Place-based decarbonisation for transport

Co-Designing the 15-Minute City

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Executive Summary

This report relates to a project which explored the potential of a mixed-method approach of using Sensor monitoring and community planning techniques to co-design ideas of the 15-minute neighbourhood.

The project, a collaboration between researchers at the University of Liverpool and Liverpool John Moores University used the neighbourhood of Toxteth, Liverpool as a base to explore how real time sensor-based monitoring would affect resident perceptions, understanding and support for active travel measures in the places that they lived, and thus could be used as a method to support place-based decarbonisation.

The project deployed two motion sensors over a longitudinal basis in Toxteth, each on a busy thoroughfare through the neighbourhood. The sensors monitored traffic count by mode, speed and flow (e.g. turning direction), allowing for analysis against time of day and conditions. The sensors found that traffic patterns on site one – Hartington Road – broadly matched expected modal share. Site two, the site of an active-travel intervention by Liverpool City Council, saw cycling rates double the expected modal share. Across both sites we observed excess speeding.

The sensor data underpinned community-focused workshop activity, working with residents to explore how they perceived their neighbourhood and the potential for future activity. We found that the sensor data broadly aligned with resident perceptions of what was happening on their street.

When presented with different options for the future of their street (as CGI visualisations) we found that residents favoured more ambitious interventions which would reduce traffic flow (e.g. modal filters) and could visualise themselves in that space.

A key finding of the workshops is that, understandably, residents focused on their neighbourhood and the potential for those who live there. It raises an important issue about the people who may travel through that street (i.e. the traffic we measured) and how they may feel about such an intervention. As such, the question goes to the heart of the nature of consultation: Who is involved, and whose views carry the most weight in determining outcomes? Do resident's rights outweigh broader utility, or vice versa?

In all, the project determined that there is merit in this approach, and value in expanding beyond this proof-of-concept to upscale for broader use. In doing so, we acknowledge the opportunity to incorporate more sophisticated sensor-based techniques including air and noise pollution monitoring, and the monitoring of more complex junctions and spaces.

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1. Introduction

The idea of the 15-minute city is a relatively simple one. If you live in a 15-minute city, most of your daily needs (e.g. shopping, work, school, recreation etc) can be met through travelling no more than 15 minutes from your home via active travel (e.g. walking or cycling). 15-minute cities began to really capture the public attention during the COVID-19 pandemic as more people stayed/worked at home, and became reacquainted with the value of their local communities and services. The 15-minute city is also coming to the fore when national and local policy agendas are paying more attention to decarbonisation. There is a growing recognition that to avoid climate catastrophe we need to shape our cities in ways that allow us to travel more sustainably, shop locally and make the most of where we live.

But the idea is not without its issues. For example, the distance a person can cover within 15 minutes might vary depending on age, health or disability. The UK also has a diverse urban fabric which means that there is a wide range of variability in what type and quality of services people have near to their homes. Going further, attempts at implementing similar ideas elsewhere have met with opposition from some groups. In some cases, this has resulted in vandalism, and in others schemes have been removed altogether. A common theme amongst this opposition is not that people are against the schemes per se, but that residents and community groups have not been consulted with - particularly in situations where interventions happened at a pace during the COVID-19 pandemic.

This has shown that it is one thing to design a 15-minute city on paper, and another thing altogether to create something that works in living breathing places. Through previous research undertaken by the University of Liverpool (Dunning, Calafiore and Nurse, 2021, Calafiore, et al, 2022) we know where *15-minute cities* can exist in principle. We have identified where services are, and their distance from people's homes on foot or by bike. However, our research recognises that these places are intrinsically different – reflecting local characteristics, demographics and socio-economic conditions.

Yet, whilst we know much about the physical possibility of a 15-minute neighbourhood existing in the abstract, what we know less about is how the idea fits onto local places, and how it fits with resident's aspirations for where they live. How does it respond to the ways in which local residents move through their neighbourhoods now, and would like to move through their neighbourhoods in the future? How does it respond to perceptions of danger? Ultimately, and taking on these questions and more, how can transport planners implement 15-minute cities in a way that brings local residents with them, responds to (and thus avoids) opposition, and thus minimises the risk of public opprobrium.

A New Approach

To engage with these issues, this project has developed a multi-disciplinary approach to explore how those planning for the 15-minute city can use data analytics and real-time monitoring of travel patterns to optimise public engagement on the implementation of active travel measures and, in doing so, enhance it by working with local residents to co-design the interventions for the places they live. In doing so, this project was designed to serve as a proof-of-concept for a collaboration between the University of Liverpool and Liverpool John Moores University. Specifically, the collaboration will establish how Sensor-based analysis undertaken by Liverpool John Moores University can be integrated with the planning-related expertise of the University of Liverpool to achieve transport decarbonisation.

Acknowledging existing and developing new understandings of the 15-minute neighbourhood, this proposal is a multi-disciplinary approach to test and calibrate a methodology for the co-design of 15-minute cities which combines sensor-based insights with the wishes of residents. To achieve this, in brief terms this project centres on two core elements. Firstly, using data captured from sensors and deploying expertise held by Liverpool John Moores University, we want to understand the routes people take in their everyday lives, and how this changes with the ebb and flow of the year (e.g. Rush-hours, school days and holidays, weather). This sensor technology will provide counts of people, cyclists and traffic data, as well as demonstrate movement patterns (e.g. speeding) around the sensor location. We will then build on this understanding through high-quality community engagement to explore this data in depth. We will ask why people take certain routes, why this varies. Where are the places that residents want, and indeed need to go? Finally, we want to understand whether the sensor data is helpful in shaping understanding and attitudes towards interventions in the places where people live.

In undertaking this work, the project sets out to achieve the overarching aim of devising a transferrable method for the co-design of 15-minute cities. To realise this, the project is delivered against the following objectives.

1) *To use real-time sensor data to understand patterns of movement of residents at specific locations within a neighbourhood and how they use active travel (i.e. walking and cycling) to achieve their daily needs*
2) *To work directly with local residents to understand the motivations behind those movement patterns and, by extension, planned improvements/changes which might be required; and*
3) *As a result, understand the role of data analytics in community planning to co-design the interventions required to make their neighbourhood a 15-minute city which reflects resident's daily activities.*

This report now develops as follows. First, we will provide an overview of the activity of work. Then we will discuss the rationale for our site selection in Toxteth, Liverpool, and provide an overview of the detailed rationale for our sensor siting. Following this we will outline the central findings from our sensor installations before going on to detail the outcomes of our community co-design workshop activity.

2. Programme of Work

The core project team consisted of academics drawn from Liverpool University and Liverpool John Moores University. They were:

- *Dr Richard Dunning, University of Liverpool*
- *Diane Fitch, Liverpool John Moores University*
- *Prof Thanh Trung Nguyen, Liverpool John Moores University*
- *Dr Alex Nurse (Principle Investigator), University of Liverpool*

In addition, the project partnered with the Liverpool City Region Combined Authority, recognising the role that 15-minute city ideas can play in achieving net zero targets, and had input from Sustrans.

This project took place between September 2021 and February 2022 and was delivered through four interconnected work packages.

Work Package One concerned the overall management of the project. This included fortnightly meetings of the project team (discussed above), which provided broad project oversight and decision-making on strategic issues such as site-selection.

Work package Two was led by LJMU and related to the sensor-based aspects of the project. This included sensor installation, longitudinal monitoring of real time data and analysis. This work provided the data which would directly support the delivery of Work Package Three.

Work Package Three was led by the University of Liverpool and related to community-focused workshops. These workshops, focused on residents living on the streets where the sensors were located, explored resident perceptions of the sensor data, notions of the 15-minute city and how interventions might change the time-distance to local services and residents' attitudes towards intervention types. The workshops were supported by the creation of bespoke CGI renderings of the streets, which were used to model interventions.

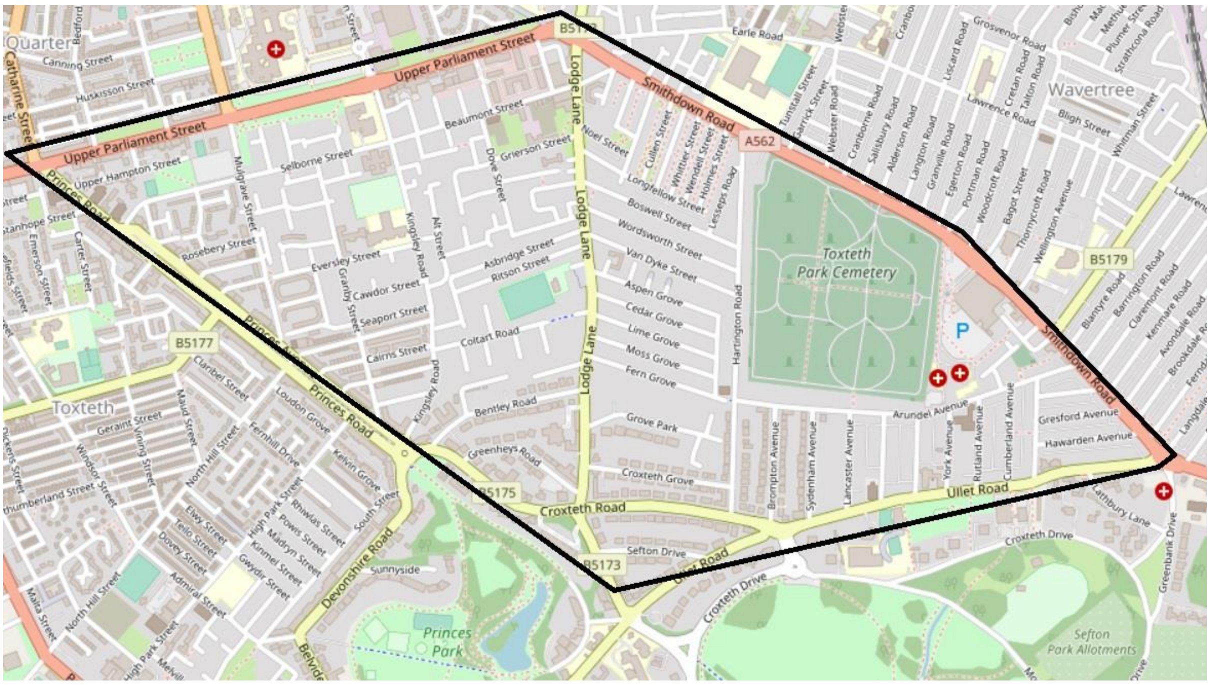
Work Package Four combined the expertise of the project team to create a co-design guide for interventions based on the experiences of the project. This draws upon the best learning from the use of sensor data and the community workshops, and reflects on how combining sensor-based analytics with community co-design can be upscaled for future use.

3. Site Selection and Sensor Placement

The broader neighbourhood used as part of this study, and subsequent sensor location within that neighbourhood was determined through discussion with the project team and project partners.

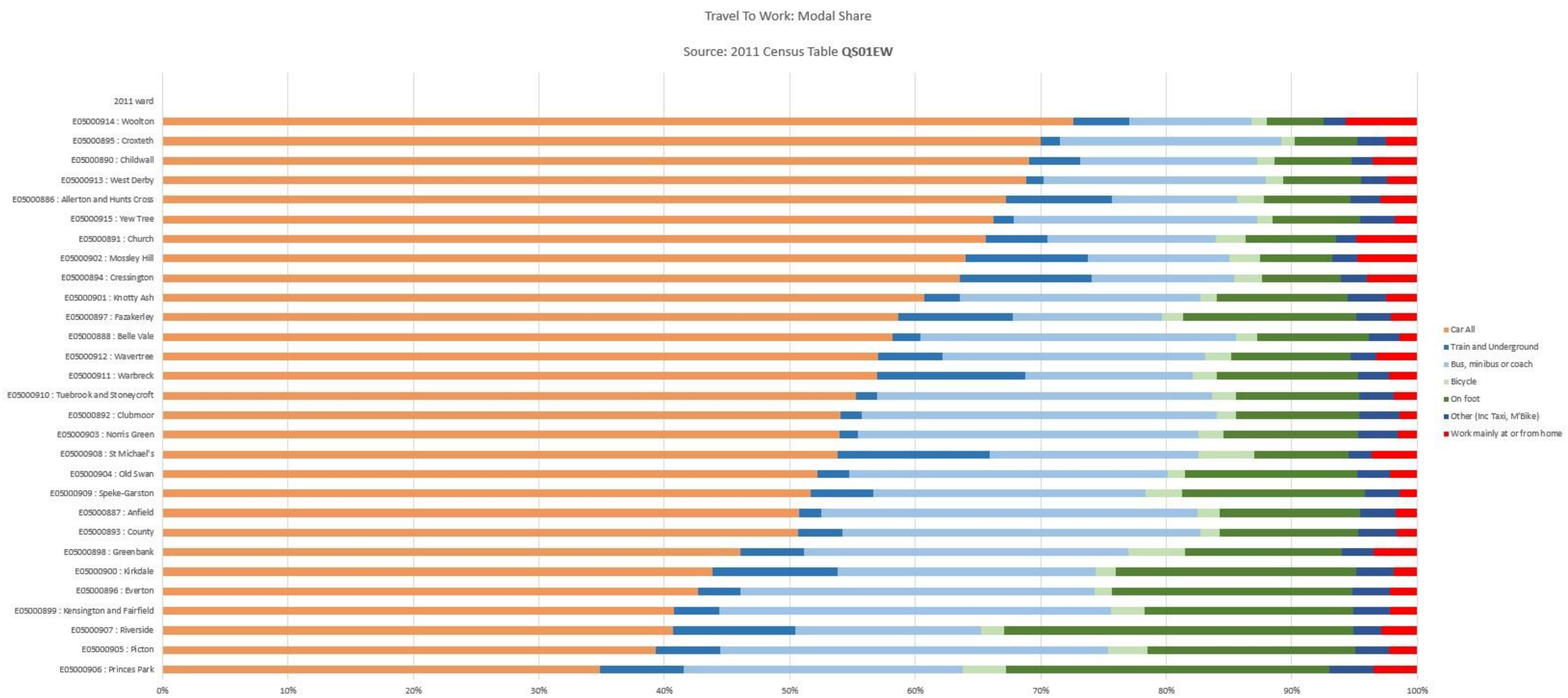
Reflecting strategic partnership with the Liverpool City Region Combined Authority, our initial site would be drawn from one of the six districts within the LCRCA. Then, within this, we spoke at length with Sustrans regarding active sites for neighbourhood level work on active travel initiatives. Here, the idea is that our project could have the potential to deliver practical benefits in the shorter term (i.e. for that neighbourhood work), and the longer term (i.e. through realisation of the proof-of-concept that could be rolled out to other neighbourhoods).

To this end an area of Toxteth, Liverpool, was selected as the site (see map, below). This reflected Sustrans' imminent launching of their 'Round Ours' liveable neighbourhood project based around Lodge Lane in the area (centre of map), taken in tandem with Liverpool City Council's recognition of Toxteth as a priority area for liveable neighbourhood work.



Source: OpenStreetMap, 2022.

Toxteth sits within the Princes Park ward of Liverpool and according to the 2011 census (see chart overleaf), modal share is primarily split between car (33.1%), Walking (25.7%), Bus (22.3%), and cycling (3.4%). Reflecting its proximity to Liverpool City Centre and its broader socio-economic characteristics, Princes park has the second lowest car-driver rate in the city, and the 3rd highest rate of walking.



Modal share in Liverpool. Source, ONS 2011

Site Selection

Within Toxteth, we had the ability to place a maximum of two sensors. The purpose of installing motion sensors is to record the level of activity of vehicles, cyclists and pedestrians in the area, so as to determine the patterns of daily life including the impact of active travel on the social activity in the area. Each motion sensor is capable of measuring traffic count (by mode: pedestrians, bicycles, cars, and other motorised vehicles distinguished by size) and speed. Each sensor has up-to six count lines which are capable of counting the numbers (speed and direction) of vehicles and cyclists on the road, and counting pedestrians and cyclists on the footpaths and cycle lanes.

The available options were to install one sensor at two sites, or to install two sensors at one site requiring more complex monitoring.

Discussion quickly centred on Kingsley Road as a potential site location - recognising that the busy Lodge Lane was already a central-focus of the Sustrans project - owing to its position as a major thoroughfare through the site (roughly 5000 vehicles per day), and its proximity to a large school which would generate a variety of traffic/daily uses. Following this, discussion moved to where on Kingsley Road would be most appropriate, including monitoring around the Primary School entrance, and some distance away with two options.

- The Junction of Kingsley Road and Selborne Street (a site that would require two sensors)
- The zebra crossing near the junction with Eversley Street.

To some extent, sensor placement on Kingsley Road was also determined by the quality of lamp posts which could accommodate sensor installation, as some lampposts were in a poor state of repair and thus could not be used.

It was agreed that it would be a prudent use of resources to use the sensors on two sites rather than one, so as to generate greater means for comparison. To this end, Hartington Road in the east of Toxteth was selected as a second site. The rationale for this selection was that Hartington Road was also a thoroughfare running parallel to Lodge Lane, albeit one that was quieter than Kingsley Road - in part owing to its distance from other strategic facilities (e.g. the University of Liverpool and Liverpool Women's' Hospital). Furthermore, Hartington Road was a purely residential street (i.e. did not have a school, or any shops) meaning that it could generate a different kind of data.

