

Interim Evaluation of the Implementation of 20 mph Speed Limits in Portsmouth

Final Report - September 2010



Department for Transport

Interim Evaluation of the Implementation of 20 mph Speed Limits in Portsmouth

September 2010

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Document History

JOB NUMBER: 5081761			DOCUMENT REF: PCC 20mph Interim Evaluation_Main Report_Final.doc			
E	Final	G Kanya-Lukoda	P Whitfield	Ian Cleeve	Ian Cleeve	19-05-10
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date

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Executive Summary

Portsmouth City Council (PCC) is the first local authority in England to implement an extensive area-wide 20 mph Speed Limit scheme – that is introducing signed 20 mph limits largely without traffic calming, covering most of its residential roads which previously had a 30 mph speed limit. This is therefore an important scheme which can be compared to more traditional 20 mph Zones, which involve extensive traffic calming.

This document results from an interim evaluation of the impact of the scheme, focusing on early monitored results. It reports on monitored changes in traffic speeds, traffic volume and road casualties, comparing data for 'Before' and 'After' scheme implementation as well as resident perception of impacts through qualitative surveys. The document is intended to provide an early transfer of information to other local highway authorities on the effectiveness of implementing speed limits through use of signs alone and without providing any accompanying traffic calming measures.

The implementation of the 20 mph Speed Limit scheme was carried out using a combination of post-mounted terminal and repeater signs. 20 mph speed limit roundel road markings were also provided at street entry points on the carriageway adjacent to the terminal post-mounted signs. In some cases of limited visibility, they were also provided adjacent to the repeater signs.

For ease of installation the city was divided into six sectors: Central East, Central West, South East, South West, North East and North West. This amounted to 94% of road length (410 km of the 438 km of road length) in PCC.

On most of the roads where the speed limit signs and road markings were installed, the average speeds before installation were less than or equal to 24 mph. The relatively low speeds before the scheme implementation were because of narrow carriageways and on-street parking, which further reduces effective width of the carriageways. 20 mph signs were also provided on roads with average speeds greater than 24 mph in order to avoid inconsistencies in the signed speed limits in Portsmouth. One of the aims of the scheme was to be self-enforcing (avoid the need of extra Police enforcement) and partly to support the low driving speeds, and encourage less aggressive driving behaviour.

Overall there was an increase in the number of sites that demonstrated speeds of 20 mph or less after the implementation of the scheme. Many sites already had low average speeds of 20 mph or less before the scheme was implemented. At the sites monitored with higher average speeds before the scheme was introduced, there were significant reductions in average speeds. For example for the group of sites monitored with average speeds of 24 mph or more before the scheme was introduced, the average speed reduction was 6.3 mph. The average reduction in mean speeds on all roads was 1.3 mph.

There is insufficient data to comment about the effects of the scheme on traffic routes and volumes. The expectation is that because most roads had fairly slow average speeds before the scheme was implemented, that the changes are likely to have been modest.

Comparing the 3 years before the scheme was implemented and the 2 years afterwards, the number of recorded road casualties has fallen by 22% from 183 per year to 142 per year. During that period casualty numbers fell nationally – by about 14% in comparable areas.

There are no large apparent disparities between the casualty changes for different groups of road users (for example pedestrians compared to motorists) or between crashes with different causes. The number of deaths and serious injuries rose from 19 to 20 per year. Because the total numbers of deaths and serious injuries and of casualties by road user type and cause are relatively low, few inferences about the scheme's impacts should be drawn from these figures.

Qualitative surveys indicate that the scheme was generally supported by residents, although most of the respondents would like to see more enforcement of the 20 mph speed limits. The survey suggests that the introduction of the scheme has made little difference to the majority of respondents in the amount they travelled by their chosen mode. Levels of car travel stayed similar, whilst the level of pedestrian travel, pedal cyclist travel and public transport usage had increased for a small number of respondents.

In conclusion, early figures suggest that the implementation of the 20 mph Speed Limit scheme has been associated with reductions in road casualty numbers. The scheme has reduced average speeds and been well-supported during its first two years of operation.

1. Introduction

General

The Department for Transport (DfT) commissioned Atkins Transport Planning and Management (Atkins) to carry out an Interim Evaluation of the Portsmouth City Council (PCC) area-wide 20 mph Speed Limit scheme using signing alone i.e. terminal and repeater signs. PCC is the first local authority in England to implement such an extensive scheme covering most of its residential roads.

This report presents the early findings of the study based on available data, covering the time periods between June 2004 and February 2008 for the 'Before' period; and between June 2007 and November 2009 for the 'After' period. For ease of installation the city was divided into six sectors: Central East, Central West, South East, South West, North East and North West. The first sector (South East) to have the scheme implemented went live in June 2007 and the last sector (South West) went live in March 2008.

This document reports on monitored changes in traffic speeds, traffic volume and road accidents/casualties, comparing data for 'Before' and 'After' scheme implementation in the six PCC sectors as well as resident perception of impacts through qualitative surveys. The document is intended to provide an early transfer of information to other local highway authorities on the effectiveness of implementing speed limit signs without providing any accompanying traffic calming measures¹.

Scope of this Report

The evaluation process has been limited to the data collected and supplied by PCC prior to and after scheme implementation. The data supplied by PCC included:

- Traffic speed data;
- Accident data;
- Travel to school data; and
- Traffic volume data on PCC cordon/strategic roads.

A qualitative survey was also undertaken as part of the evaluation process to assist in assessing the anticipated qualitative impacts of the scheme.

In addition, consultation was carried out with Hull and London Local Highway Authorities that have implemented the more traditional 20 mph zones on an area-wide scale in order to assist with the comparison of the effects of the 20 mph Speed Limit scheme in Portsmouth.

