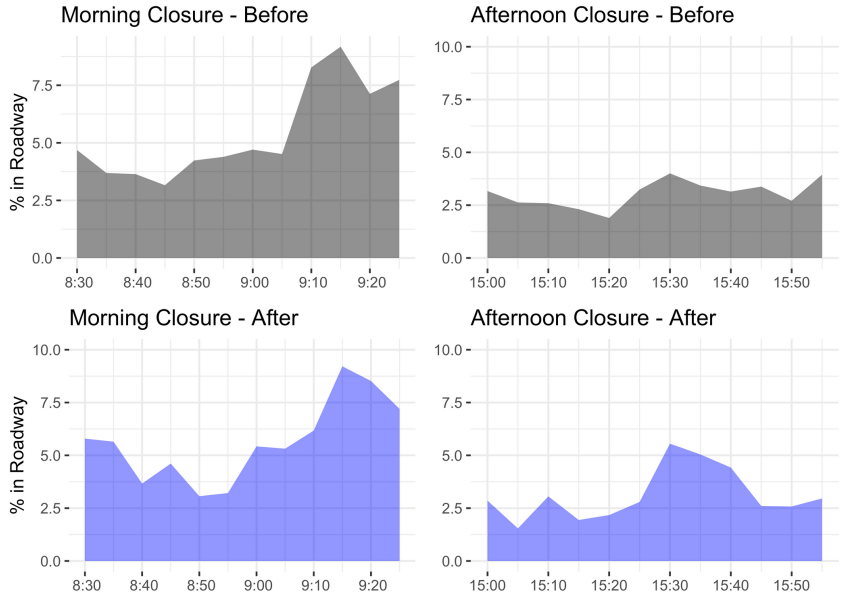


Figure 9: Chart showing the pattern of carriageway use during School Street closure times, before and after its introduction (Fairholt Road)

The above plot shows the pattern of average roadway use for every 5-minute interval during the closure periods for Fairholt Road, both before and after the implementation of a School Street. Interestingly, the morning sees more significant use of the roadway than the afternoon. There is also a peak between 09:10 and 09:20. Despite the overall average being below 4%, at times there is nearly 10% roadway use, which is significant. However, this did not meaningfully change with the introduction of the School Street.

The School Street has, however, coincided with a new peak around the middle of the afternoon closure. This is the time of day where we might expect more lingering, socialising, and play outside of the school gates, so although this might partially explain it, it is still surprising that overall, the afternoon sees less roadway use than in the morning.

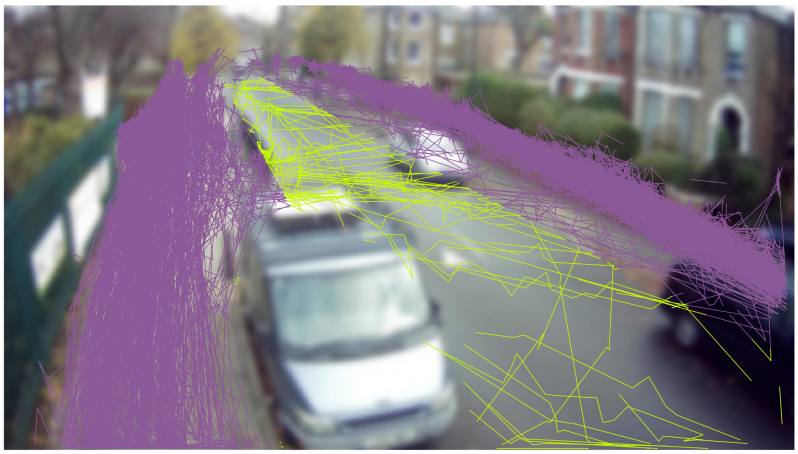


Figure 10: Plot of the pattern of pedestrian use of space during a single day's closure periods (Fairholt Road).