From herein, and including during discussion of their detailed placement which follows, the Hartington Road Site will be referred to as HRS, and the Kingsley Road Site will be referred to as KRS.

Detailed Sensor placement: Motion sensors and their count lines

The HRS has a motion sensor that provides three count lines, as shown in FIGURE 1. The road (Road) count line counts all kinds of motion in the road path, including cyclists, pedestrians, and motorised vehicles, as shown in FIGURE 1. The Right-Hand Side (RHS) and the Left-Hand Side (LHS) count lines cover the footpaths, and count pedestrians and cyclists as shown in FIGURE 1. However, it should be noted that the last two count lines do show a percentage of an error where, to account for parked vehicles, on occasion cars and vans are counted in the pedestrian and cyclist area.

In addition, the HRS sensor allows for 'turn counts' to measure the ways in which those travelling down Hartington Road, Arundel Avenue and Fern Grove change direction. This allows us to understand how the junction is used, including the modal filter on Fern Grove.

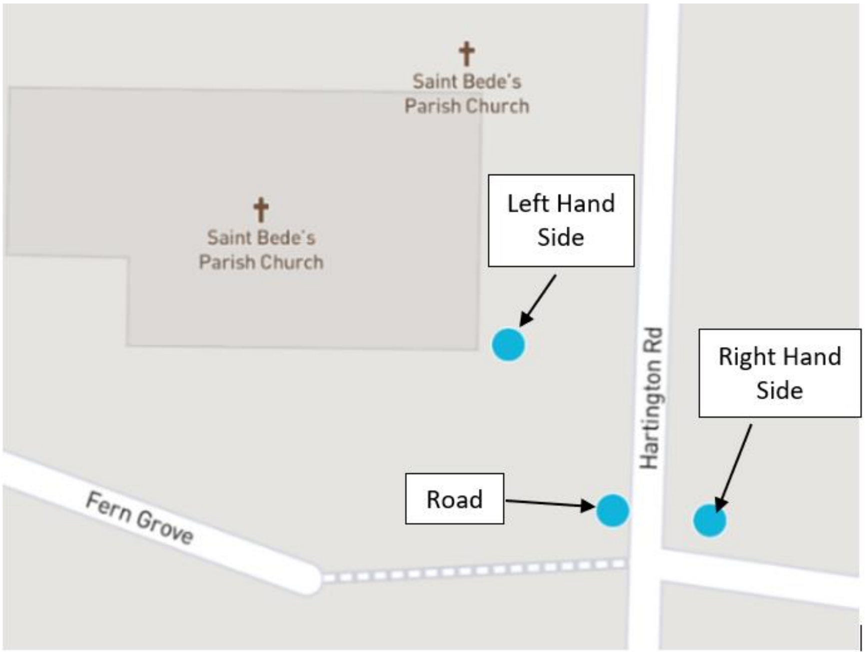


FIGURE 1: HRS' three count lines

The KRS has a motion sensor with five count lines. Again, the Road countline counts all traffic using the main carriageway. The Left-Hand Side (LHS) and Right-Hand Side (RHS) count lines are for counting pedestrians on the pedestrian footpaths, and they are expected to count pedestrians and cyclists, as shown in FIGURE 2 (it should be noted they would also count parked cars and vans). The Left-Hand Side Cycle Lane (LHSCL) and Right-Hand Side Cycle Lane (RHSCL) count lines that count cyclists and pedestrians in the segregated cycle-lane element of Kingsley Road, but they would also count parked vehicles.

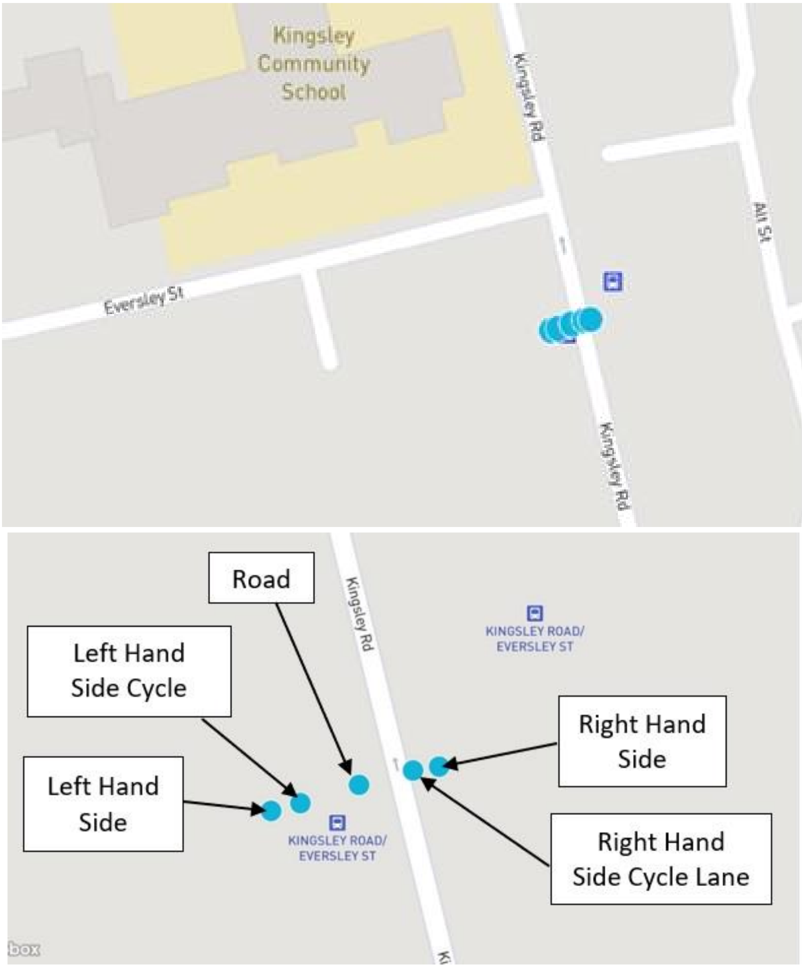


FIGURE 2: KRS' five-count lines

4. Sensor Findings

User Counts

Unless otherwise specified, the data discussed across this section refers to the average daily data from twelve weeks of activity, spanning the 3rd of January to the 27th of March of 2022, the peak times for cars at both sites are 8-9 am and 3-4 pm during workdays, as shown in FIGURE 3 and FIGURE *5*, and 1-4 pm on Saturdays and 12-3 pm on Sundays, as shown in FIGURE 4 and FIGURE 6. As a proof of match, in terms of cars count and peak times for both sites, a comparison between the cars counts of both sites can be seen in FIGURE 7. However, the peak time counts of LGVs, cyclists, and pedestrians don't match across HRS and KRS as shown in FIGURE 8, FIGURE 9, and FIGURE 10.

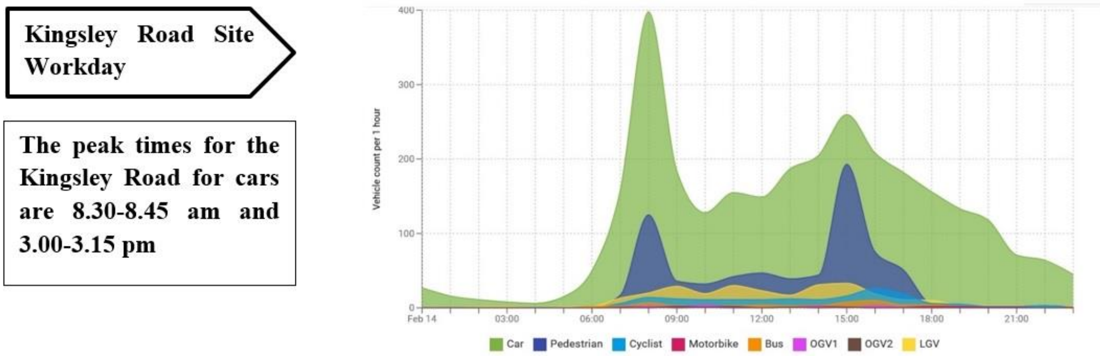


FIGURE 3: Typical workday count for all types of users for the KRS

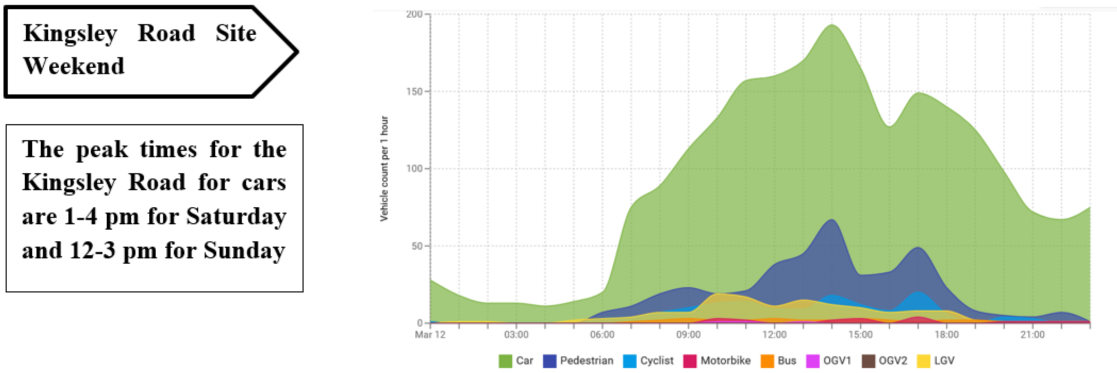


FIGURE 4: Typical Saturday count for all types of users for the KRS

Hartington Road Site Workday

The peak times for the Hartington Road for cars are 8.15-8.30 am and 3.15-3.30pm

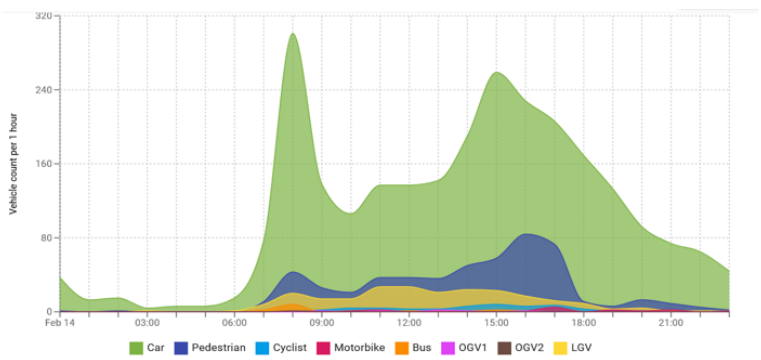


FIGURE 5: Typical working day count for all types of users for the HRS

Hartington Road Site Workday

The peak times for the Hartington Road for cars are 1-4 pm for Saturday and 12-3 pm for Sunday

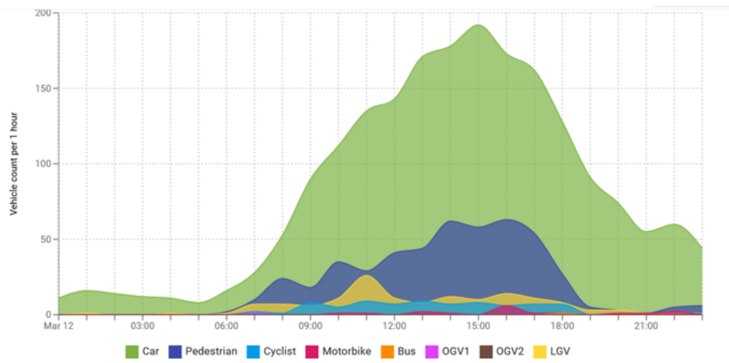


FIGURE 6: Typical Saturday count for all types of users for the HRS

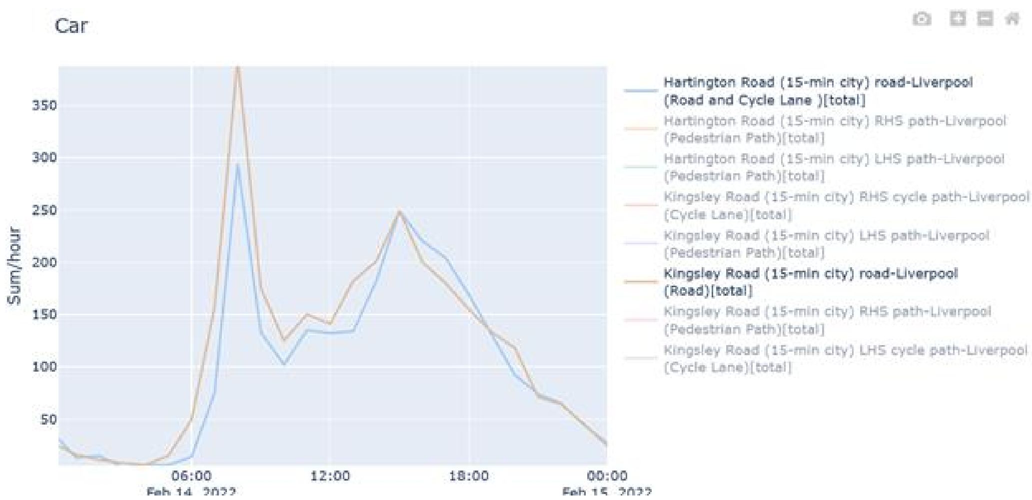


FIGURE 7: Comparison between the hourly count of cars at both sites

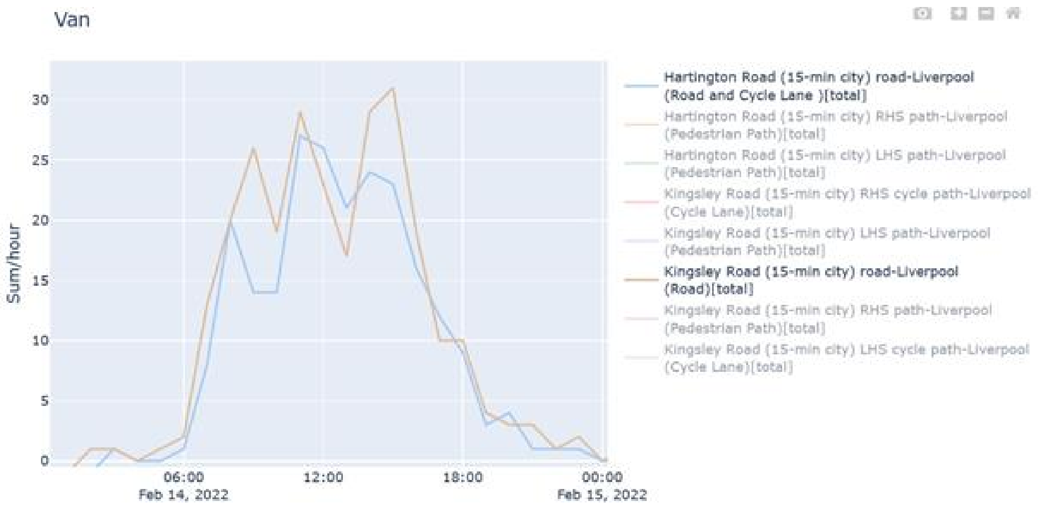


FIGURE 8: Comparison between the hourly count of LGVs at both sites

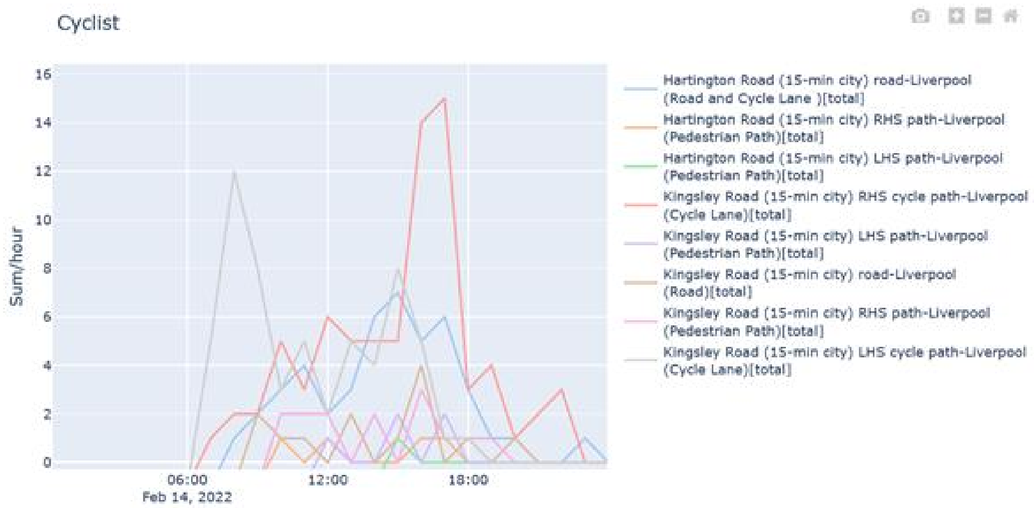


FIGURE 9: Comparison between the hourly count of cyclists at both sites

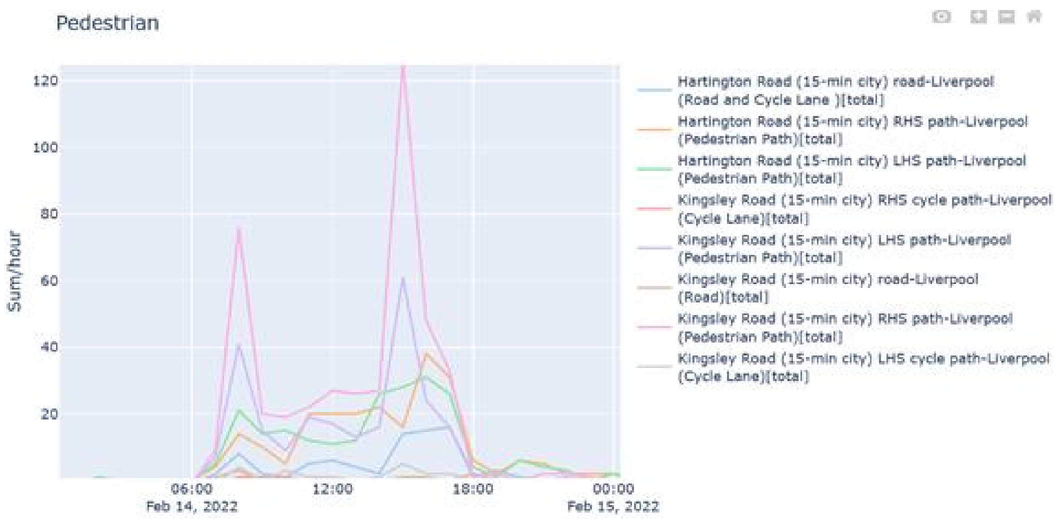


FIGURE 10: Comparison between the hourly count of pedestrians at both sites

The average workday and weekend day count for all users and both sites is shown below:

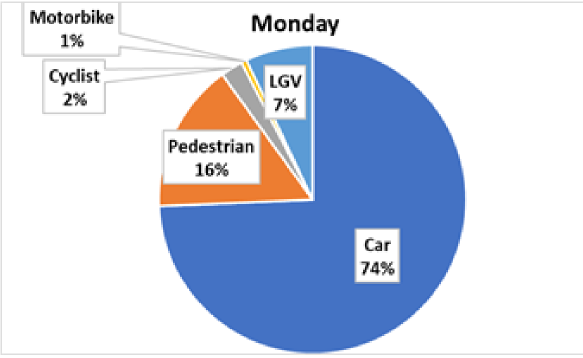
Hartington Road Site's Average Daily Count of 3rd of January to 27th of March 2022

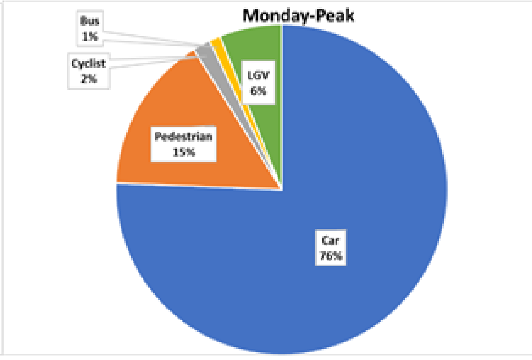
	Car	Pedestrian	Cyclist	Motorbike	Bus	OGV	LGV
Workdays	2444	526	77	20	15	7	233
Weekend	1838	447	68	18	2	1	87

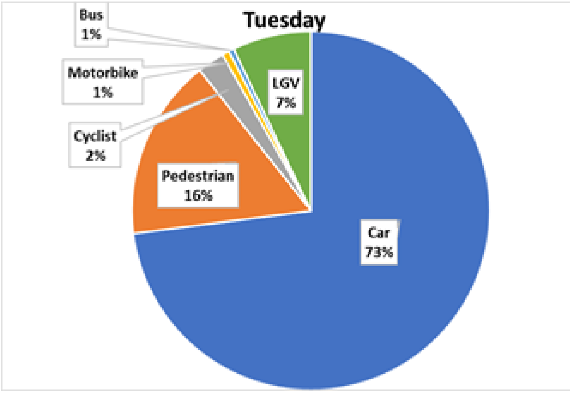
Kingsley Road Site's Average Daily Count of 3rd of January to 27th of March 2022

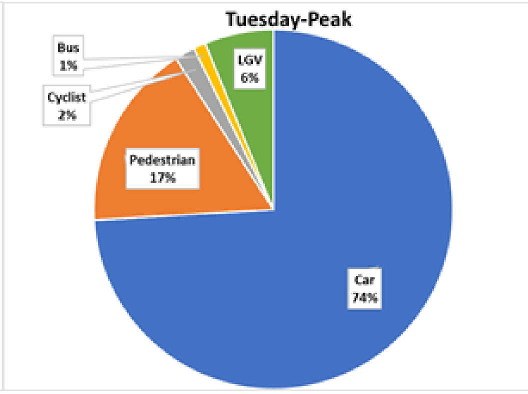
	Car	Pedestrian	Cyclis	Motorbike	Bus	OGV	LGV
Workdays	2751	705	190	18	50	14	272
Weekend	2042	333	117	13	18	2	111

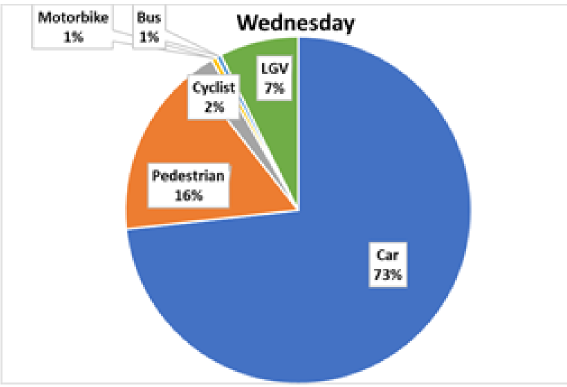
The modal split results have shown that an average of 75% of road users at both sites are Cars. Pedestrians and LGVs come second and third in daily counts, respectively. It should be noted that the number of cyclists and pedestrians increases on weekends. Results have also shown that at peak hours, the HRS users' share of the count does not change, as shown in FIGURE 11, FIGURE 12, FIGURE 13, TABLE 1, and TABLE 2, while at the KRS, the cars' share decreases and the pedestrians' share significantly increases, as shown in FIGURE 14, FIGURE 15, FIGURE 16, TABLE 3, and TABLE4. In the latter case, this reflects travelling hours around the primary school.

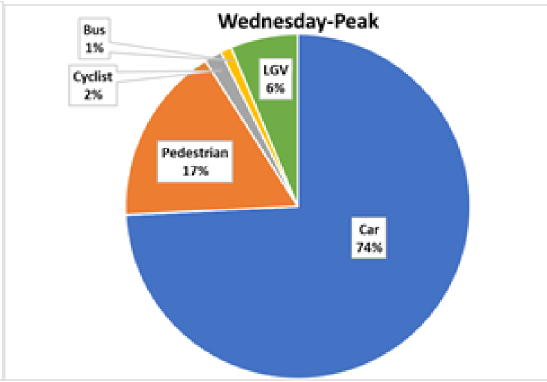

Monday
Motorbike 1%
Cyclist 2%
LGV 7%
Pedestrian 16%
Car 74%

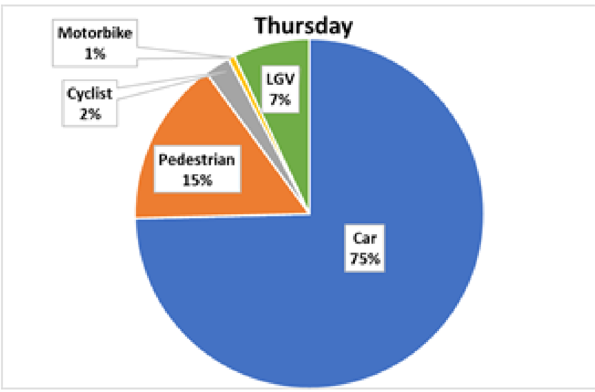

Monday-Peak
Bus 1%
Cyclist 2%
LGV 6%
Pedestrian 15%
Car 76%

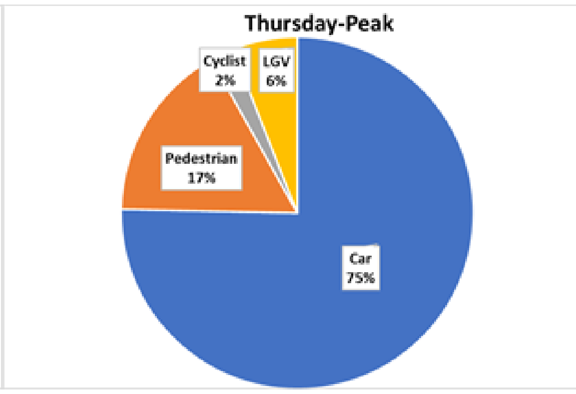

Tuesday
Bus 1%
Motorbike 1%
Cyclist 2%
LGV 7%
Pedestrian 16%
Car 73%


Tuesday-Peak
Bus 1%
Cyclist 2%
LGV 6%
Pedestrian 17%
Car 74%


Wednesday
Motorbike 1%
Bus 1%
Cyclist 2%
LGV 7%
Pedestrian 16%
Car 73%


Wednesday-Peak
Bus 1%
Cyclist 2%
LGV 6%
Pedestrian 17%
Car 74%


Thursday
Motorbike 1%
Cyclist 2%
LGV 7%
Pedestrian 15%
Car 75%


Thursday-Peak
Cyclist 2%
LGV 6%
Pedestrian 17%
Car 75%

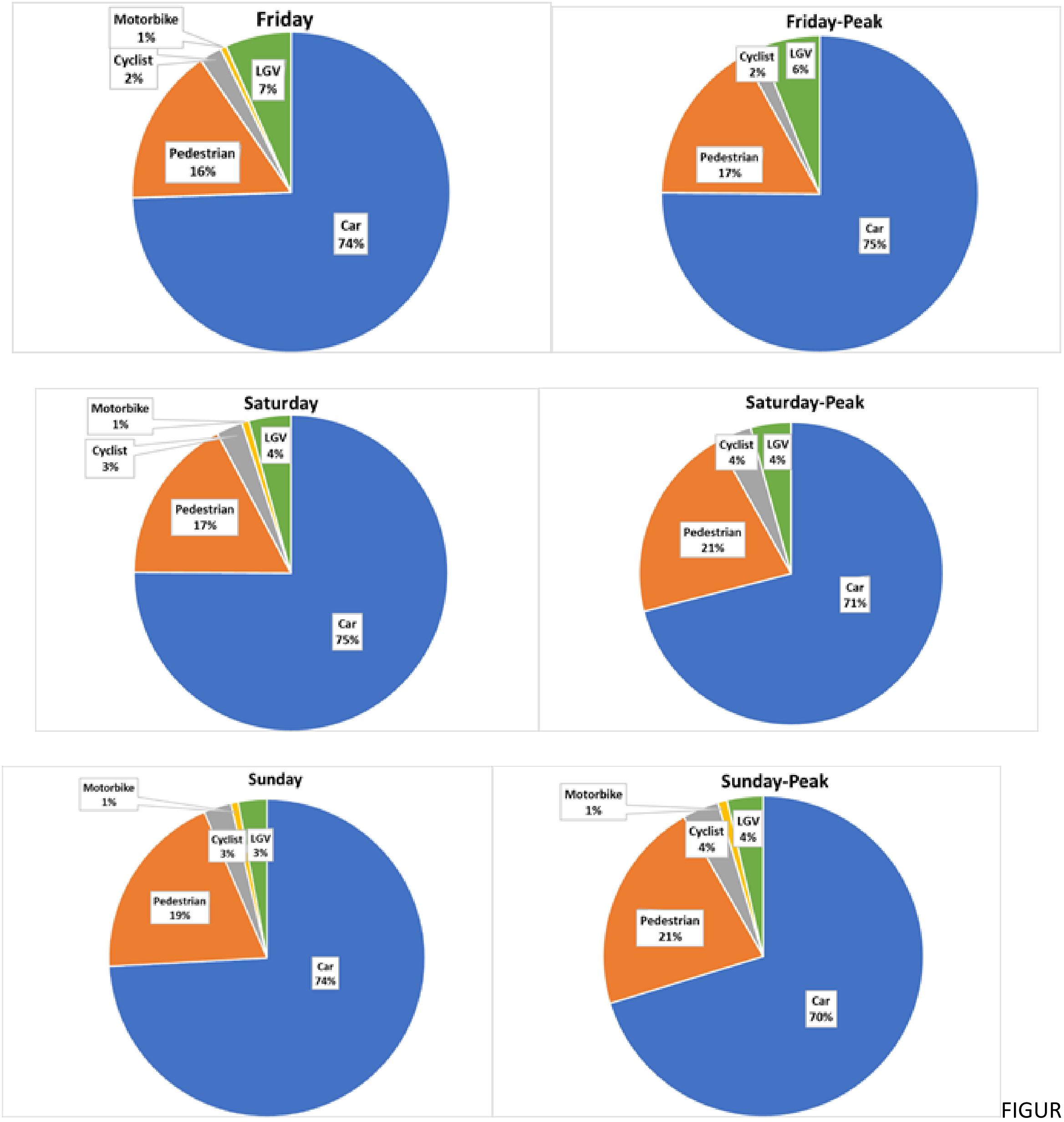


FIGURE 11: Hartington Road site average daily and peak hours counts' share of 3rd of January to 27th of March 2022

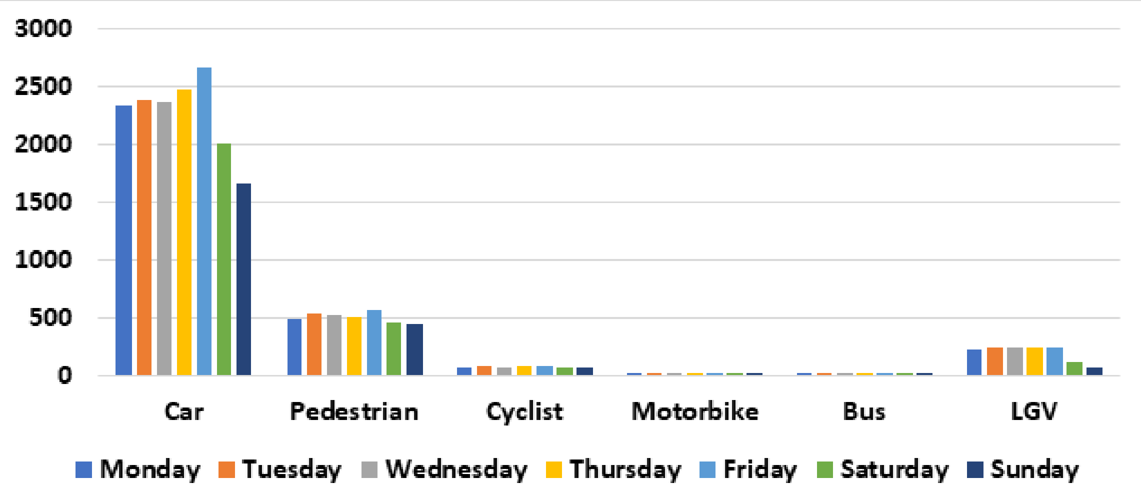


FIGURE 12: HRS average daily counts and split model of 3rd of January to 27th of March 2022

TABLE 1: HRS an average daily share and modal split for the average day, average week, and the sum of the period 3rd of January to 27th of March 2022

Day	Car	Pedestrian	Cyclist	M'bike	Bus	OGV1	OGV2	LGV
Monday	2330	492	73	18	14	4	1	222
Tuesday	2389	536	80	21	15	6	1	233
Wednesday	2358	520	72	16	16	8	1	237
Thursday	2477	510	79	20	14	6	0	235
Friday	2666	571	82	22	15	7	0	241
Saturday	2007	458	72	20	2	2	0	116
Sunday	1669	435	64	17	1	0	0	66
Average day	2271	503	75	19	11	5	0	193
Average Workday	2444	526	77	20	15	6	1	233
Average Weekend	1838	447	68	18	2	1	0	91
Average week	15895	3522	523	134	77	33	3	1349
Sum of 12 weeks (3/1/22-27/3/22)	190739	42259	6276	1613	925	392	35	16187