Introduction

Since July 1999, traffic authorities have had the powers to introduce 20 mph speed limits without obtaining the consent of the Secretary of State². Guidance on how to implement 20 mph speed limits had also been released (Traffic Advisory Leaflet 09/99, "20 mph Speed Limits and Zones" and DfT Circular 01/06, "Setting Local Speed Limits"). DfT Circular 1/06 states that:

'Successful 20 mph zones and 20 mph speed limits should be generally self-enforcing. Traffic authorities should take account of the level of police enforcement required before installing either of these measures. 20 mph speed limits are unlikely to be complied with

¹ Initial Summary Report published on DfT website:
<http://www.dft.gov.uk/pgr/roadsafety/research/rsrr/theme4/interimeval20mphspeedlimits.pdf>

² The Road Traffic Regulation Act 1984 (Amendment) Act Order 1999 (S.I. 1999/1608)
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on roads where vehicle speeds are substantially higher than this and, unless such limits are accompanied by the introduction of traffic calming measures, police forces may find it difficult to routinely enforce the 20 mph limit.

In 20 mph zones, speeds are kept generally low by installing traffic calming measures such as speed humps and chicanes.'

DfT Circular 1/06 also discusses other published studies on 20 mph speed limits, stating that:

'Research into 20 mph speed limits carried out by TRL (Mackie, 1998) showed that, where speed limits alone were introduced, reductions of only about 1 mph in 'before' speeds were achieved. 20 mph speed limits are, therefore, only suitable in areas where vehicle speeds are already low (the Department of Transport would suggest where mean vehicle speeds are 24 mph or below), or where additional traffic calming measures are planned as part of the strategy.'

Thus the two different means of implementing 20 mph speed limits are:

- "20 mph Speed Limits" - indicated by use of terminal and repeater signs alone, without traffic calming measures; and
- "20 mph Zones" - indicated by use of terminal signs with prescribed (TSRGD 2002) traffic calming measures provided to ensure that the measures are self-enforcing.

DfT Circular 01/06 also states that '20 mph Speed Limits should be used for individual roads, or for a small number of roads'. As an innovative design it is noted that the PCC scheme does not comply with this advice, but the advice is not related to any statutory requirement. The PCC design is also consistently applied and avoids mixing and matching between 20 mph Zones and sign-only limits thereby avoiding potential confusion for road users.

Background

The 20 mph speed limit signs in Portsmouth have been mounted on lamp columns along approximately 94% of roads on the PCC road network (410 km of the 438 km of road length) that had a previous 30 mph speed limit.

The city has three strategic entry and exit routes and a number of primary roads, interlinked by a network of primary and secondary distributor roads, many of which pass through residential areas. A great number of the city's residential streets form a closely packed network of terraced housing, developed in the 19th Century or earlier, with little or no off-street parking. As a consequence of high volume of on-street parking, the available carriageway space is often narrowed to a point where the roads operate as informal one-way streets. Standoff situations often arise when drivers fail to give way to each other. Thus the layout of Portsmouth's roads was considered to lend itself well to the provision of speed limit signs alone without the need for complementary, additional physical traffic calming measures.

The area-wide implementation of the 20 mph Speed Limit signing scheme was a result of four years development work:

- In 2004, PCC carried out a Traffic Calming Review which divided the city into ten potential **20 mph Zones**, prioritised on the basis of weighted road casualty data to emphasise vulnerable road users. The Council agreed to implement two 20 mph Zones per year over a five year period at a cost of approximately £200,000 per Zone or £2 million to complete the programme. The strategy was intended to address the high number of randomly located person injury accidents in residential streets.
- Whilst consultation on the first 20 mph Zone was being undertaken, a triple fatality led to the need to react swiftly to public demand for the speeds on one of the city's routes to be lowered. An experimental **20 mph Speed Limit** scheme was therefore installed. In addition, measurement of the speed and volume of traffic on the surrounding roads showed that

existing speeds on these roads were sufficiently low for them to be included in the Traffic Order. At the same time, consultation on a 'Safer Routes to School' scheme indicated a public wish for a 20 mph speed limit outside the school and in the surrounding estate roads. In this way, the area-wide 20 mph Speed Limit scheme was born which resulted in a shift from the originally envisaged ten 20 mph Zones.

- Following consultation with the Police, six sectors were then identified for funding over two years to focus on residential roads, most of which had existing speeds equal to or less than 24 mph.
- A comprehensive programme of surveying the identified roads in each sector was carried out. The implementation (including the consultation process) of the 20 mph Speed Limit scheme started in April 2006 following various consultations with relevant stakeholders, seeking public support. The implementation was completed in March 2008 for all the six sectors.
- The relatively low speeds before the scheme implementation on these roads are mainly the result of narrow carriageways and on-street parking, which reduces the effective carriageway width. The scheme was implemented partly to support the low driving speeds adopted previously by many motorists and partly to encourage less aggressive driving behaviour from those who drove at inappropriate speeds. The aim was to ensure that the scheme was self-enforcing so as to avoid the need for extra Police enforcement.
- The implementation of the 20 mph Speed Limit scheme was carried out using a combination of post-mounted terminal and repeater signs (see Figure 1.1 below) on roads with existing speeds equal to or less than 24 mph. 20 mph speed limit roundel road markings were also provided on the carriageway coincident with the terminal post-mounted sign locations at street entries. However, 20 mph signs were also provided on roads through residential areas with speeds greater than 24 mph in order to provide consistency in the signing and road user perception.



Figure 1.1 – 20 mph terminal signs on Lyndhurst Road, Portsmouth

- The scheme cost was wholly funded using capital from the Council's Local Transport Plan capital settlement. Table 1.1 shows the costs of implementation on 410km of PCC (six sectors) road length.

Table 1.1 – Scheme Costs

Task	Cost (£)
Consultation	20,626
Preparation & Supervision	117,089
Traffic Surveys	14,535
Implementation	420,738
Total	572,988

Anticipated benefits and causal chain of impacts

Area-wide 20 mph Speed Limit schemes have the potential to play an important role in delivering local authorities' Local Transport Plans (LTPs) and wider policy objectives. For many local authorities, achieving further reductions in casualty numbers is becoming increasingly difficult as site specific problems and localised accident clusters are addressed. Some local authorities are therefore refocusing their road safety strategies on more innovative area-wide solutions, such as 20 mph Speed Limit schemes.

In addition, such schemes could:

- play an important role in creating a safer environment for walking and cycling;
- form an important part of a strategy designed to encourage modal shift and tackle congestion;
- improve air quality; and
- support local authorities in their new duty to tackle climate change.