The image above shows a snapshot of all the pedestrian movements during both the morning and afternoon closure periods on the first day the Fairholt Road School Street was in operation. It highlights the use of the roadway and shows the extent to which the pavements are still the dominant place of pedestrian movement on the street. The image below is a heat map that shows where the most intense pedestrian use of the roadway is. Unsurprisingly, this is concentrated where the road is raised to an informal crossing. There is also a gap in the guard rails directly in front of the entrance to the school. The street here is at its narrowest. Another concentration is at the furthest end of the street, which intersects with the slightly larger road. The heatmaps imply that pedestrians primarily use the road to cross instead of walk along. The guard rails and parked cars are also potentially limit where pedestrians can access the carriageway, constraining movement to the crossing areas. This kind of analysis may be helpful for designers when designing more permanent infrastructure to identify where conflict points between pedestrians and vehicles might be and how a more open use of the street might be encouraged.

Figure 11: Heatmap showing where pedestrians have primarily used the carriageway (Fairholt Road)

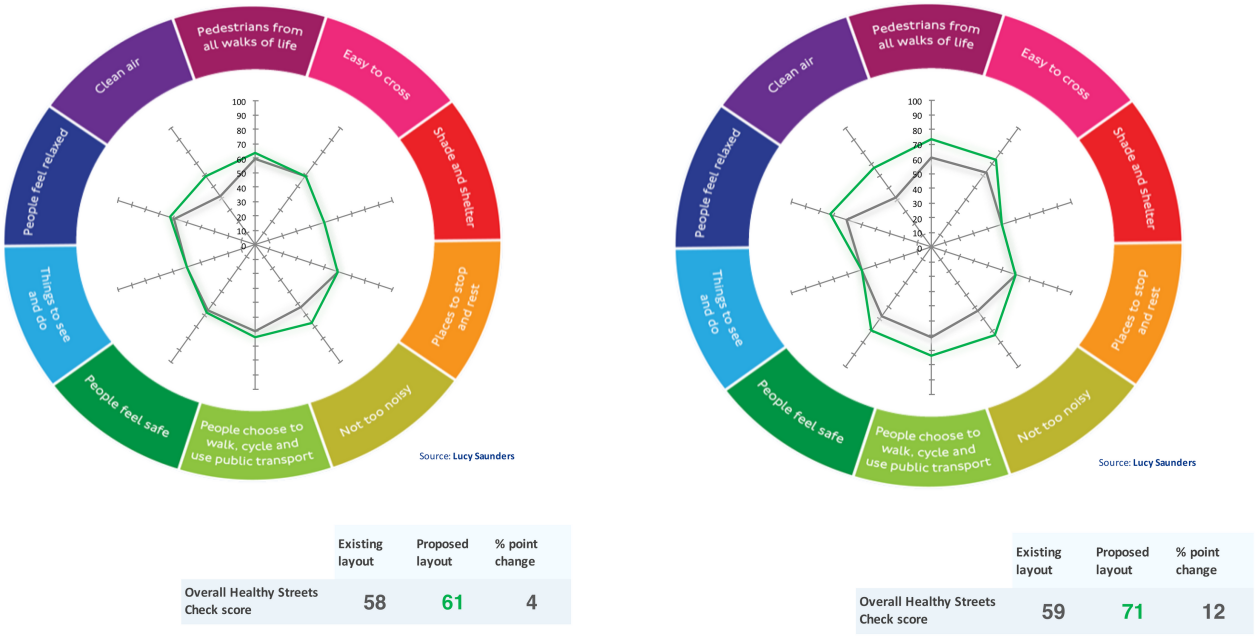
Healthy Streets Indicators

Key Findings:

1. The School Streets increased the Healthy Street score for both streets, but not evenly across the ten indicators.
2. Fairholt Road saw a lower improvement due to road safety issues surrounding the proportion of large vehicles and vehicle speeds during the closure time highlighted by the check.