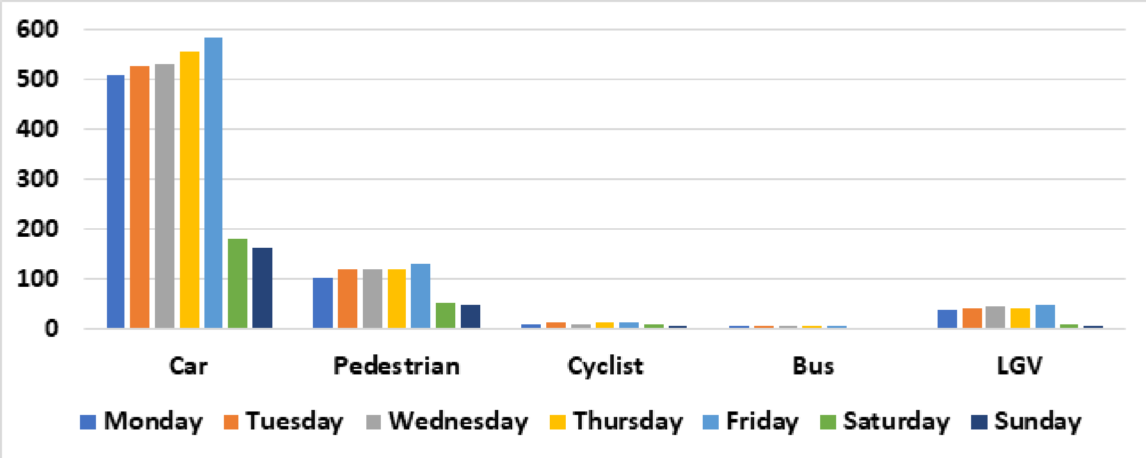
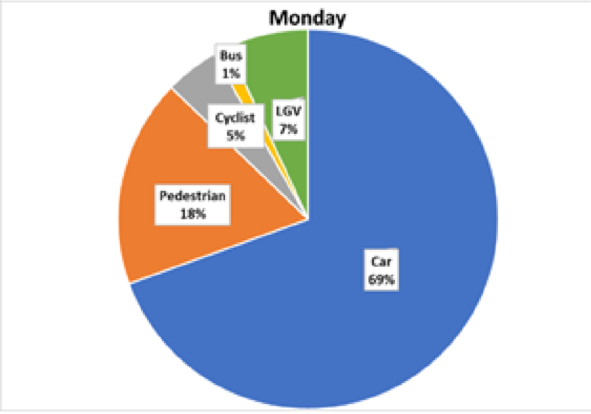
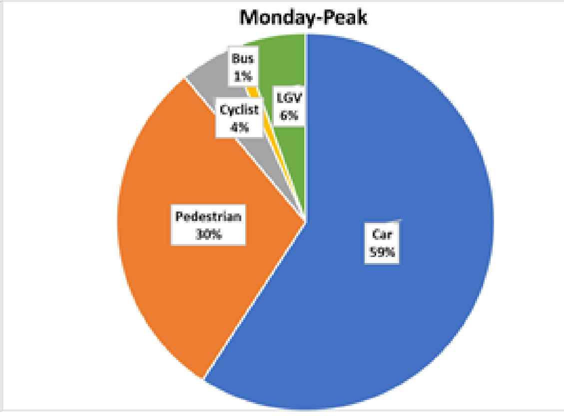


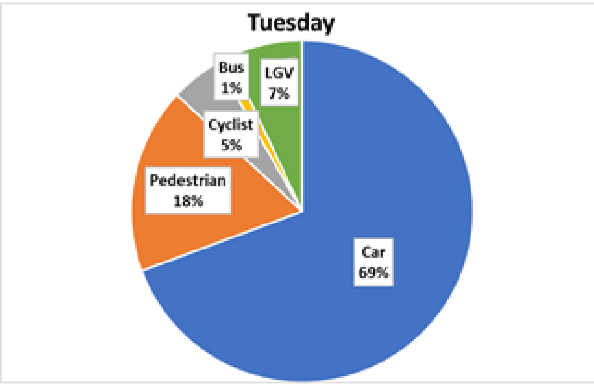
FIGURE 13: HRS's average daily peak hours' count and modal split for 3rd of January to 27th of March 2022

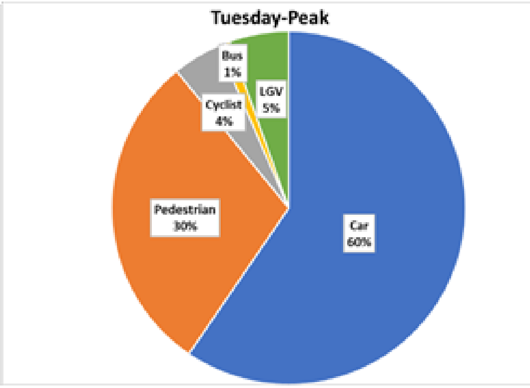
TABLE 2: HRS average daily peak hours count share and modal split for the average day, average week, and the sum of the period 3rd of January to 27th of March 2022

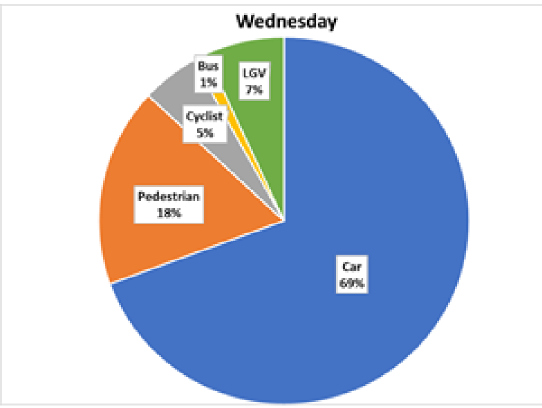
Day	Car	Pedestrian	Cyclist	M'bike	Bus	OGV1	OGV 2	LGV
Monday	508	104	12	2	7	1	0	41
Tuesday	525	119	13	2	8	1	0	44
Wednesday	531	120	12	2	7	2	0	45
Thursday	556	122	16	3	7	1	0	44
Friday	583	130	15	2	7	1	0	48
Saturday	182	54	10	2	0	0	0	11
Sunday	164	50	9	2	0	0	0	9
Average day	436	100	12	2	5	1	0	35
Average Workday	436	100	12	2	5	1	0	35
Average Weekend	173	52	9	2	0	0	0	10
Average week	3049	699	85	15	38	6	1	242
Sum of 12 weeks (3/1/22-27/3/22)	36591	8393	1020	181	458	72	9	2901

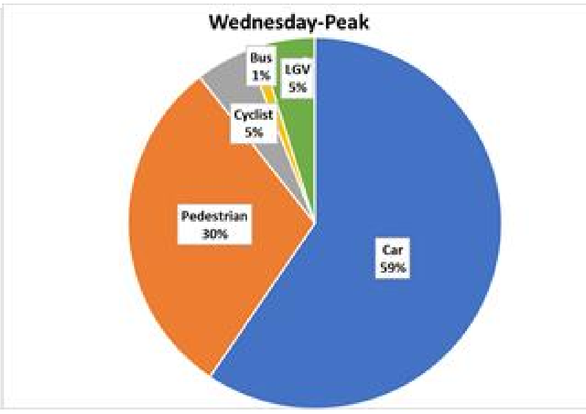

Monday
Bus 1%
LGV 7%
Cyclist 5%
Pedestrian 18%
Car 69%

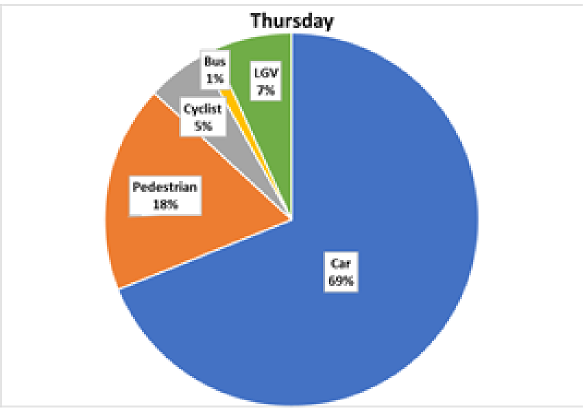

Monday-Peak
Bus 1%
LGV 6%
Cyclist 4%
Pedestrian 30%
Car 59%

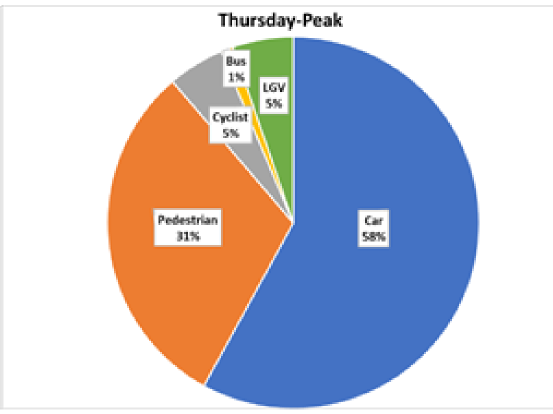

Tuesday
Bus 1%
LGV 7%
Cyclist 5%
Pedestrian 18%
Car 69%


Tuesday-Peak
Bus 1%
LGV 5%
Cyclist 4%
Pedestrian 30%
Car 60%


Wednesday
Bus 1%
LGV 7%
Cyclist 5%
Pedestrian 18%
Car 69%


Wednesday-Peak
Bus 1%
LGV 5%
Cyclist 5%
Pedestrian 30%
Car 59%


Thursday
Bus 1%
LGV 7%
Cyclist 5%
Pedestrian 18%
Car 69%


Thursday-Peak
Bus 1%
LGV 5%
Cyclist 5%
Pedestrian 31%
Car 58%

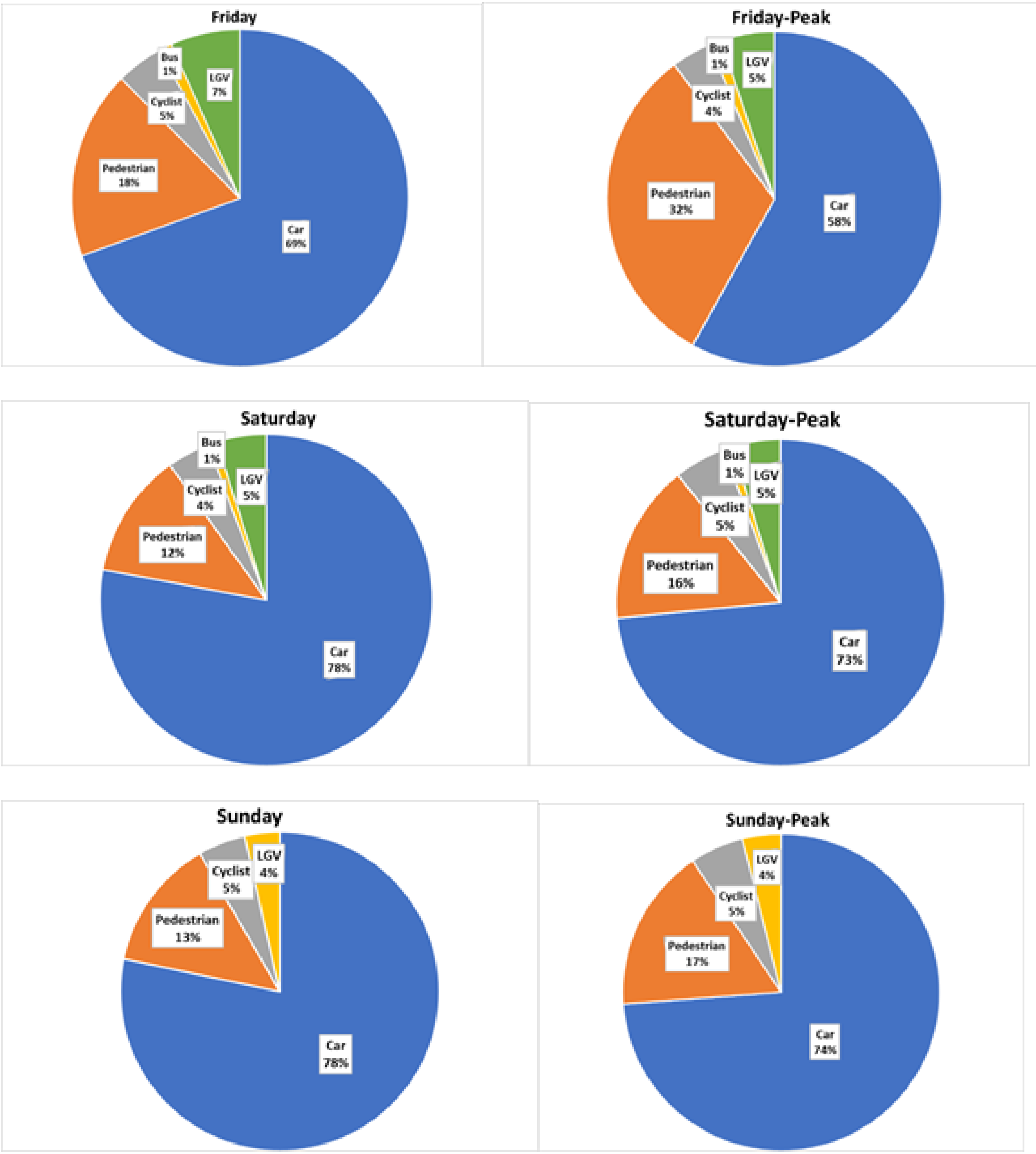


FIGURE 14: KRS split modal for average daily and peak hours of 3rd of January to 27th of March 2022

TABLE 3: KRS average daily share and modal split for the average day, average week, and the sum of the period 3rd of January to 27th of March 2022

Day	Car	Pedestrian	Cyclist	Motorbike	Bus	OGV1	OGV2	LGV
Monday	2577	657	169	16	49	9	3	256
Tuesday	2726	690	190	19	50	12	3	274
Wednesday	2777	700	198	18	49	15	5	276
Thursday	2791	728	203	19	52	10	2	277
Friday	2885	750	189	18	51	11	4	278
Saturday	2250	353	121	15	25	3	1	139
Sunday	1833	313	113	12	11	1	0	83
Average	2548	599	169	17	41	9	2	226
Average Workday	2751	705	190	18	50	11	3	272
Average Weekend	2042	333	117	13	18	2	0	111
Average week	17839	4191	1181	116	288	60	17	1584
Sum of all 12 weeks	214069	50295	14172	1392	3460	714	204	19004

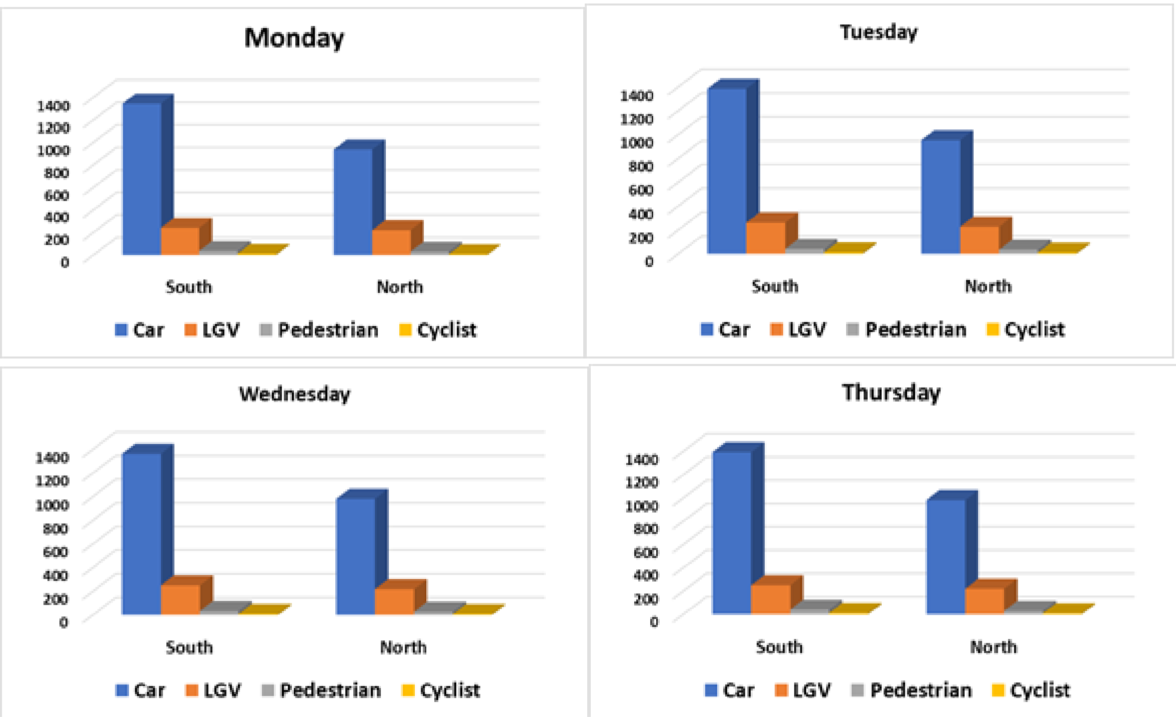
TABLE 4: KRS an average daily peak hours counts' share and split model for the average day, average week, and the sum of the period 3rd of January to 27th of March 2022

Day	Car	Pedestrian	Cyclist	Motorbike	Bus	OGV1	OGV2	LGV
Monday	553	278	41	2	11	1	0	51
Tuesday	591	293	44	3	11	2	1	54
Wednesday	588	296	46	2	11	3	1	48
Thursday	595	316	50	3	11	1	1	54
Friday	608	332	41	2	12	3	1	54
Saturday	552	119	39	3	6	0	0	36
Sunday	454	103	34	3	3	0	0	24
Average day	563	248	42	3	9	1	1	46
Average Workday	587	303	44	2	11	2	1	52
Average Weekend	503	111	36	3	5	0	0	30
Average week	3941	1736	293	18	66	10	4	321
Sum of the 03-Jan to 27-March	47293	20835	3519	216	791	121	47	3853

Flow direction

The data that counts the path's users according to their flow/direction is also essential to understanding how people move around the neighbourhoods. The HRS is a two-way road. Therefore, there are users going to the north and others going to the south. KRS is a one-way road, but pedestrians and cyclists that are using the pavement and the cycle-lanes are free to go in two directions.