Area-wide 20 mph Speed Limit schemes could also play a role in delivering wider policy benefits, which authorities may be promoting through their Local Transport Plans. This might involve working with schools to encourage greater use of walking and cycling for the journey to school, working with town planners and urban designers to incorporate urban realm improvements, and joint working with the Police to tackle crime and vandalism in the area.

The Portsmouth scheme was designed to address actual and perceived safety issues associated with busy residential areas and inappropriate vehicle speeds. It represents a major component of the Council's Road Safety Plan, and is intended to deliver the LTP2³ objective to *'improve the levels of safety beyond the national 2010 targets for all road users especially children and other vulnerable groups'*. The scheme is also intended to give a greater priority to cyclists and pedestrians, and encourage greater use of these modes.

Therefore the vision for developing this approach to the 20 mph speed limit signing scheme was to ensure that the city's residents enjoy a safer and healthier environment and that the streets outside their houses revert to community areas as opposed to 'hostile' traffic corridors.

Figure 1.2 shows the anticipated causal chain of impacts for Portsmouth's area-wide 20 mph speed limit initiative on residential roads at the time of inception. It illustrates links between the immediate anticipated outcomes such as maintaining average speeds at less than or equal to 24 mph, increasing the number of vehicles travelling at 20 mph or less, reducing aggressive driving; a safer (actual and perceived) environment for walking and cycling; fewer and less severe casualties; less through-traffic in residential areas; and an increase in walking and cycling

³ Portsmouth City Council Local Transport Plan 2006-11
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(including modal shift from car); associated quality of life benefits; and links with Portsmouth’s wider LTP and Community Strategy objectives.

The potential increase in walking and cycling in residential areas was anticipated to result from a general modal shift from the car, corresponding to a reduction in traffic on PCC 20 mph Speed Limit residential roads.

Noise and local air quality effects were not monitored by PCC as no negative effects were envisaged.

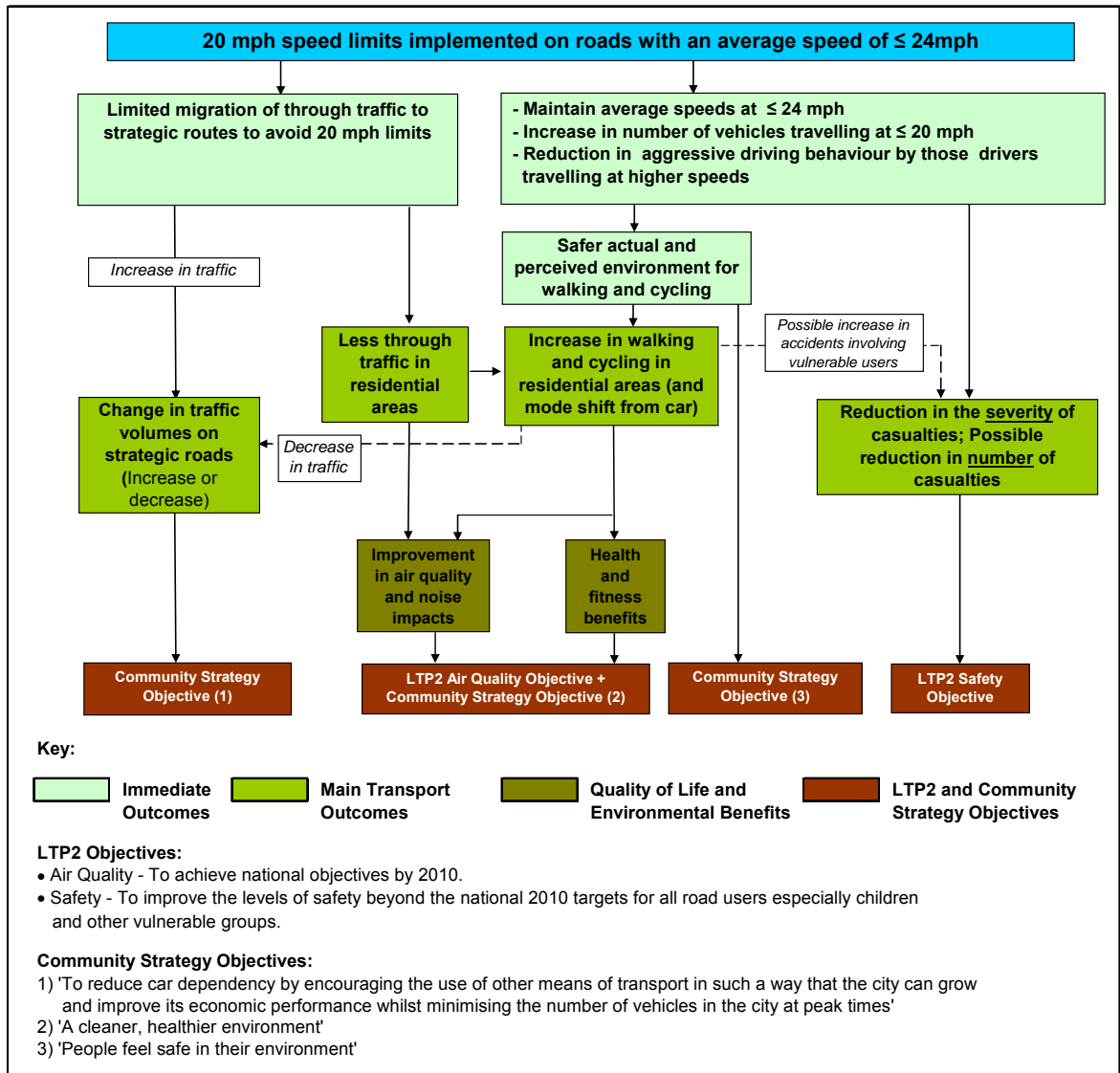


Figure 1.2 - Anticipated causal chain of impacts

2. Implementation

Stakeholder Engagement

Public information about the scheme was disseminated via the media and community involvement, as opposed to relying on notices published on-street. This proactive approach received positive feedback from the public and did not generate complaints about a lack of information.