The Healthy Streets Check for Designers is a tool that has been created as part of TfL's Healthy Streets programme to provide a score for a street, quantifying how it provides for each of the 10 Healthy Streets indicators. To compare a street before and after a proposed or actual change, the Healthy Streets Check uses data on its use, along with objective measurements of the street layout and its characteristics. The check, in short, provides a succinct summary of the street and how it has changed. Here the check helps to illustrate how a School Street relates to the 10 Healthy Streets indicators. As this tool is primarily designed to consider permanent changes that are in place 24 hours a day, it can also be used to compare the impact that a School Street currently has on the street with the effect a closure might have if it was in place 24/7.

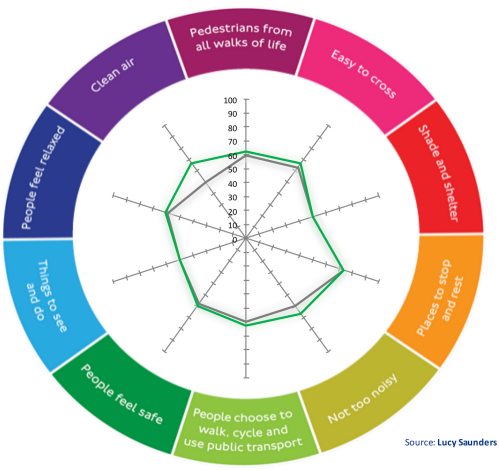
The graphic below shows the score (out of 100) given to both streets before and after the implementation of a School Street - taken over the course of 24 hours and concentrated on the closure time. The vehicle numbers, speeds, and class that we have considered so far all contribute to the final score, along with measurements of the street and the quality of the pavement and roadway taken during site visits.



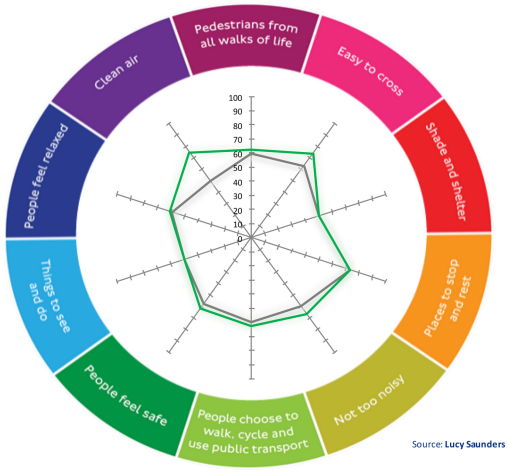
	Existing layout	Proposed layout	% point change
Overall Healthy Streets Check score	58	61	4

	Existing layout	Proposed layout	% point change
Overall Healthy Streets Check score	59	71	12

Figure 12: Rendlesham Road 24 hour (left) and Closure-focused (right) Healthy Streets check



	Existing layout	Proposed layout	% point change
Overall Healthy Streets Check score	59	62	3

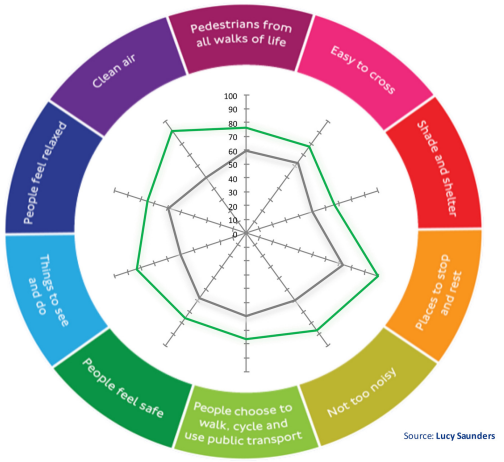


	Existing layout	Proposed layout	% point change
Overall Healthy Streets Check score	59	63	4

Figure 13: Fairholt Road 24 hour (left) and Closure-focused (right) Healthy Streets check

These results show that the implementation of a School Street has improved the street's score in terms of the Healthy Streets indicators. In all cases, this is driven by the reduction in traffic and the effect on the street environment. It also shows that both streets improve to an even greater degree when the analysis is limited to the closure period. Both sites show improvements in 'clean air' and 'not too noisy' indicators and, to a lesser extent, 'easy to cross' and 'people choose to walk and cycle'. However, and as would be expected from a School Street with minimal physical interventions such as this, indicators around the public realm such as ‘places to rest’ or ‘things to see and do’ are not improved. Figure 14 demonstrates this further, showing the score for Fairholt Road if it had undergone a significant public realm scheme as well.