The data included below (FIGURE 18) is for the counts of the left and right-hand sides of the HRS. Although the count lines are supposed to count only pedestrians and cyclists, the Left-Hand Side count line has counted only pedestrians and cyclists, while the Right-Hand Side has counted a slightly higher number of pedestrians and cyclists with some cars, LGVs, and motorbikes. Therefore, the data suggests that drivers are parking vehicles on the right-hand side of the road.



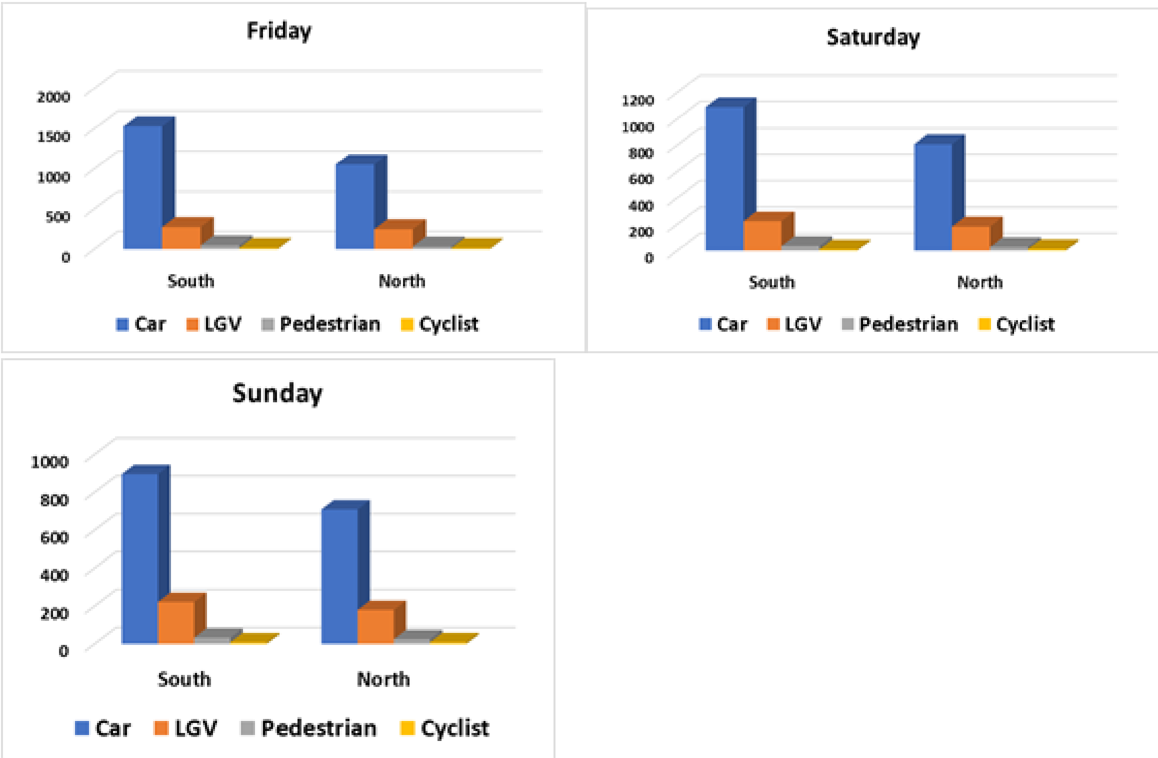


FIGURE 18: HRS Traffic Flow Direction of all users

Results from the HRS have shown that the traffic flow count for every type of user going south is significantly higher than the counts of users going north (TABLE 5). The average difference (i.e. percentage increase on traffic travelling north) in the number of cars, pedestrians, cyclists, motorbikes, buses, OGV1, OGV2, and LGVs are 45%, 14%, 32%, 18%, 23%, 79%, 59%, and 46% respectively. However, on some days, this trend can vary for some user types such as buses, motorbikes, OGV1, and OGV2, such as with the motorbikes on Saturday.

TABLE 5: HRS directional flow of all user classes to North and South for the period of the 3rd of January to the 27th of March 2022

Day	Direction	Car	Pedestrian	Cyclist	Motorbike	LGV
Monday	South	1390	255	40	11	128
	North	940	237	33	7	94
Tuesday	South	1433	286	44	12	139
	North	957	249	36	10	94
Wednesda y	South	1416	274	42	9	138
	North	943	246	31	7	99
Thursday	South	1486	270	46	12	141
	North	991	240	34	9	94
Friday	South	1597	303	49	11	141
	North	1069	268	33	11	100
Saturday	South	1167	251	41	9	68
	North	839	207	31	11	47
Sunday	South	948	248	36	9	41
	North	723	206	27	8	25

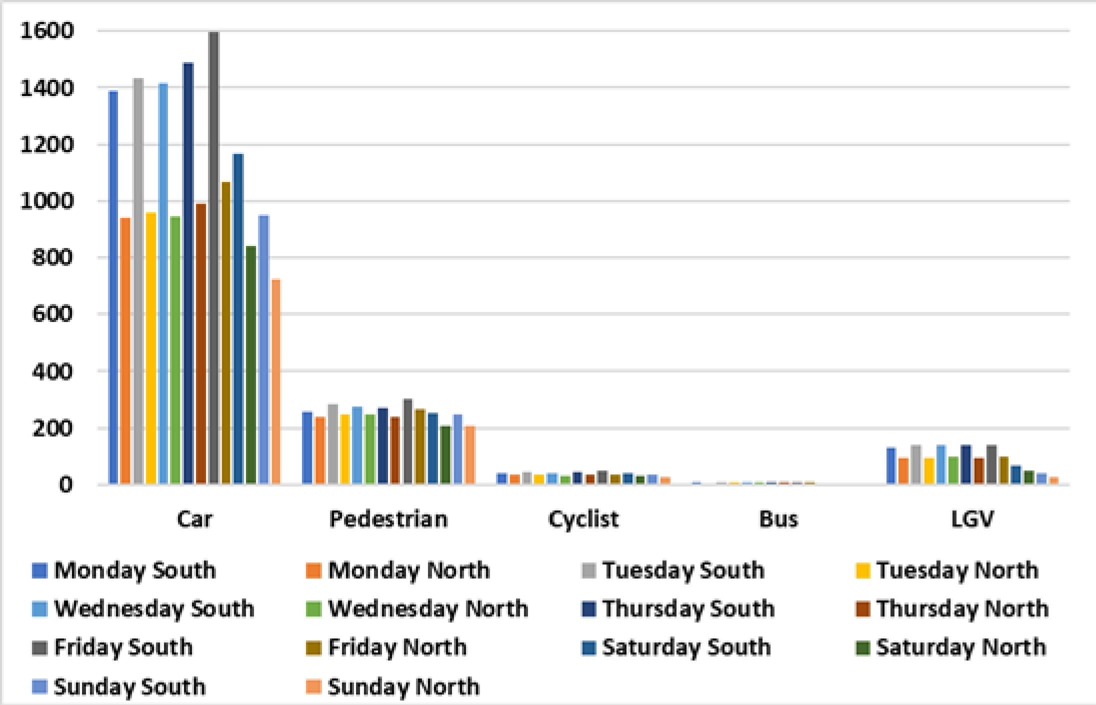


FIGURE 19: HRS modal split

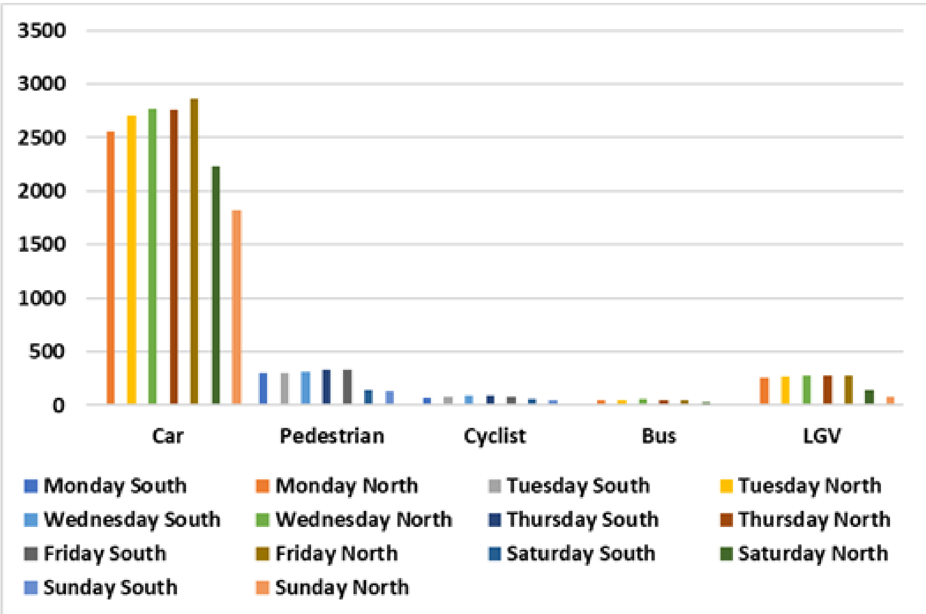


FIGURE 20: KRS modal split

The directional traffic flow of motorised vehicles for the KRS shows a dominant count towards the north reflecting the fact that, in the wake of Liverpool City Council's experimental traffic order, Kingsley Road is now a one-way road and the pedestrians and cyclists can go both ways, as shown in TABLE 6 & FIGURE 20. The results show that the majority flow of pedestrians' and cyclists' is to the south. Therefore, the vast majority of pedestrians and cyclists move in the opposite direction to motorised vehicles.

TABLE 6: KRS directional flow of all user classes to North and South for the period of the 3rd of January to the 27th of March 2022

Day	Direction	Car	Pedestrian	Cyclist	Motorbike	Bus	OGV 1	OGV 2	LGV
Monday	South	7	295	65	1	0	0	0	1
	North	2562	7	6	12	49	8	3	255
Tuesday	South	7	299	76	1	0	0	0	1
	North	2707	6	8	16	50	12	3	273
Wednesday	South	8	308	86	2	0	1	0	1
	North	2772	7	8	15	52	10	2	276
Thursday	South	6	334	92	2	0	0	0	1
	North	2759	8	7	16	49	15	5	275
Friday	South	8	333	81	2	0	0	0	0
	North	2865	6	9	15	51	11	4	276
Saturday	South	7	145	53	1	0	0	0	1
	North	2234	4	8	12	25	3	1	137
Sunday	South	6	129	47	1	0	0	0	0
	North	1819	6	8	11	11	1	0	83

Flow Speed

There are concerns that speeding (motorised) vehicles may cause accidents that lead to the injury or death of pedestrians or cyclists. This is reflected in the data which suggests that, for example, 72%, 58.4%, 29.87% of all the cars, LGVs, and buses, respectively, on Kingsley Road exceeded the posted speed limit of 20mph. The drivers on Hartington Road were more compliant with the speed limit of 20 mph than drivers on Kingsley Road, but nonetheless 54.74%, 33.86%, and 12.53% of cars, LGVs, and buses have exceeded 20mph.

The Hartington and Kingsley Roads' Average Cars', LGVs', and Buses' speed of the period of 03-January to the 06th of March 2022

	Average Speed			Percentage of exceeding 20 mph		
	Cars	LGV	Bus	Cars	LGV	Bus
Hartington Road	19.81 mph	16.18 mph	12.78 mph	54.74%	33.86%	12.53%
Kingsley Road	23.48 mph	21.53 mph	17.74 mph	72%	58.4%	29.87%
Kingsley Road Peak times	21.56 mph	20.44 mph	18.19 mph	Average percentage of drivers that exceed 20 mph decreases by a minimum of 50% of the off-peak times		
	Average Speed of Cars drops by an average of 2 mph					

Within this there are two issues of note:

1. During peak times for the KRS, the average speed drops by an average of 2 mph and significantly decreases the percentage of drivers exceeding the 20 mph
2. During the peak times of the HRS, the impact of peak time is unpredictable due to the bi-directional flow, unlike Kingsley Road which is one way.

Turning counts

There are four zones at the HRS which allow us to measure the turning direction of traffic, as shown in FIGURE 21. The data in FIGURE 22, FIGURE 23, and FIGURE 24 show the numbers of turning cyclists, pedestrians, and cars from zone to zone. It can be observed that the turn between Zone1 to Zone4 have the highest number of cyclists, pedestrians, and cars in comparison to other turns. However, the cyclists and cars going between Zone 2 and Zone 4 (i.e. straight on, north/south) show the highest flow counts among all zone transitions, and the pedestrians moving from Zone 1 to Zone 3 (i.e. crossing Hartington Road) show the highest pedestrian movements, as shown in FIGURE 23, FIGURE 24, and FIGURE 25.

FIGURE 21: The turning zones at the HRS

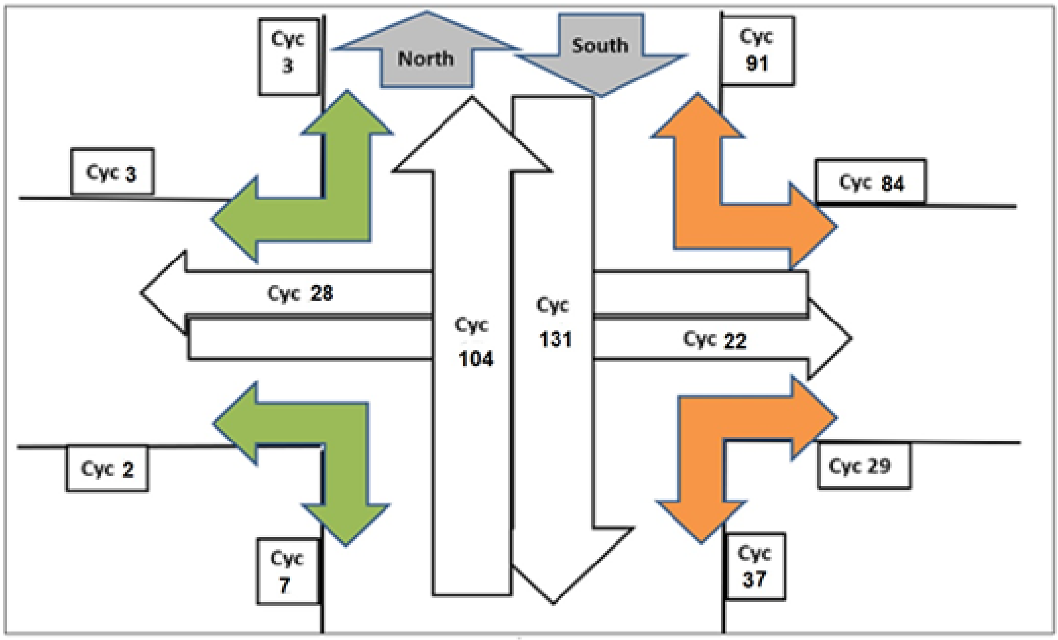


FIGURE 22: HRS's Cyclist turning counts: An average week count from 19th of January to 29th of March 2022

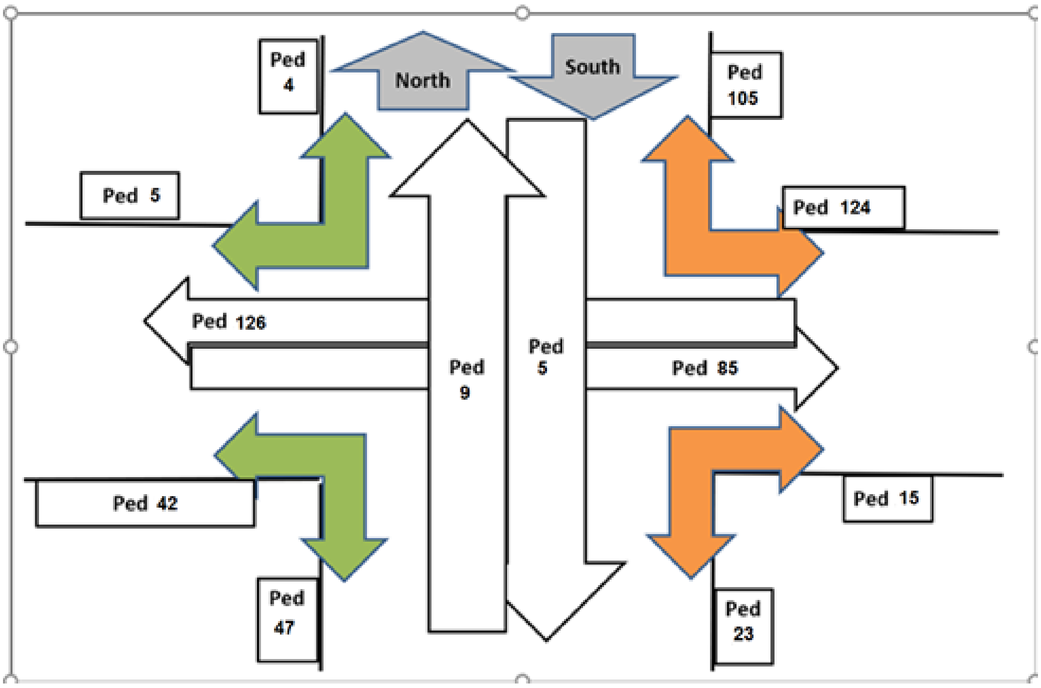


FIGURE 23: HRS's Pedestrians turning counts: An average week count from 19th of January to 29th of March 2022