In summary, the stakeholder engagement process included:

- consultations with Neighbourhood Forums and residents' associations;
- publishing statutory advertisements in The News;
- placing articles in the body of The News;
- recording television and radio interviews both locally and nationally;
- application of news flashes on the PCC website and PCC's intranet site;
- including the FAQ website link in the Traffic Regulation Order (TRO);
- exhibition of plans and posters in all schools and public buildings;
- sending each school pupil home with a leaflet for the 20 mph sector being advertised; and
- distributing plans and leaflets at the Civic Offices.

Community engagement involved close liaison with the local schools. Each child was sent home with a publicity leaflet showing which roads in their sector would be affected, responses to Frequently Asked Questions (FAQs), and contact details. This was supported by large posters placed in school halls. Posters and leaflets were also placed in doctors' surgeries, libraries, and shopping centres, etc. At the same time, the scheme received considerable publicity in the local press and the local radio which interviewed members of the council. A dedicated answer line was set up to answer queries on the scheme. Within the Council, cross party member support was received early which enabled a coordinated approach to seeking public support.

The Police supported the scheme as it would be self-enforcing without the need for direct enforcement using fixed time / distance cameras or mobile spot speed safety cameras. Other consultees, that included PCC Cycle Forum, Hampshire Fire & Rescue service, utility companies, public transport operators, Freight Transport Association, Road Haulage Association, Central Ambulance control, and the Royal Mail, did not have any objection to the scheme.

Implementation of Signs

The 20 mph Speed Limit scheme implementation by signs alone was introduced on PCC residential roads where the average speeds were already low (24 mph or less) and therefore neither required the provision of additional traffic calming features nor enforcement. However, 20 mph signs were also provided on roads through residential areas with average speeds greater than 24 mph in order to provide consistency in the signing and road user perception.

The guidance stated in the Traffic Advisory Leaflet 09/99 - 20 mph Speed Limits and Zones, DfT Circular 01/06, Setting Local Speed Limits, as well as the Traffic Signs Manual, was followed in the scheme implementation (see 'Bibliography & References' section for other relevant documents). However, although the DfT Circular 01/06 also states that '20 mph Speed Limits should be used for individual roads, or for a small number of roads', the 20 mph limits in Portsmouth were applied to a large number of roads covering 94% of Portsmouth's road network.

Terminal signs (diameter 600mm) to TSRGD⁴ diagram 670 were provided at junctions, on both sides of the carriageway, in accordance with the advice of TSM⁵ Chapter 3 (Section 14). Repeater signs (diameter 300mm) to TSRGD diagram 670 were provided on the lamp columns at a spacing of 200m if provided on alternate sides of the road, or at a spacing of 300m if provided on the same side of the road.

At junctions, a 30m clear visibility distance is required to the terminal signs and speed limit carriageway roundel road markings to TSRGD diagram 1065 (Height 4300mm) were also provided (see Figure 2.1 below) to reinforce the low speed limit message irrespective of whether the required clear visibility distance was available or not. The terminal signs were mounted on posts behind the boundary line so as to remove the need for lighting.

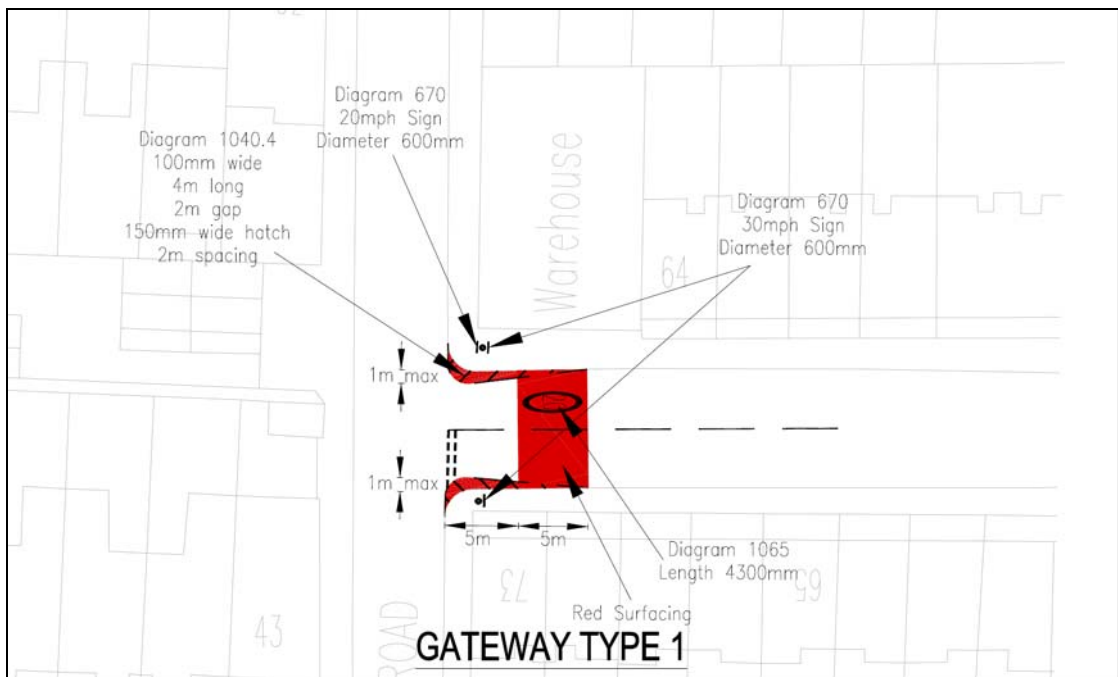


Figure 2.1 – Entry Treatment to 20 mph residential road in PCC

Along the stretches of the road where the required visibility distance could not be achieved and at street entry points where terminal signs had been provided, speed limit roundel road markings to TSRGD diagram 1065 (Height 4300mm) were provided on the carriageway surface. Where provided, on stretches of the road, the speed limit roundel road markings were positioned adjacent to the existing lighting columns to which the repeater signs were attached.

As illustrated in Figure 2.1 above, red surfacing, and/or hatching to TSRGD diagram 1040.4, to ensure right-angled approaches to the junction, was provided at some junctions to improve on the conspicuousness of the change in road character. However, the majority of junctions did not require this treatment.