Another critical finding is that Rendlesham Road sees a more significant increase than Fairholt Road. The check also identifies potential road safety issues that should be addressed in a design response. The increase in the proportion of large vehicles at the Fairholt Road site during the closure - present in both versions of the analysis and outlined in the previous section - mutes the effect of some improvements to the Healthy Streets score. An uneven pavement surface and inadequate width for cycling also dampened the improvements. This is a helpful reminder that even if traffic reduction is achieved, potential road safety issues or hazards in the public realm may undermine an intervention's overall objectives.



	Existing layout	Proposed layout	% point change
Overall Healthy Streets Check score	59	78	19

Figure 14 Healthy Streets chart showing score for a School Street with an extensive public realm scheme

The lesson from this exercise is that designers and planners seeking to improve the Healthy Streets score for the streets around their schools should focus on reducing traffic. If exempt vehicles are allowed, their speed and size still need to be considered. Design responses to this issue might include traffic-calming interventions such as chicanes, carriageway width reduction, or other recommendations in TfL's Achieving Lower Speeds toolkit. These might also provide opportunities to reallocate road space for play or build seating/shelter into the public realm. Doing so would improve a wider variety of the Healthy Streets indicators and the overall score, as outlined in figure 14 (See recommendation 2 at the end of the report). The Healthy Streets indicators offer a holistic understanding of the relationship between streetscapes and public health; a reduction in traffic when accompanied by improvements in the public realm/provision for active modes can encourage healthier behaviour. The School Street sites we have looked at here demonstrate perhaps the limits of what can be done within a framework focusing on traffic reduction alone.

Summary

1. Significant reduction in traffic after introducing the School Streets – including an 'afterglow' effect outside of the closure times. Continuous enforcement like fixed ANPR improves this effect. Significant rise in cycling at one site.
2. The School Streets have not led to pedestrians using the carriageway for walking. People tend to stick to the pavement and mostly use the carriageway for crossing movements.
3. The School Streets have improved their roads' Healthy Streets Score, even when in place only some of the time. However, this improvement is not evenly distributed across all indicators and to a different extent at both sites. Improvements to the public realm perhaps provide opportunities to increase scores further.

Discussion

Key Takeaways

1. Flexible timed closures can provide benefits through effectively reducing traffic. However, the evidence of their role in changing how people use urban space is less clear.
2. This may have implications for the limitations of 'light touch' approaches with non-fixed enforcement, especially for schools on busier streets, or streets with many exemptions.

The findings presented here provide a window into the life of two small stretches of street. School Streets have shown great promise in improving a street's contribution to the health of those who use it. Increasingly, the experience of using a street is considered when assessing its contribution to health – some of the Healthy Streets indicators being an example of this. This shift has been compounded by the Covid-19 pandemic, which has made stark the connection between street layout and health. In this context, School Streets have seen a rapid 'emergency' expansion, often utilising light-touch approaches to allow quick implementation and to stretch budgets across more sites. These findings provide a positive but qualified picture of this approach.