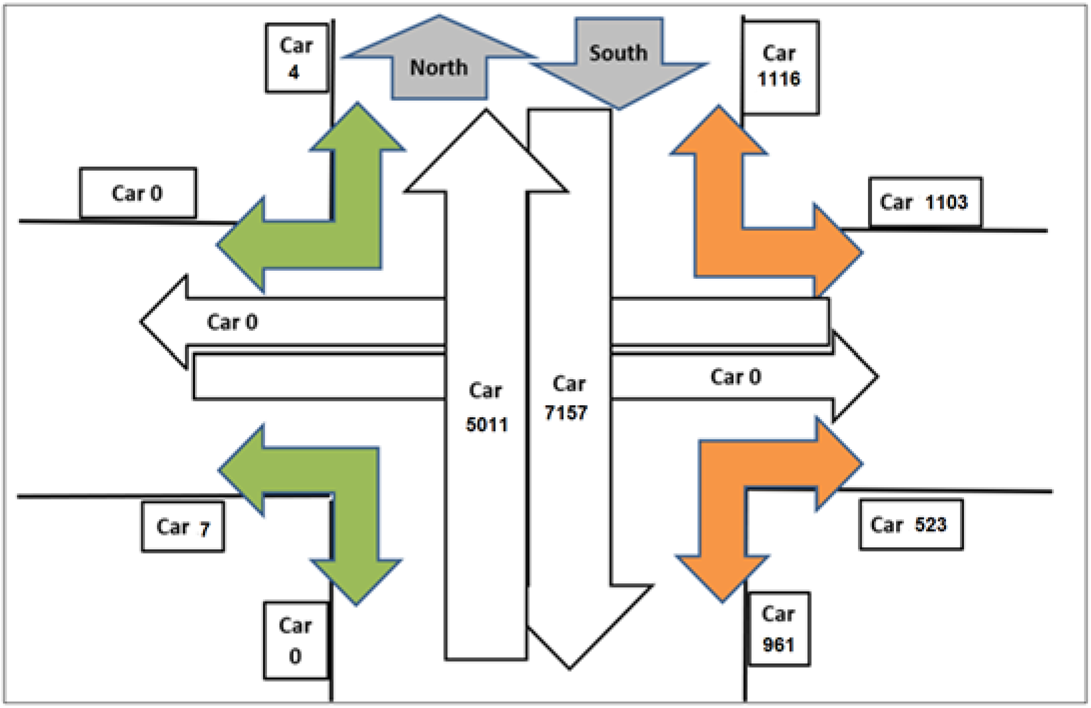


FIGURE 24: HRS's Cars turning counts: An average week count from 19th of January to 29th of March 2022

Travel Patterns and Weather

A Correlation between the weather conditions and the number of road users for the 3rd of January to the 27th of March 2022 was calculated using the Pearson's Correlation Coefficient. The Pearson's correlation coefficient results can be interpreted as follows:

1. The Pearson's correlation factor can be in a range of values from +1 to -1.
2. A value of 0 indicates that there is no association between the two variables.
3. A value of 1 indicates that there is a direct association between the two variables.
4. If the correlation factor is positive, then it means that if the value of one variable increases, the value of the other variable also increases.
5. If the correlation factor is negative, then it means that if the value of one variable increases, the value of the other variable decreases.

The results in TABLE 7 shows that cars, LGVs, cyclists, and pedestrian counts positively correlate with temperature. Within this, cyclists are the most influenced by temperature among all other users. The data suggests that bus counts are very-slightly correlated with the temperature, reflecting bus schedules which operate regardless of temperature. Whilst the data suggests that traffic flow count is negatively correlated with the wind speed, 24 hours rain, hourly rain, and rain now, the levels are such that there is no meaningful relationship.

TABLE 7: The Pearson correlation coefficient for combined flow count (both directions) with respect to weather (temperature, wind speed, wind direction, and rain)

Both	temperature	Rain 24h	Rain hour	Rain now
Car	.278**	-0.048	-.051*	-.055*
Pedestrian	.318**	-.055*	-.063*	-.056*
Cyclist	.330**	-.061*	-.057*	-.057*
Bus	0.014	-0.036	-0.024	-0.018
LGV	.303**	-0.023	-0.035	-0.034

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Summary of Sensor-based Findings

The motion sensors have shown that there are 147% more cyclists at the KRS site during weekdays than the HRS site, and 72% more at weekends.

At the HRS, the average daily share of cyclists on weekdays is consistently 2% (approximately matching the expected modal split for the area) including peak periods for cars', rising to 3% at weekends. Pedestrians' share increases during peak (car) hours on weekends by an average of 3%.

At the KRS, the average daily share of pedestrians on workdays never drops below 18% and increases to an average of 30.6% at peak (car) hours. At weekends the pedestrian count sits between an average of 12.5% to 16.5%, and the cyclists share during workdays is fixed at ~5%. Notably, this is double the expected modal split for the area).

Most cars and LGV drivers exceed the speed limit at the KRS site, and this remains an issue that could endanger cyclists and pedestrians. It was noted that the drivers at the HRS were more compliant, perhaps because traffic calming measures (i.e. speed bumps) are in place, whereas speed restrictions at the KRS are controlled through signage. Whilst the risk at the KRS site could be reduced by making a few changes to the road, such as speed bumps, speed cameras, and warning signs; it should be noted that experts suggest that speed bumps may cause more pollution because they can cause vehicles to slow down and idle.

5. Developing Key Findings for Community Workshops

The data revealed by the two sensors provided a wealth of information to support the community workshops. This included information on background usage, periods of activity, speed, and travel patterns which would go on to inform the questions and scenarios we would pose to residents, and the design of potential interventions.

External Considerations

In developing a set of key findings to take to the residents of Toxteth, we also had to take some external factors into account. In particular, we needed to pay consideration to an intervention which was put in place on Kingsley Road - our first site - by Liverpool City Council in December 2021. The intervention - an Experimental Traffic Order - had the effect of making Kingsley Road one way to vehicle traffic whilst installing segregated cycle-lanes, including one as a contraflow to the one-way system. The intervention was put in place unbeknownst to the project team, or Sustrans as our project partner and, importantly, was announced after the process for sensor installation had begun.

Nonetheless, we saw the Kingsley Road scheme as an opportunity. Firstly, our sensor would now be monitoring a live, and newly installed active travel scheme, and create the opportunity to support LCCs own consultation process. In this way, the Kingsley Road intervention provided a serendipitous expansion of the ways in which data of this kind can support community consultation, and provide greater first-hand insights into how this data is received by residents. Secondly, our sensors would leave us perfectly placed to discuss the potential real-time effects of a scheme with residents whilst using the other sensor on Hartington Road as a form of ‘control’ in terms of normal road conditions.

Usage

The sensors revealed a number of issues relating to data usage - not least when comparing Hartington Road and Kingsley Road.

To some extent, Hartington Road showed utility as a ‘control’, with modal splits roughly reflecting expected modal share for the Princes Park ward (based on the 2011 Census). This provided a helpful platform to then compare Kingsley Road and whether the LCC intervention was having any effect on active travel rates.

In both instances the car was the most popular use. That is to be expected. We also observed a rise in LGVs - likely delivery vans - peaking during ‘business hours. One interesting finding was that whilst Cycling rates on Hartington remained at ~2% - in line with expectations - cycling rates on Kingsley Road sat at 5% - nearly double the background modal share for the area. This provided a vehicle to ask residents whether the intervention on Kingsley (and the data) changed their view of the scheme one way or the other.

Speed

Data from the sensors revealed two central findings relating to speed.

The first was that the speed limit - 20 mph at both sites - was rarely observed. For example, on Kingsley Road, in excess of 72% of vehicles exceeded the posted speed limit. Sensor-data showed that this followed day-night cycles (i.e. more propensity to speed in the evenings), and that maximum speeds (45.5mph on Kingsley Road and 38.3mph on Hartington Road) took place when average speeds were higher overall. Propensity to speed also changed by mode - with LGVs being the most likely to exceed the speed limit.

Secondly, and perhaps counter-intuitively however, although there was widespread speeding, our sensor data did not observe excessive speeding. Rather, the average speed on Kingsley Road and Hartington was 23.48mph and 19.81mph, respectively, indicating that drivers were only marginally over the speed limit, by and large.

These two findings taken in tandem show a need to explore perceptions of speed with residents. Do they notice times when speed is higher or lower? Are there times when residents feel that speed is excessive, and how does this tally with compliance with posted limits? Combined, how does this affect residents' reflections on current speed reduction mechanisms (e.g. speed bumps)? Conversely, what are the reasons for speed being low at other times, and does this raise issues itself (e.g. is it because of the volume of traffic which may bring greater idling)?

Timings

Closely following on from issues of speed, the sensor data revealed several patterns of travel across the day. This included expected peaks and troughs around 'rush hour' and the early hours respectively, but also showed a longer tail during the evening commute. We will explore these broader travel patterns with residents, and ask their views on how this tallies with their lived-experience of their streets, and how it affects the ways they use them.

Use of Existing Infrastructure

The sensor data revealed numerous patterns regarding how people travelling through and across Hartington Road used the existing bike infrastructure. This included specific directions of travel, and some directions where, effectively, no travel was recorded at all. This gives us grounds to explore why this might be? Is it that the infrastructure is ineffective / not fit for purpose? Does it not do what residents need? What interventions might they need instead? Ultimately, there are grounds to explore if earlier interventions are a barrier to active travel and, taking this further, whether that limits their understanding or shapes their ideas of potential interventions?

Direction of travel

In addition, the sensor on Hartington Road revealed several interesting patterns regarding how people moved around the area, via the junction of Hartington Road, Arundel Road and Fern Grove. In particular, whilst it showed a dominant pattern of vehicular travel north/south on Hartington Road, the sensor revealed a high number of cyclists making a left hand turn onto Arundel Road from Hartington, and to a lesser extent, traversing Hartington between Arundel Road and Fern Grove. This gave us grounds to explore how, but importantly, why residents might prioritise this routing, and then to explore the potential for interventions.

Design of interventions

Combined, the sensor data on Hartington Road and Kingsley Road (post-intervention) gave us the means to consider a number of potential interventions which might speak to these issues. This included a mixture of traffic calming, segregated infrastructure to facilitate movement patterns, and pedestrian-friendly design. These interventions will be outlined in the next section.

6. Visualising active travel

Creating images of development is a central part of public consultation. Whilst there is significant literature about the role of visualisations in planning, only rarely has the impact of visualisations on perceptions of active travel interventions been considered.

There are many different techniques to provide visualisations of development options, but the creation of a 3D model of the case study site offers the potential to create multiple active travel intervention alternatives within the same model and present these in a consistent style to the public. As this project goal is to assess the impact of visualisations of alternative intervention types on the public's imagination of their roads, we sought continuity in style between the intervention types. Thus, a single 3D model was created which could be adapted to represent different interventions, as agreed with the stakeholder group.

The 3D model was created in SketchUp and renders applied to give a realistic style to the road and minimal elements of the urban environment. For example, no render was applied to the buildings in order to emphasise the significance of the road in the images.

The model and all images were created by Todd Lithgow, a leading Urban Planning student at the University of Liverpool. The base model, without any new active travel interventions, is presented in figures 25, 26, 27.

Figure 25. Pedestrian eye-level view from the south side of Arundel Avenue, looking west across Hartington Road

Source: Todd Lithgow, 2022

Figure 26. Top building height view from the west side of Hartington Road, looking east across to Arundel Avenue

Source: Todd Lithgow, 2022

Figure 27. Bird’s eye view of the junction between Arundel and Hartington Road

Source: Todd Lithgow, 2022

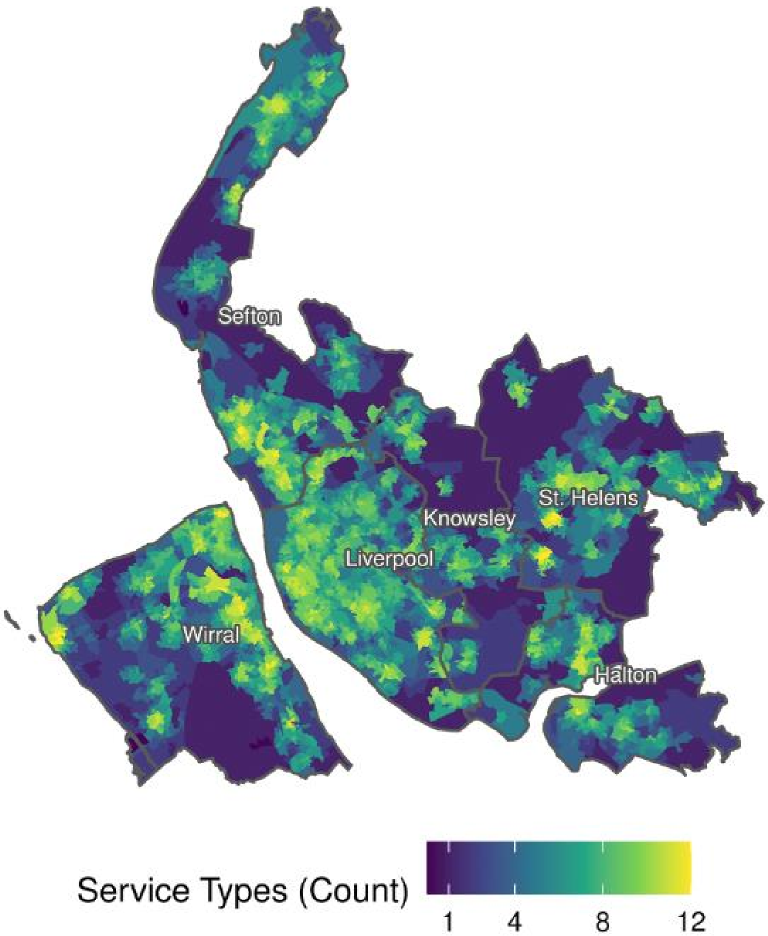
15-minute neighbourhood

The concept of the 15-minute neighbourhood is a new brand of healthy or active travel cities (Nurse and Dunning, 2020). As such whilst the broad ideas underpinning the 15-minute neighbourhood have a long gestation period in planning and in the academic geography literature, the precise collection of categories that comprise 15-minute neighbourhood is a new construct (Dunning et al., 2021).

The 15-minute neighbourhood, also known as the 15- or sometimes 20-minute city, means that citizens' everyday needs are met within a 10-minute walk of their home, i.e. a 20-minute round trip (Sustrans, 2020).

Previous research by some of this project team operationalised the concept of the 20-minute neighbourhood through accessibility analysis of Liverpool City Region (Figure 28 - Calafiore et al., 2022). That research evidenced the distribution of service accessibility across the region, displaying both urban-rural and within urban variation. However, this evidence was not analysed in relation to local residents' perceptions and accessibility. As such, this project seeks to understand residents' perceptions of accessibility and how closely the case study location conforms to the concept of the 15-minute city.

Figure 28. Map of accessibility to 20-minute neighbourhood services across Liverpool City Region as presented by Calafiore et al. (2022)



Source: Calafiore et al (2022)

Workshop

15-minute neighbourhoods are planned with professionals, but they belong to residents. Residents' views on mobilities are therefore vital to understand.

Our approach recognises that simple data-driven or 'one size fits all' approaches to active travel interventions like 15-minute neighbourhoods simply do not capture the nuance of space and place. Indeed, we acknowledge the critiques surrounding the implementation of 'low traffic neighbourhoods' around the UK, and this research project was conceived specifically as a way to create a transferrable method which brings people with it, and responds directly to those criticisms.

At the heart of this method is the recognition that spaces and the people who live in them are different. To this end, we also acknowledge that a data driven approach can only get us part of the way. Often it can provide a 'snapshot' of conditions as they currently are, and its agency in community planning is not well understood. The community workshop was therefore designed as a way to test the agency of data as a starting point for conversations with residents about place-making.

In this approach, local residents are imperative to the research project and our outputs, in the form of a co-designed 15-minute neighbourhood. The community workshop seeks to understand the reasons behind the movement patterns the data reveals (that of 15-minute accessibility, 'expert' designs and sensor data) as well as perceptions of that data. Only through those discussions is it possible to understand why data may present as it does, the nuances of particular places and to explore the appetite, attitudes and suggestions for change within the neighbourhood.

Overlap with existing consultations

The site selection for this project was undertaken through consultation with stakeholders (see Section 3 of this report). The rationale was to combine expertise and effort to provide a sizeable evidence base to support neighbourhood level planning. This was effective in the choice of streets for implementation of the traffic sensors, however it did introduce greater complexity for the workshop.

This complexity was largely for two reasons. First, there was a new intervention in the layout of Kingsley Road. Whilst this is a positive contribution to active travel on the street, it makes the process of understanding perceptions of evidence and design complex because: a) residents are responding to a recent change and therefore do not necessarily have settled views on the street, b) the evidence does not necessarily identify 'normal' behaviour as traffic adapts to the change in layout, and c) because of concern that discussing alternative road layouts might raise unrealistic expectations that were unlikely to be implemented given the recent Council investment in the street. As such, we were concerned that a workshop focussing on Kingsley Road would not provide an appropriate location to test a novel workshop approach and might not contribute to residents' wellbeing.