⁴ TSRGD – Traffic Signs Regulations and General Directions 2002

⁵ TSM – Traffic Signs Manual

3. Traffic Speeds

Introduction

Average 'Before' and 'After' spot speed data was provided by PCC for all the six sectors of Portsmouth. This data was monitored at 47 sites in the Central West sector, 60 in the South East sector, 52 in the Central East sector, 20 in the North East sector, 31 in the South West sector and 13 in the North West sector, a total of 223 monitored sites.

The speed data provided included the average spot speed for each direction of the road before and after the implementation of the 20 mph speed limit scheme.

Traffic Speed Changes

Table 3.1 below indicates the change in average speed at the 223 monitored sites within the six sectors of Portsmouth following implementation of the 20 mph speed limit scheme.

Table 3.1 – Average Traffic speed changes after 20 mph speed limit implementation

Sector	Average Before Speed (mph)	Average After Speed (mph)	Speed Change (mph)
Central West	20.2	19.1	-1.1
South East	19.6	18.6	-1.0
Central East	18.5	17.9	-0.6
North East	18.2	16.4	-1.8
South West	18.4	16.9	-1.5
North West	23.9	22.2	-1.7
All Sectors	19.8	18.5	-1.3

Table 3.1 shows that average speeds reduced in all sectors even though, it was already close to the 20 mph posted speed limit before implementation of the scheme. The average overall speed for the six sectors before the scheme implementation was 19.8 mph. This reduced to an average of 18.5 mph after implementation of the scheme; a reduction of 1.3 mph. Although the average speeds for each sector were close to 20 mph, there were individual sites within the sectors that had speeds greater than 20 mph. The average speed measured in the combined western sectors was higher than that in the corresponding eastern sectors (which was also the case after the scheme was implemented).

Table 3.2 – Number of monitored sites by specified average speed range in all PCC sectors

Sector	'Before' Average Speed	'After' Average Speeds			
		≤20 mph	21 to 24 mph	>24 mph	Total
All Sectors	≤20 mph	124	15	2	141
	21 to 24 mph	23	21	6	50
	>24 mph	12	9	11	32
	Total	159	45	19	223

Table 3.2 shows the number of monitored sites by specified speed ranges in the six PCC sectors. It shows that surveyed speeds decreased at 35 sites, in all the six sectors, from above 20 mph to 20 mph or below. However, speeds increased at 17 sites from below 20 mph to above 20 mph. It is important to note that the speed surveys took place over a single day. This means that the larger the number of sites that is considered, the more likely it is that a systematic change will be apparent and statistically significant.

Table A.1 of Appendix A shows the number of monitored sites by specified average speed range and PCC sector. The South East and the North West sectors had the most sites that were above 24 mph after the implementation of the scheme i.e. 7 and 5 monitored sites respectively.

Table A.2 of Appendix A shows that most of the monitored sites had recorded average speed reductions of between 1-5 mph in all the specified speed ranges. There was an overall reduction of 1.4 mph in average speed at sites with before average speeds less than or equal to 24 mph. However, there was an average reduction of 6.3 mph at sites with speeds greater than 24 mph.

Two monitored sites, one in the Central East sector and the other in the Central West sector, had an increased speed from below 20 mph to above 24 mph. There was a reduction in average speeds at 28 of the 32 monitored sites in the six sectors where before speeds were above 24 mph, with one site having similar before and after average speed recordings and three other sites recording an increase. Speeds reduced to below 20 mph at 12 of these sites. Within the over 24 mph subset, the average speed (before implementation) exceeded 30 mph at 10 of the 32 sites, with an actual average of 33.8 mph. After the scheme was implemented, the average speed at 7 of the 10 sites had reduced to 22 mph; a speed reduction of 11.8 mph.

Figure 3.1 below shows a representational map of speed reductions in the South East sector of PCC.

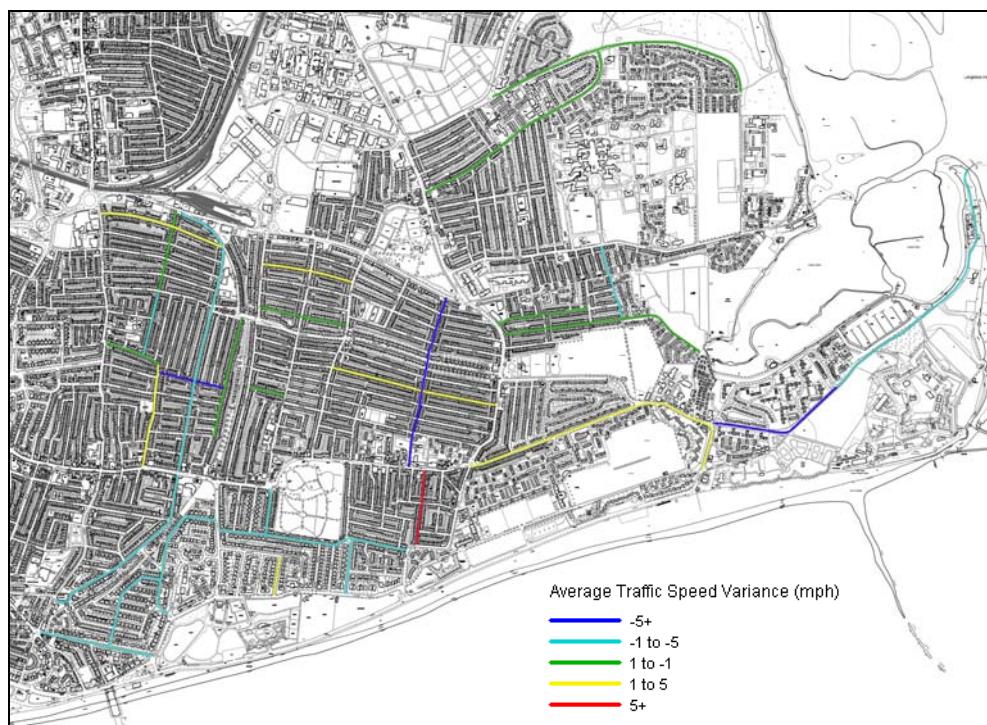


Figure 3.1 – Average speed reductions in the South East sector

Despite a reduction in the number of sites with average speeds above 24 mph, 19 sites were found to still have average speeds between 24 mph and 29 mph after the scheme was implemented.