This picture also requires some qualifications. Firstly, many of these improvements were augmented and extended when more permanent fixed ANPR enforcement was introduced at Fairholt road, highlighting the importance of enforcement particularly on busier streets. The data on pedestrian traffic at both sites and cyclist numbers at Rendlesham are much more mixed, with no notable increases and some unexpected declines. The information presented here unfortunately cannot be used to determine whether more parents are choosing to walk and cycle to school as opposed to drive. However, the decline in pedestrian numbers on the closed segments observed after the initial introduction of the School Street is difficult to explain and may be due to the remaining parents that do drive rerouting to the entrances on perpendicular and busier roads which remain open. It is worth noting that during the period after full ANPR was introduced at Fairholt Road pedestrian numbers returned to baseline levels. This, along with the increased cycling, may be an early indicator of modal shift but mode of travel data will be needed to confirm. This data might also provide evidence for traffic evaporation which has been observed at other School Street sites[11] or whether these fluctuations in pedestrian numbers are for reasons extraneous to the school.

The analysis of the pedestrian paths shows that there has been no significant change in the use of the roadway by pedestrians. One possible aim for a School Street, which is reflected in their use to support physical distancing during the Covid-19 pandemic, is to have pedestrians feel more comfortable stepping off narrow pavements and walking in the carriageway. Although this has not been a goal for Hackney's School

Streets, in this vision most or all of the street space should be shared between the few vehicles that are permitted and the pedestrians at the school gates. In other contexts, this effect is often achieved through the total redesign of a street to indicate to both drivers and pedestrians that a space should be shared. The design guidance for this type of shared space outlined in Manual for Streets advises that motor vehicle traffic should be below 100 vehicles an hour before pedestrians will feel comfortable using the entire street space[12]. We should expect this threshold to be even lower for parents escorting small children. Although there has been a 64% reduction in traffic on Fairholt Road during the closure times, this still leaves over 130 vehicles an hour. Rendlesham Road, although seeing a smaller reduction, carries on average only 43 vehicles an hour during the closure, well below the threshold of 100. This, alongside the overall lower traffic numbers, may explain in part the greater number of pedestrians using the roadway at Rendlesham Road. However, more research is needed to establish whether this is in fact the case.

Research on the success of shared street designs for pedestrians and vehicles shows that the 'pedestrian level of service' – an overall measurement of the performance of a street layout for pedestrians – is closely related to motor vehicle traffic levels[13]. However, much of the existing research of this kind has focused on large-scale changes to the public realm instead of the more flexible approach to space provided by School Streets. The 100 vehicles an hour threshold from Manual for Streets applies to peak hours. However, a School Street is only designated as shared during the closure time. If parents and pupils experience much higher volumes on that same stretch at other times of day, they may be less likely to see it as shared even when traffic is below the threshold during the closure. More research is needed to examine the extent to which traffic reduction alone can achieve shared use of space, specifically at schools. Academic research on active travel to school has emphasised that parents' perception of road safety is a significant barrier[14] – but that measures such as school crossing guards or improved and more frequent crossings can help. In making School Streets permanent, there has been a focus on automated camera enforcement instead of staffed closures. There is the possibility that the use of marshals/lollipop people may improve how a School Street operates in terms of how parents and pupils perceive the space.

Individual School Street schemes have differing constraints and aim to solve problems that are often unique to their context. That there is not a greater volume or a less constrained use of the space by pedestrians or cyclists does not mean that many of the goals of a specific scheme have not been achieved. Although displacement to other streets is often perceived as a negative outcome of a School Street, it may be justified on safety grounds – where the remaining car movements are moved to a more appropriate section of street. The heatmap analysis of the street showed that Fairholt Road is still predominantly crossed as opposed to lingered on, but the experience of that crossing is now likely greatly improved by the reduced traffic. This brings up the more general point that although achieving a shift to active travel is important, improving or protecting the safety and air quality of those who already

travel actively is also a key goal of these schemes – especially in schools where existing rates of active travel are high.

Overall, we can say that the change in use of these streets is indicative of a 'healthier' street. However, the extent of this is difficult to quantify. For example, we do not know if because of these changes more walking and cycling is now associated with the school as a whole. However, with the steep reduction in vehicle traffic both during and after the School Street closure times, there will be improvements to the safety, air quality, and overall experience of the street. Within TfL's Healthy Streets framework these are important, if incomplete indicators of a healthier street.