The alternative, Hartington Road, was a more hopeful location as it represented a street with no significant changes to the structure within the last decade and also had the potential to be adjusted through Council investment in the near future. As such, it had the experimental and moral justification which would have been problematic with Kingsley Road. Additionally, Sustrans was about to implement a neighbourhood level consultation on nearby Lodge Lane (Figure 29), which therefore opened the possibility of aggregating evidence from residents to produce a substantial evidence base.

Fig 29. Flyer for "By Ours Lodge Lane" community project

Source: Sustrans, 2022

Initially this synergy between projects was entirely beneficial, and in early planning the collection of sensor data was scheduled to be completed in the autumn of 2021 to enable a workshop in late 2021. However, due to a delay in the project start, this timing was re-scheduled, and the workshop postponed to late February 2022. By this time consultation for the Lodge Lane project and a separate consultation by Liverpool City Council had both begun. Thus, the anticipated synergies became unforeseen competition, wherein it was no longer possible to cross-advertise community events because of the moral risk of participant confusion.

Online meeting
Early 2022 presented complex circumstances for the workshop mode. The relaxation of COVID-19 restrictions for gathering and in-person meetings occurred whilst there were increasing numbers of COVID-19 cases in England. Divergent public views were held at the time between people seeking ‘normality’ versus those seeking ‘caution’. As such, it was not clear that there would be a collective participant preference for either an online or an on-site workshop. At the time the University of Liverpool’s guidelines for research ethics were being updated and it was not clear that an on-site workshop would be approved. Thus, the workshop was designed as online.

Advertising
The main advertising route for the workshop was a flyer (Figure 30 and 31) posted to every dwelling on Hartington Road (150) and the 20 closest addresses to Hartington of 5 adjoining roads (100 addresses in total). Initially we had hoped to combine this flyer with an email distribution to a list of participants from the other consultations, but this idea was rejected to avoid conflict between communication with residents.

Figure 30. Front page of the Hartington Road community workshop flyer

Source: University of Liverpool, 2022

Figure 31. Reverse of the Hartington Road community workshop flyer

Zoom community workshop

We want to understand your views and show new information about services, traffic and road designs:

- Is Hartington Road a neighbourhood where you can access your daily needs?
- Which local services do you use?
- What do you want Hartington Road to look like?

Access the Zoom workshop through the QR code or join Meeting ID: 936 8342 8032 (use password: Hello@123)

See you online from 7-8pm Tuesday 8th March

Password:
Hello@123

This workshop is organized by the University of Liverpool and funded by DecarboN8. The workshop has been designed in consultation with Liverpool John Moores University, Sustrans and Liverpool City Council, but views shared may not represent those organisations. We will record your opinions, but we will only ever report those opinions anonymously.

If you have any questions about the workshop please contact Dr Alex Nurse (a.nurse@Liverpool.ac.uk)

UNIVERSITY OF LIVERPOOL   LIVERPOOL JOHN MOORES UNIVERSITY   DecarboN8

Source: University of Liverpool, 2022

Response and participation

The workshop was attended by only two residents of Hartington Road. This number is inevitably too small to make generalisable comments about collective residents' perceptions of the interventions, but as a pilot workshop, it was nevertheless very helpful in exploring changes in perceptions through the threefold evidence presented.

In addition to workshop participants, several others also contacted the research team to indicate that they could not make the workshop, but would like to provide their views. In each instance the research team responded with the opportunity to participate in a further workshop but it was not possible to undertake this within the tight time frame of the project window.

Overview of the workshop
A presentation on the 15-minute neighbourhood and the modelled active travel distance of services from the relevant street will begin the focus group. Residents will then be asked questions across four themes: perceptions of existing mobilities and services accessed; perceptions of the 15-minute neighbourhood concept; attitudes towards different types of street intervention; perceptions of active travel preferences in a 15-minute neighbourhood.

All focus groups will be audio-recorded, the recordings will be retained for one year after the project conclusion to facilitate publication and destroyed.

Participant consent
Participants were introduced to the rationale of the project, the research funders, the research team and the intended use of the research. An overview of the following issues was provided at the start of the workshop in line with ethics requirements from the University of Liverpool: data storage; confidentiality; anonymity; data use; access to data; archived data; and data destruction. Further information about the research ethics explained is available upon request. Participants were informed of their right to leave the workshop at any point without providing an explanation. Participants were then asked for verbal consent (recorded through audio recording) before the workshop continued.

Quotes and views from the participants are indicated as P1, P2, etc. The interviewers are indicated as I1 and I2.

Participants view of neighbourhood services and accessibility
The starting point of community engagement in the workshop was to describe their perceptions of the neighbourhood, the local services which they utilise and their accessibility. Participants immediately praised the accessibility of everyday services.

> P1. “everything is within a ten-minute walk, I can get the bus to work, walk to the shops, all our daily needs are well within ten minutes. Some of our social is further away.
> I2: “How far can you get in ten minutes?”
> P1: “Over ½ a mile”
> P2: “I can get the baby to nursery, get the 86 (bus) to work, Smithdown Road. It’s ideal, you can go anywhere around here like”

The participants, however, also made use of delivery services for some grocery shopping, indicating that whilst services were accessible within a 10-minute walk, it didn’t mean they were the most convenient for all purposes.

> P2 “We both work full time, so we get our big shop delivered.”

I1 “Where do you go just if you need a pint of milk?”
P2 “We’ve got a one stop shop, offie, that’s just round the corner”

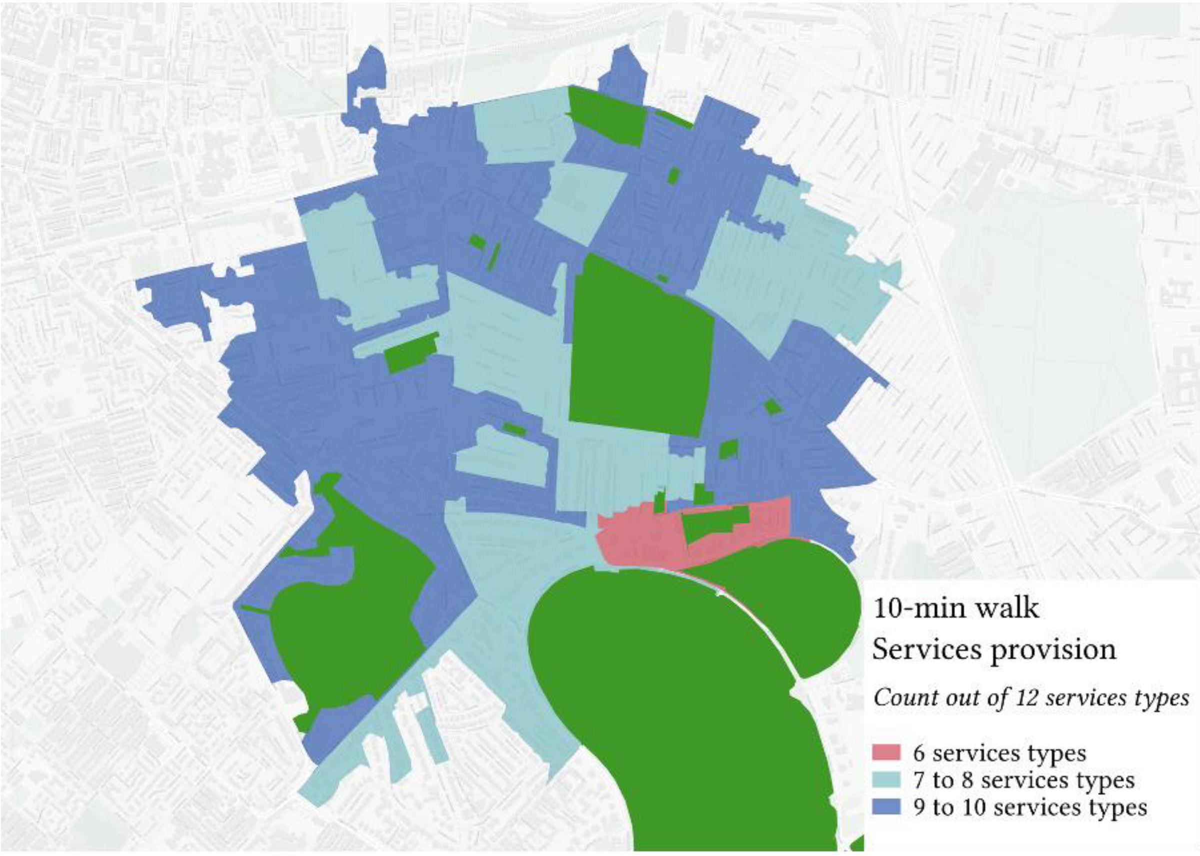
Delivery based shopping and services has the potential to fundamentally alter accessibility and the 15-minute neighbourhood, however, this is evidently dependent upon the availability of delivery services, which are not equitably distributed. Our participants combined delivery of their ‘big’ shop with use of local stores for small items. This combination of services makes modelling the 15-minute neighbourhood quite complex, as residents’ behaviours are performed in multifarious ways and with different logics at different times.

15-minute Hartington neighbourhood?

Participants were presented with an accessibility score map, showing the area within a 10-minute walk of Hartington Road (see figure 32). The accessibility score builds on analysis undertaken by members of the research team for Liverpool City Region as a whole (see Calafiore et al., 2022 for an overview of the method and the precise service categories). The accessibility score shows how many different service types are accessible within a 10-minute walk. The service types are predicated on the concept of the 15-minute neighbourhood and represent services that are typically needed each week by residents. The top accessibility score would be 12/12, but 8/12 services is normal for Liverpool. Hartington Road itself is in this category, having access to 8/12 services, but is below some of the adjoining streets.

Our previous research recognises that these places are intrinsically different – reflecting local characteristics, demographics and socio-economic conditions. Going further, whilst we know much about the physical possibility of a 15-minute neighbourhood existing, what we know less about is the ways in which local residents would like to move through their neighbourhoods.

Figure 32 15-minute neighbourhood accessibility map for Hartington Road and the area immediately surrounding it.



Source: Alessia Calafiore (for this report)

Participants supported the evidence provided by the spatial accessibility analysis.

I2 “Does this map feel right to you? You’re very positive that you can get to everything within a ten-minute walk.”

P1 “Yeah, we live just (X), so we can get to all areas

P2 “There’s loads of side streets too which mean we can cut through”

Their endorsement should not be considered to relate to the specific number of services accessible, but to a broad picture of the nature of accessibility in the neighbourhood. Hartington, despite being very close to the City Region average, was perceived by the participants as highly accessible and meeting their routine needs. As people who walked to access most services (or transport nodes, for example to get the bus to work) their route selection was based on the shortest route in most instances (although they did agree to occasionally taking a more ‘scenic’ route through the graveyard when they were not rushing to access the service). This raises an interesting question for modelling; is strict proximity to services more important, or perceptions of those services? The former is certainly easier to model, but the latter evidently has the same impact upon whether the area functions as a 15-minute neighbourhood (as opposed to being simply designated one).

Quality and perceptions of the road

The interview moved on to consider participants' perceptions of the quality of the road itself and the infrastructure within the area. This was to elicit an understanding of the key issues that the residents wanted to raise before alternatives were highlighted by the interviewers. As such, these views should be considered uninfluenced by the later visualisations and evidence presented on traffic.

Three key problems were volunteered by the participants: car parking, rubbish and the speed of vehicles.

CAR PARKING

P1 “It’s chocker. When we have people come round they can’t find somewhere. It’s first come first served. Mind you its quieter in the summer when the students have gone”

LATER

P1 “There’s not a lot you can do about parking though”

RUBBISH

P1 “The main thing I want is for people to clean it (the road) like the city centre. Cos, the amount of rubbish. It must be coming from Smithdown Road. Sometimes we’re walking and it's just kicking up rubbish. There’s used condoms and all sorts.”

SPEED

P1 “The speed bumps have made a distance, cos people use it as a cut through from Smithdown, mind you the police (laughs). But, they’re quite high-speed bumps so its slowed down the traffic.”

P2 “But not all of them (laughs) Not the speedy ones. You can hear them (makes fast car noise) and then there’s the police (makes siren noise!) (laughs)

This presents a complex milieu of issues. Infrastructural issues, like the absence of car parking, are considered within the traditional planning domain, and speeding vehicles is a core issue for highways engineers in transport planning, however, the role of rubbish is largely absent in planning. The residents’ issues, however, highlight the significance of both citizen behaviour (e.g. fly-tipping) and the structure of the built environment that they inhabit - both have a role to play in making high quality neighbourhoods. Whilst the tension between use and provision is a perennial feature of the planning literature, it is necessarily a consideration for 15-minute neighbourhoods and those planning active travel. The use of a space can perform or inhibit its planned function, and needs to be remembered in design.

Visualisations

An integral component of the workshop was to present pre-created road designs for Hartington. The rationale was to explore residents’ perceptions of the visualisations and to assess whether there was any change in their perceptions about the interventions which they would like to take place on the road after seeing the visualisations.

Pre-creating the designs required a pre-determination of the types of intervention to display. Whilst this introduces a bias in the co-design process; that of expert design skills potentially influencing the perceptions of residents, this was part of the research goal. As we could only realistically present a small number of design options during the workshop it was necessary to be selective in the options considered. There was extensive discussion with the project’s stakeholders about which options to present, from full pedestrianisation to simply increasing the number of ‘soft’ traffic calming measures such as speed cameras and signage.

Three options were presented: the creation of a continuous footpath along Hartington (making a raised path across Arundel); a full modal filter across Hartington Road to prevent vehicles from passing the full length of Hartington Road; and the combination of continuous footpath and modal filter. A more detailed explanation of each and the attendant visualisations are provided below.

Option 1: Continuous footpath

The first option prioritised pedestrians using Hartington Road, by creating a raised continuous footpath at the junction of Hartington Road and Arundel Avenue. This was designed as a small-scale intervention, which would not limit traffic continuing along Hartington Road, but would slow down traffic turning into or out of Arundel. The intention was to provide a signal to road users of the prioritisation of pedestrians.

Figure 33. Bird's eye view of continuous footpath along Hartington Road

Source: Todd Lithgow, 2022

Figure 34. Continuous footpath along Hartington Road

Source: Todd Lithgow, 2022

Option 2: Modal filter across Hartington

The second option is a more significant intervention in the road and involved creation of a full modal filter across Hartington Road at the north side of the junction with Arundel. The rationale was to prevent traffic from travelling the full length of Hartington Road and thus change its dominant use by vehicles from through route to access only. The modal filter however would enable pedestrians to cross Hartington Road and allow cycles, scooters and other low impact modes to continue along Hartington Road, thus supporting active travel.

Figure 35. Birds eye view of modal filter across Hartington Road

Source: Todd Lithgow, 2022

Figure 36. Modal filter across Hartington Road

Source: Todd Lithgow, 2022

Option three: Modal filter and continuous footpath

The third option was the most significant scale of intervention and combined the two previous options. This has the intention of changing the use of Hartington Road (through route to access only) and slow traffic from and on to Arundel Avenue. It was intended to have the compound impact of signifying the prioritisation of road space for local residents and support active travel.

Figure 37. Bird's eye view of modal filter and continuous footpath

Source: Todd Lithgow, 2022

Figure 38. Modal filter and continuous footpath

Source: Todd Lithgow, 2022

Participants were asked about their views of the three options at the end of presenting them all. The participants were immediately attracted to the full modal filter (option two), even though this was a more significant intervention than the continuous footpath.

I2 What do you think about these options?
P1 I really like the second option, I haven't observed too many people turning down Arundel, most people use it as a cut down from Croxteth Road, so that would stop it.
P2 I like that
P1 I'm very conscious when I'm locking my door, that there's cars coming all the time, but with that they're less likely to be coming down.

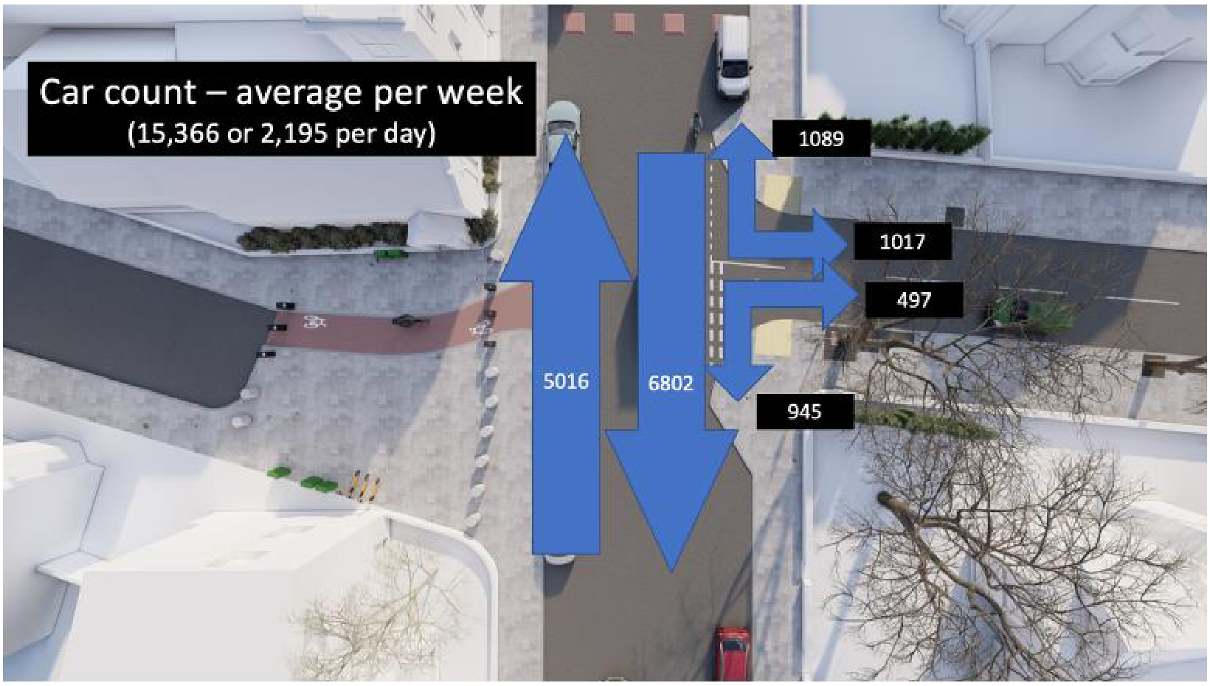
The argument that a reduction in both the speed and volume of the traffic on Hartington appealed to the participants.