There were also increases of greater than 5 mph at 11 monitored sites, all of which had 'Before' average speeds of less than 22 mph, although the speeds remained below 24 mph for 9 of the

sites. However, two of the 11 sites had a recorded speed of above 24 mph. In all the six sectors, the number of sites with speeds of 30 mph or more (10 sites) was reduced to zero. However, a number of sites (19 sites), seven of which were in the South East sector, still had average 'after' speed recordings of between 24-29 mph.

The overall results show that there has generally been an average decrease of 1.3 mph in average traffic speeds following the introduction of the 20 mph Speed Limit scheme.

Statistical Significance

The Mann-Whitney U statistic test has been carried out to determine the statistical significance of any reduction in speeds. The test determines whether the 'Before' and 'After' average speeds are from two independent samples, which would indicate that there is a statistically significant difference in the measurements as a result of the 20mph Speed Limit scheme. If the test is not found to be statistically significant, the 'Before' and 'After' speed measurements are considered to be from the same population, and therefore the 20mph Speed Limit scheme will have had little statistical impact on the speed of cars in the area.

The two-tailed version of this test uses a hypothesis of assessing any difference between the two samples. The one-tailed test, used in this analysis, uses a hypothesis of a statistically significant decrease in the 'After' average speed measurements compared to the 'Before' measurements as a result of the 20mph Speed Limit scheme.

This statistical test has been performed on several subsets of the data:

- Overall results measured in the six sectors,
- Central West sector;
- South East sector;
- Central East sector,
- North East sector,
- South West sector, and
- North West sector.

In addition to performing the analysis on a sector basis, separate calculations have also been performed on those roads that had an average speed of over 21 mph, 21-24mph and over 24mph before the introduction of the scheme, to test the impact of the scheme on those sites where speeds were at their highest before the 20mph Speed Limit scheme was implemented.

Statistically, the data has large confidence intervals due to the small sample size compared to the overall population (223 measurements in the six 20 mph sectors). However, the measurements were taken in a controlled way along the same routes both 'Before' and 'After' the scheme implementation to draw robust conclusions on the data. Table 3.3 below provides detail on the 'Before' and 'After' measurements for each subset, along with the results of the statistical significance testing.

Table 3.3 – Mann-Whitney U statistic on average traffic speeds in Portsmouth

Sector	No.	Speed						Mann Whitney Significance		
		Before Scheme			After Scheme			2-tailed ¹ (1-tailed ²) significance value	Significant at 95% confidence level*	Significant at 90% confidence level**
		Min	Max	Average	Min	Max	Average			
Central West	47	12	40	20.2	13	27	19.1	0.53 (0.265)	No	No
South East	60	11	31	19.6	8	29	18.6	0.22 (0.111)	No	No
Central East	52	10	35	18.5	8	27	17.9	0.82 (0.411)	No	No
North East	20	11	25	18.2	9	21	16.4	0.16 (0.079)	No	No
South West	31	9	26	18.4	6	24	16.9	0.15 (0.075)	No	No
North West	13	11	34	23.9	15	26	22.2	0.42 (0.209)	No	No
All sectors	223	9	40	19.8	6	29	18.5	0.05 (0.025)	No	Yes
21-24mph	50	21	24	22.1	12	27	20.2	0.006 (0.003)	Yes	Yes
Over 20 mph	63	22	40	25.7	12	29	21.1	0.00 (0.000)	Yes	Yes
Over 24 mph	32	25	40	28.5	17	29	22.2	0.00 (0.000)	Yes	Yes

¹ For the 2-tailed test a significance value of less than 0.10 would indicate a change

² For the 1-tailed test a significance value of less than 0.05 would indicate whether the change is statistically significant

* A statistically significant decrease in speeds is noted between the before and after recordings at the 95% confidence level if the 1-tailed test has a significance value of less than 0.025.

** A statistically significant decrease in speeds is noted between the before and after recordings at the 90% confidence level if the 1-tailed test has a significance value of less than 0.05

The results showed average speed reductions in each of the six sectors, but because only some roads were surveyed the reductions in each sector are not statistically significant.

However, when the results are added together across all six sectors they demonstrate a statistically significant reduction in average speeds of 1.3 mph. For sites with speeds in excess of 20 mph, it averages 4.6 mph; and for sites with speeds in excess of 24 mph, it averages 6.3 mph.

4. Traffic Volume

In each of the years from 2004 to 2007, overall motorised traffic levels in Portsmouth have been estimated as being varying between 1,274 and 1,292 million vehicle kilometres per year, before falling to 1,243 million vehicle kilometres in 2008. The fall of 3% in the volume of traffic between 2007 and 2008 in Portsmouth is higher than the national average reduction. It is however not exceptional – for example reported traffic volumes in Southampton fell by 4% then.

Traffic cordon counts in Portsmouth also indicate an average reduction in traffic of about 3%. This suggests traffic has not re-routed systematically from the roads subject to 20 mph limits to the main roads on the cordon.