Recommendations

As many of the temporary and emergency School Street schemes become permanent, lessons from this project, wider academic and policy research, as well as site-specific Local Authority monitoring can be applied to ensure permanent schemes provide significant benefits. The London Borough of Hackney's School Streets Toolkit for Professionals provides helpful and detailed technical and policy guidance for implementing schemes [15]. These four recommendations outline more general considerations that are relevant to embedding schemes more permanently into schools, streets and neighbourhoods while maximising their potential to encourage shift to active modes of travel and creating healthier streets.

R1 – A whole school and whole route approach

Many schools have multiple entrance points, and often the most significant barriers to safe walking and cycling are not on the segment of the street that is easiest to close. Especially in cities like London, where street layouts are so varied, it is necessary to consider the unique constraints and issues with sites and their surrounding areas. Research on school travel has shown that parental perception of safety is a crucial determinant of active travel, especially independent travel to school. However, their perception of the streets along the route to school rather than the roads immediately surrounding the school is of most importance when parents determine whether active travel is safe (despite the greatest road danger concentrated at the school itself)[16]. TfL research[17] has confirmed that parents perceive School Streets to improve the safety of the street. However, the lesson from this academic research is that schemes should also seek to consider the broader context if trying to achieve a shift toward active travel or if independent mobility is a scheme goal.

This could be done in multiple ways. Hackney's School Streets Toolkit [18] advises Local Authorities conduct Mode of Travel Surveys to identify where each student is arriving to school from and by which mode of transport. This information can be used to identify which entrances to a school are most popular as well as where barriers to active travel are beyond the immediate surroundings of the school itself. Augmenting schemes with crossing improvements, crossing guards, or even wider area treatments like controlled parking zones or Low Traffic Neighbourhoods can help address some of these issues. Using stopping restrictions can help alleviate some of the issues of rerouting to other entrances mentioned above. Successful removal of barriers to walking and cycling on both a whole school and whole route basis should lead to increased uptake of active travel and would be measurable in follow-up travel surveys.

Costs and Benefits

Air Quality ★★

Cost ★★★★

Public Space ★★

Active Travel ★★★★★

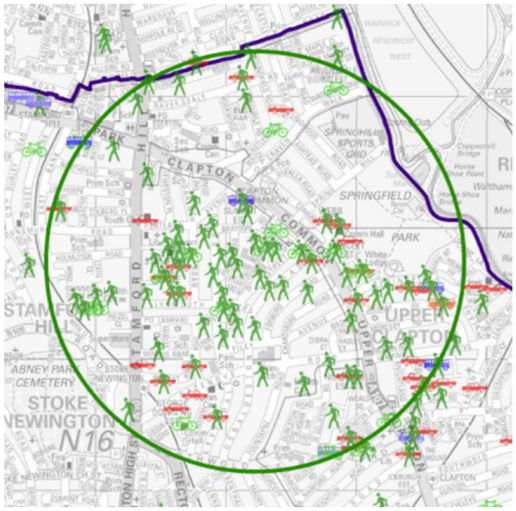


Figure 15: Mode of travel postcode plot for a School. Source: Hackney Council

R2 – Reducing traffic effectively through enforcement and exemptions

Most School Street schemes issue exemptions to residents and allow vehicles to enter or leave the street during the closure. Exemption policies often also allow local blue badge holders, emergency vehicles and, in some cases, taxis through the restriction. Exemption policies and enforcement methods should consider what an acceptable number of vehicle movements is for a School Street scheme. Different metrics are available to determine what level of traffic flow constitutes a quiet and safe street. TfL's cycling design guidance defines flows of less than 500 vehicles an hour as characteristic of a quiet residential street. However, as outlined in the discussion section, the Manual for Streets threshold of 100 vehicles an hour for shared pedestrian and vehicle space is a more appropriate starting point.