I1 If this was in place tomorrow, what would be the impact on people who live here?
P1 It would be much quieter.
P2 How would people get between Croxteth and Smithdown then?
P1 They'd have to go the long way round….it would increase the traffic on Lodge Lane.

Evidence of use and speed

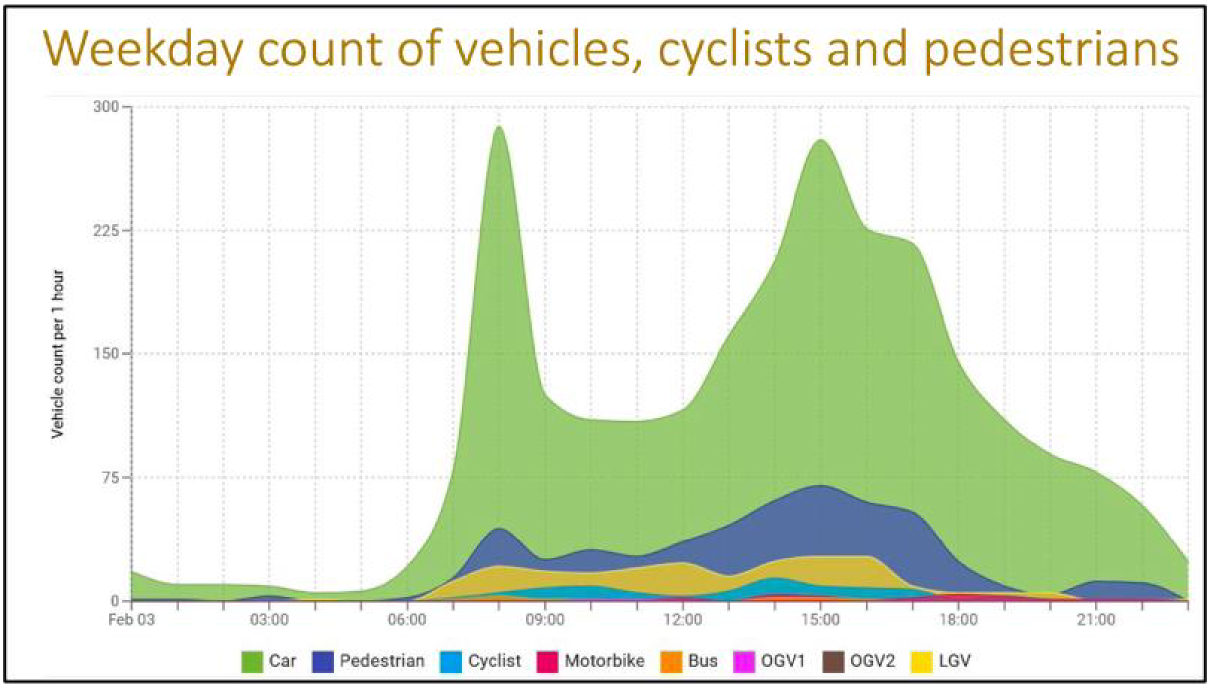
The third area of exploration in the workshop was participants' understanding of the use and speed of vehicles on the road against evidence from the sensor data. Participants were first asked to provide their views on the use and speed of vehicles broadly before they were presented with the evidence. Three components of the evidence were presented to the participants; the average car count per week (and direction of travel – see figure 39); the timing and volume of road users through the week (see figure 40) and the average speed of cars and LGVs (see figure 41).

Figure 39. Slide showing participants the average car count per week and direction of travel



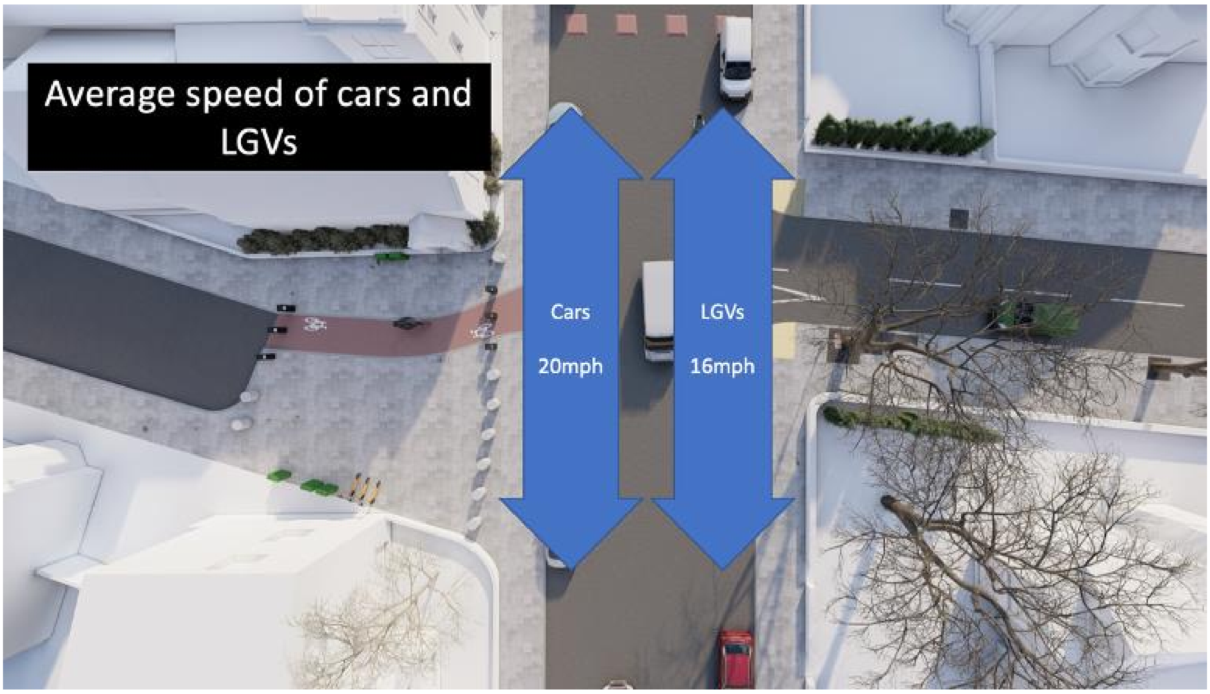
Source: Combined (authors)

Figure 40: Slide showing participants the volume and time of road users



Source: LJMU (authors)

Figure 41: Slide showing participants the average speed of cars and LGVs



Source: Combined (authors)

Residents' perceptions of use, speed and response

The residents were surprised by the volume of the traffic, but not by the speed, nor by the time of the week / day that Hartington Road was busiest. Whilst the participants articulated the number of road users as a flow concept (about one per minute), the aggregate outcome of that (relatively accurate) picture was shocking to them.

P1 It shows that there is a significant amount of cut through traffic, there's no shops or reason for them to come down here other than to cut through.

The participants picked up on this evidence to argue for the modal filter across Hartington, arguing that it provided additional rationale for their naive preference for the filter.

The participants picked up on the impact of the (supposed) school run on Hartington Road and recognised that there was a long tail in the evening.

One argument that the participants made for a limited speed (averaging 20mph) was that the parked cars limited the width of the road and may have made it difficult to drive much faster. This logic was combined with the perceived impact of the speed bumps.

7. Discussion and Conclusions

In all, the project suggests that there is value in a mixed-method approach that combines sensor-based analysis with focused community orientated planning skills. The evidence from this proof-of-concept project suggests that each approach added something to the whole that each would not be able to achieve in isolation. This included the opening of new insights, and providing the ability to challenge perceived wisdom. Going further, however, the approach also enriched the outcomes - meaning that new and bespoke options could be taken to residents which reflected local conditions. However, as a proof-of-concept, the project also encountered issues which could be remedied if the approach were to be upscaled or translated into other places. To expand on this, and to explore some of the core findings in more depth, we will now reflect on some of the successes and areas for improvement, before outlining the next steps for this research.

What worked Well

Across the project there were a number of things that worked really well or were seen as a positive. Importantly, it should help to shape thinking to underpin future projects of this nature. This includes:

1. Responsive Residents

The residents we had the opportunity to engage with were overwhelmingly positive and engaged about the future of where they live. In short: it was clear that people care about where they live. Even when residents couldn't attend the workshop, some wrote to us with their views on the area.

In all cases, residents were proactive and positive about change. Above all, it demonstrates the strength of the underlying assumption of this project - in that people are supportive of change to where they live (supporting findings from surveys such as BikeLife), and welcome the opportunity to have their views heard. In particular we found residents who, when presented with visualisations of what might happen, choose options which would change their lives, and could conceptualise the ways in which that change could happen (e.g. I could let my kids play out in the street). In other words, they could visualise themselves in the change, which helped them to buy into it.

2. Sometimes it's also about simple things

Building on this, we found that residents were as motivated by the opportunity to talk about things like street scene as much as they were active travel. Seemingly simple matters such as litter were high-priority issues for residents. In some cases, the lack of action on these simple matters then bled into a scepticism of the potential for future action. This is perhaps a lesson for local authorities seeking to engage and implement schemes: If local residents don't feel like they are part of the journey on small things, they might struggle to adapt to bigger things.

3. Trust Residents to have good instincts.

During the course of the workshop it became apparent that the residents had a broadly good handle on the day-to-day travel patterns. In most cases they were able to correctly describe the traffic patterns across the day (particularly in terms of the peaks and troughs). This is, perhaps, expected and reflects the lived experience of people who live in a place. However, in terms of engaging about the future of a place we found that we didn't have to challenge preconceived notions or biases.

There are grounds to explore this further in other neighbourhoods. How close are people's perceptions to the reality of traffic flows? To this end, is the use of sensor data a means to confirm and formalise embedded local knowledge, or a vehicle to challenge misconceptions?

4. Sensor Insights

The wealth of data provided by the real-time sensors, both in terms of numbers of each type of transport mode as well as insights into movement patterns and speeding issues was invaluable. Backed by real-world data and analytics, discussions with residents can take a different and more enlightened course. The LJMU team have had experience of this in other projects, particularly where residents are opposed to the new cycling infrastructure and complain that there are no cyclists using it, only to be presented with the data evidencing the contrary.

However, we note that there is scope to go further. For example, at present our sensors did not measure air quality/pollution or noise levels - both of which may factor into resident perceptions of intervention. Moreover, we also recognise that our proof of concept is transferable, and could be expanded to monitor more complex junctions and intersections, perhaps with an array of sensors.

What worked less well

Equally there were things that worked less well, and could be addressed or approached differently in a future version of this kind of engagement. In many cases, it is important to recognise that this is exactly the purpose of this project - to serve as a proof of concept and identify these issues before upscaling. To this end, and perhaps counterintuitively, the issues discussed below are not necessarily weaknesses.

1. Unforeseen issues

The nature of working in a real neighbourhood means that projects can be exposed to external events which can have a knock-on effect on how the project works.

The project was affected by the installation of the Experimental Traffic Order on Kingsley Road, which was announced/installed in the period after our sensor had been ordered, but before it was installed.

A key lesson for future projects is how change can also present opportunity. The installation of the scheme and accompanying community consultation by LCC forced us to change our initial plans for running the community workshops. In the conception stage, our plan was to hold consultation events along Hartington AND Kingsley Road, but following LCCs announcement of community consultation, the decision was made to withdraw those planned events to a) avoid muddying the waters of LCCs 'live' consultation and b) reduce the risk of operating in a crowded field.

The presence of our sensor allowed us to provide some support to LCC in our consultation, and to provide another means of analysing how sensor data does affect community views on active travel. In this way, the situation presented an opportunity to further reflect on our approach, and to potentially affect support for real-world change in the community we were working in. In this way, it was not a net-loss, but nevertheless shows that such schemes are exposed to external shocks.

2. The role of external partners

The above also underscores the role of external partners in delivering a scheme of this nature, and the need for good communication of strategic activity. As discussed above, Liverpool City Council surprised many people with their Kingsley Road scheme - including our other project partners Sustrans who had been undertaking strategic work in the area on their 'Round Ours' liveable neighbourhood project. In some cases, it reflects the complexities of dealing with a large organisation who deals with issues (e.g. highways) in a multi-faceted way that is not always joined up. To this end, a key outcome for future projects should be to build a network map of the organisations they are working with, rather than relying on a single point of contact who may not be aware of the entirety of strategic interventions.

3. Lead In

One clear lesson for future iterations of this project is the amount of lead-in time required to set up the sensors. Even with lead-in time designed into the programme of delivery, the period of discussion, engagement and negotiation between the project team and project partners (e.g. Sustrans) to ensure the optimal sensor positioning exceeded this time. This included identifying potential sites in a broader area and the narrowing down placement to specific lampposts. In some cases, we were dependent on the state of physical infrastructure and the state of the lamppost including the presence of a "Commando socket" to accept sensor installation. Then following this, an installation and calibration period was then undertaken.

It is not insurmountable, but upscaling a project to a larger neighbourhood, or even a broader local authority area must recognise that the extent of this lead in will also upscale. There must be a dedicated planning phase to do this, and reflecting the role of external partners, should incorporate them at every possible step.

Broader issues

1. Who is consultation for?

The study raises one of the most important issues around the need for good community engagement on active travel. This is: Who is consultation for? We spoke with residents of Hartington Road, and they in turn shared their views on the future of their street with us. However, there are approximately 150 houses on Hartington Road, and our data suggests that in excess of 2,000 vehicles go up and down it in each direction, each day. As a through-road it is clear, therefore, that not everybody travelling up Hartington Road lives there.

There is therefore the conundrum at the heart of intervention. On the one hand we saw evidence that residents favoured intervention outside their homes, but we could not engage with the transient daily population moving through the space whose lives may be equally affected. Whilst other studies have suggested that those populations (i.e. those who are inconvenienced) are likely sources of opposition, and this may be true, we are still left with the question: whose rights are more important? The people who live on a street, or the people that want to move through it? This is something we need to think about in future consultation, and it demonstrates that we likely need to think beyond the street. Our residents did give some through to where displaced traffic might go - albeit perhaps in the context of their own inconvenience - but this is something we need to do more broadly. If we're going to intervene, and intervene in a way that faces down opprobrium, we need to have a coherent answer for where traffic might go. From our study we suggest that the net needs to be cast wider than the residents of any individual affected street.

8. Next Steps for the Project

This proof of concept has demonstrated that there is merit in an approach to co-design which mixes sensor data with community focused planning techniques. But it is also important to acknowledge that this project is the beginning of developing this process and not a final end product. To this end it is evident that there are steps that can be taken to refine our approach. We consider this here, before outlining how this innovative approach can continue to develop and upscale.

We hope to refine our methods, and add further sensor-based analysis. This includes static and mobile sensors which can monitor air quality to explore whether changes in air quality at the street-level can have a significant impact on behaviour change. We also recognise that this approach could be used to monitor a broader area, using multiple sensors to monitor movement across a stretch of road, or a complex junction or intersection.

The next step for this project is scaling up an approach which can work to support the Liveable City Region combined Authority's programme of activity around active travel and net zero. We recognise that this activity is delivered in a complex network of local government and third-sector actors. Our work will continue to develop and support those networks as we do so. Ultimately, however, the project has shown that residents can be placed at the heart of this kind of transport planning and, in doing so, can co-design planning outcomes which take people with them and are more likely to enjoy popular support.

References

Calafiore, A., Dunning, R., Nurse, A. and Singleton, A., 2022. The 20-minute city: An equity analysis of Liverpool City Region. *Transportation Research Part D: Transport and Environment*, *102*, p.103111.

Dunning, R., Calafiore, A., Nurse, A., 2021. 20-minute neighbourhood or 15-minute city? J. Town Country Plan. Association, 90, 5/6, 157-159.

Dunning, R. and Nurse, A., 2020. The surprising availability of cycling and walking infrastructure through COVID-19. *Town planning review*, pp.1-7.

Nurse, A. and Dunning, R., 2020. Is COVID-19 a turning point for active travel in cities?. *Cities & health*, pp.1-3.