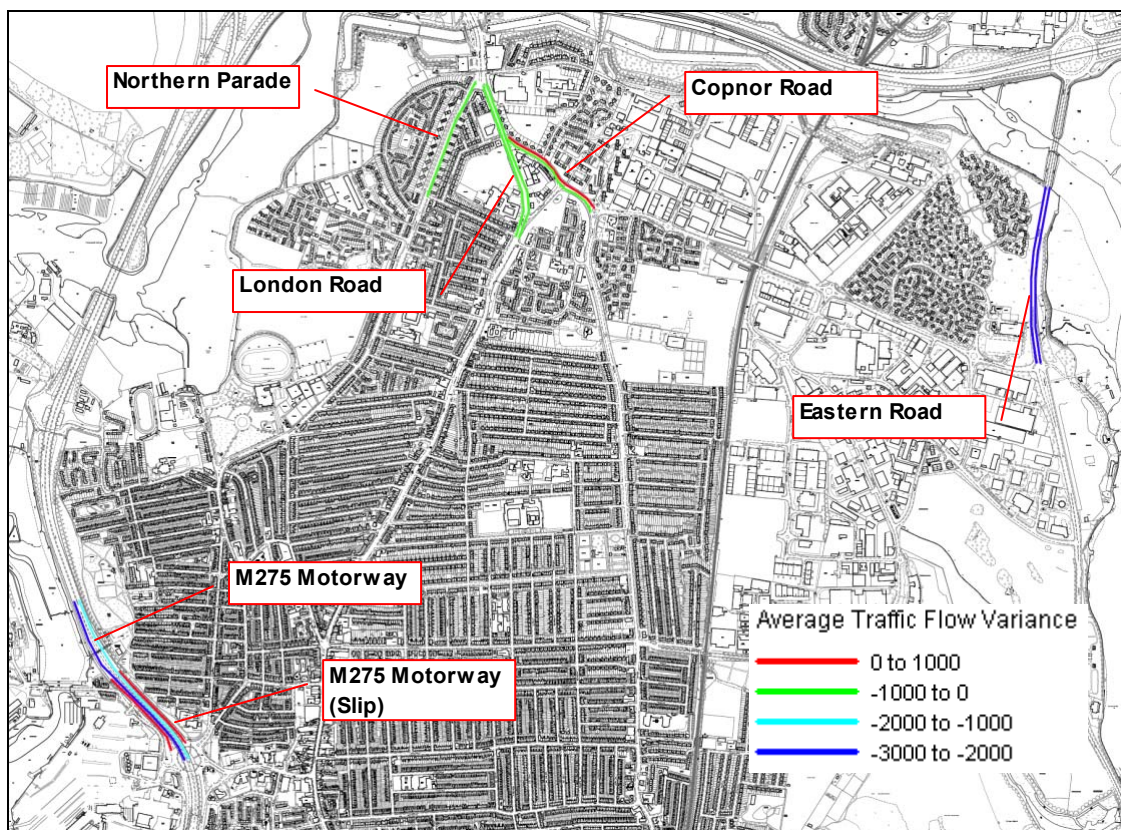


Figure 4.1 – Traffic Volume changes on PCC cordon roads

5. Safety

Introduction

'Before' and 'After' road traffic accident and casualty data was provided for all six PCC sectors. In each case, the 'Before' period was 36 months with the "After" period covering 24 months for all but one sector, the South West which had 21 months of accident and casualty data available. There was no gap in the accident/casualty data to separate the implementation period; consequently the implementation period is included in the 'Before' study period. This is justified because the implementation period involved erecting signs off running lanes, with the signs being covered until implementation day. The before and after study periods for the six sectors are shown in Table 5.1 below.

Table 5.1 – PCC 20 mph sector study periods

Sectors	Before Period		After Period	
	From	To	From	To
Central East	01 Dec 04	30 Nov 07	01 Dec 07	30 Nov 09
Central West	13 Oct 04	12 Oct 07	13 Oct 07	12 Oct 09
North East	13 Oct 04	12 Oct 07	13 Oct 07	12 Oct 09
North West	01 Dec 04	30 Nov 07	01 Dec 07	30 Nov 09
South East	22 Jun 04	21 Jun 07	22 Jun 07	21 Jun 09
South West	01 Mar 05	28 Feb 08	01 Mar 08	30 Nov 09

Given that the 'Before' and 'After' data was available for different lengths of time periods, the data was averaged to provide comparative one year baseline periods. The study has used proportional occurrences in either period when assessing trends and comparisons, to determine any changes in the accident trends and causation factors as a result of the scheme implementation.

Change in accident numbers

Table 5.2 below shows the change in accident numbers by accident severity within each sector. Overall, in the six sectors, there was a reduction in the number of accidents of about 34 per year (21%).

The total number of KSI accidents increased by about 1.5 per year. However, the total numbers of KSI accidents are small across all sectors and are therefore susceptible to variations.

Table 5.2 – Change in accident numbers by accident severity

Sectors	Before (Average of 3 year data)			After (Average of 2 year data)			%change	
	KSI	Slight	Total	KSI	Slight	Total	KSI	Total
Central East	6.0	30.7	36.7	4.5	27.0	31.5	-25%	-14%
Central West	3.0	21.0	24.0	4.0	17.5	22.0	33%	-8%
North East	2.3	24.0	26.3	3.5	11.5	15.0	50%	-43%
North West	1.7	13.7	15.3	1.0	11.0	12.0	-40%	-22%
South East	2.3	29.7	32.0	4.0	22.0	26.0	71%	-19%
South West	3.0	26.3	29.3	2.9	20.0	22.9	-5%	-22%
All Sectors	18.3	145.3	163.7	19.9	109.0	129.4	8%	-21%

Change in casualty numbers

Table A.3 in Appendix A shows variations in casualty numbers by injury and class within each of the six sectors in Portsmouth.

Table 5.3 shows that, overall, there was an average reduction of 41 per year (22%) in the number of casualties after scheme implementation.

Table 5.3 – Change in casualty numbers by road user type and injury severity

Sector	Casualty Class	Before (Average of 3 year data)			After (Average of 2 year data)			%change	
		KSI	Slight	Total	KSI	Slight	Total	KSI	Total
All Sectors	Pedestrian	6.3	39.0	45.3	8.7	29.4	38.1	38%	-16%
	Passenger	1.0	25.3	26.3	0.0	18.1	18.1	-100%	-31%
	Driver/Rider	11.3	100.0	111.3	11.1	75.0	86.1	-2%	-23%
	Total	18.7	164.3	183.0	19.9	122.5	142.4	6%	-22%

The number of pedestrian casualties reduced by 7 per year, although the number of pedestrian KSI casualties increased by 2.5 per year. Pedestrian counts are not available and as such no allowance for exposure to risk has been made in the analysis.

On average, there was an increase in the number of killed and seriously injured (KSI) casualties of about 1 per year.

Table A.4 in Appendix A shows further breakdown of casualties amongst Pedestrians, Passengers and Drivers /riders across the age ranges.