Arguably, given the age of the primary road users, this threshold should be significantly lower if a genuinely shared use of the roadway is to be achieved. Local Authorities using ANPR or signage-based enforcement should monitor vehicle traffic after introducing a scheme to ensure that exempt and transgressing vehicles do not amount to excessive traffic. After the scheme has had a chance to bed in over a school term, exemption policies should be reviewed and amended if necessary. The method of enforcement can also be changed. In this research, the example from Fairholt Road demonstrates the additional effect that fixed ANPR enforcement can have. Physical modal filters with bollards or planters can be used either on their own or with ANPR to create entirely traffic-free areas or reduce the number of houses requiring permits.

Costs and Benefits

Air Quality ★★★★

Cost ★★

Public Space ★★

Active Travel ★★★★

Figure 16: Parents and children occupying the carriageway at a Lambeth School Street. Source: Anna Goodman.

R3 – Completing a scheme by improving the public realm

Although 'lighter touch' School Street measures such as temporary barriers or mobile ANPR (in the case of those discussed here) can achieve significant benefits without dramatic alterations to the street, many schemes would also benefit from an improved streetscape. Widened pavements, reduced parking, raised roadways, and reduced street clutter may all help signal to drivers and pedestrians that the street in front of the school has both 'place' and 'movement' functions. Incorporating shelter, places to sit, or elements of play into the streetscape may also improve the built environment outside of the closure time and improve how the street performs in terms of the Healthy Streets indicators. Problems with high vehicle speeds can also be targeted by altering the built environment. TfL's Achieving Lower Speeds toolkit has several options that might be considered.

After successfully implementing a trial scheme, a review of the site should be conducted to understand how it is operating. Publicly available resources like the Healthy Streets Check for Designers used in this report or Jan Gehl's Public Life Tools[19] can be implemented to assess how a space is being used and identify where possible improvements to promote play or sociality might be best targeted. There are many great examples of child-centric public realm schemes to draw on for inspiration. Barcelona's Protegim Escoles scheme demonstrates how light-touch interventions can designate street space in front of schools for different uses such as play. Similarly, Bridget Joyce Square in Hammersmith and Fulham is an example of how the roadway in front of a school can be completely transformed into a new public square.

Costs and Benefits

Air Quality ★★

Cost ★★★★★

Public Space ★★★★★

Active Travel ★★★

Figure 17: A School Street in Barcelona (Copyright Barcelona City Council – CC-BY)

R4 – Designing for and responding to scheme issues through in-depth monitoring and evaluation

The research above shows some of the advantages of in-depth monitoring of School Streets. By counting vehicles, pedestrians and cyclists, a complete picture of the effects of a scheme can be made. Monitoring how the street is used using similar techniques outlined in this research and some recommendations here can help designers respond to issues identified during temporary schemes when considering more permanent interventions. Air quality monitoring can be conducted but should be done with caution as background trends can highly influence results. A recent detailed report commissioned by the GLA[20] has found evidence of air quality improvement at School Streets. The report can be consulted for more information about the issues around assessing air quality at School Streets. It is possible to estimate air quality changes through modelling based on traffic flow data, and this might be preferable if this data is already being collected. To fully gauge the health impact of a scheme, the collection of 'hands up' surveys of pupil travel mode before and after the implementation of a School Street is also essential. It is a low budget/high reward evaluation technique. Several other methods have already been mentioned that could be used as part of a regular review process to ensure a street is functioning as expected.

However, the importance of collecting baseline data cannot be overstated. Without 'before' data, it is impossible to quantify positive changes and fully understand the extent of any health benefits and thus the return on investment expected from the scheme. Collecting data across schools can also allow for control groups in an evaluation, reducing the confounding effects of weather or temporary disruptions on conclusions. The advantage of using more flexible interventions like temporary School Streets is that they can be amended easily. Effective before and after data can also feed into the design process before implementation and help determine the shape of a final permanent scheme.

Costs and Benefits

Air Quality	N/A
Cost	★★★
Public Space	N/A
Active Travel	N/A

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