Table 5.4 – Change in number of vehicles involved in accidents by vehicle type & accident severity

Sector	Vehicle Type	Before (Average of 3 year data)			After (Average of 2 year data)			%change	
		KSI	Slight	Total	KSI	Slight	Total	KSI	Total
All Sectors	Pedal Cycle	5.0	34.7	39.7	5.6	28.2	33.8	11%	-15%
	PTW	5.7	21.0	26.7	5.1	15.4	20.4	-11%	-23%
	Car/Taxi	18.7	180.3	199.0	20.8	136.1	156.9	11%	-21%
	Other	1.0	22.0	23.0	1.5	12.6	14.1	50%	-39%
	Total	30.3	258.0	288.3	32.9	192.2	225.1	9%	-22%

'Other' represents all buses, minibuses, goods vehicles, other motor vehicles, other non-motor vehicles and unknown vehicle types.

Table 5.4 shows that there has been an overall decrease of 22% in the number of vehicles involved in accidents in the six sectors. However, Table A.5 in Appendix A shows that there was wide variation amongst the sectors; the greatest reduction was in the North East (49%) whilst the Central West recorded the smallest decrease of 10%. There was a 9% reduction in number of vehicles involved in KSI accidents across the six sectors.

Table A.5 in Appendix A shows the breakdown of accidents by type and severity. Accordingly, the number of pedal cyclists involved in accidents decreased by 15%, with wide variations within the sectors. Overall, there was an 11% increase in the number of KSI pedal cyclists although the results vary between sectors from a 100% reduction in the North West to a 7% increase in the Central East.

Figure 5.1 below provides a graphical representation of the accident locations by severity in the Central West sector of PCC.

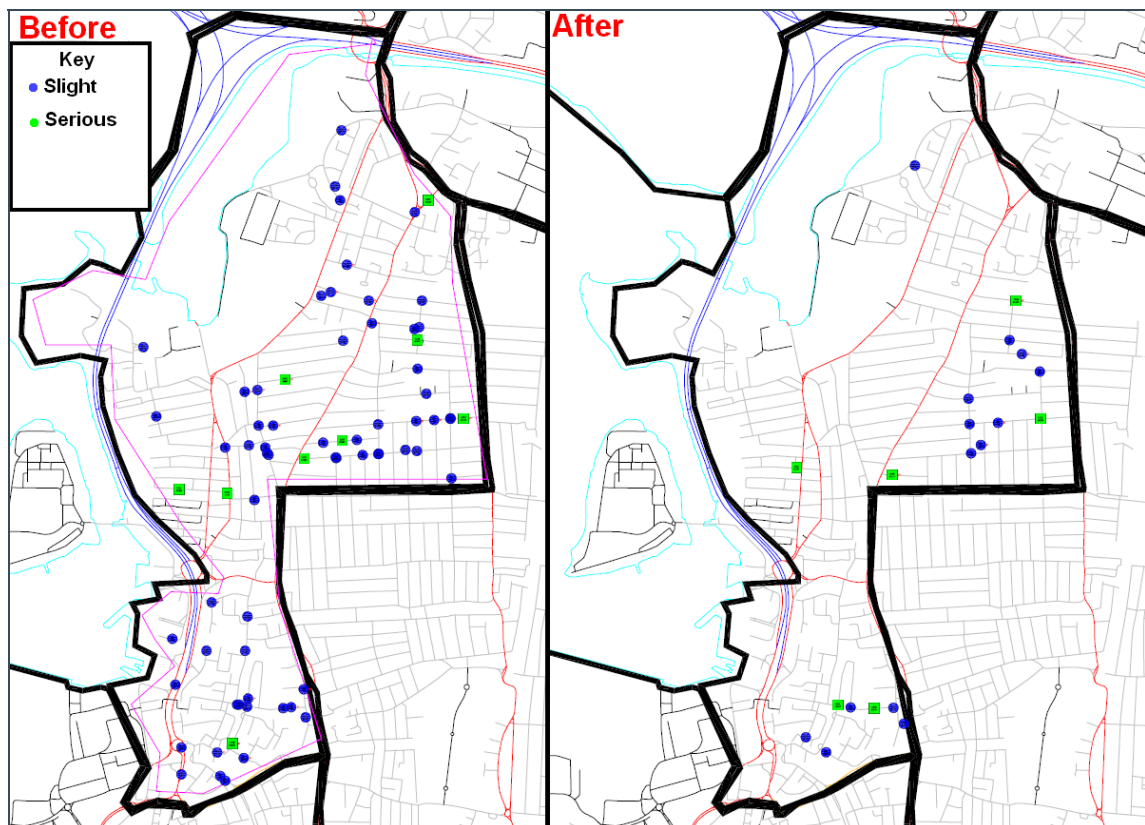


Figure 5.1 – Central West 20 mph Speed Limit PCC sector accident locations

**The 'Before' period shows locations of accidents over a three year period whilst the 'After' period shows locations of accidents over a one year period.*

The number of PTW users involved in accidents reduced by 23%, with a corresponding reduction of 11% in the number of KSI accidents involving PTW users. The number of cars/taxis involved in accidents reduced by 21%, with a corresponding increase of 11% in the number of cars/taxis involved in KSI accidents.

The provisional casualty data provided directly by the DfT (from 2004 to 2009) shows an underlying trend of decrease in national casualties (14% reduction in the number of casualties on Great Britain (GB) roads based on previous three year results and two year after results of the same study period as the PCC sectors, with a 12% reduction in KSI casualties). Whilst not directly comparable due to differences in time period, the total casualty reduction of 22% for the roads within the 20mph Speed Limits in Portsmouth is greater than the total GB casualty reduction.

The overall reduction of 16% in pedestrian casualties in Portsmouth is also greater than the national average of reduction of 13%.

Although there was a 12% average reduction in KSI casualties nationally, Portsmouth recorded a 6% increase in the small number of KSI casualties.

A detailed examination of the accident trends as well as the accident causation factors (refer to Appendix B for details) did not show any noteworthy change in patterns, in particular those related to inappropriate speeds and aggressive driving.

6. Qualitative Survey Findings

The scheme was anticipated to have an impact on the following qualitative aspects (see also figure 1.2):

- Play an important role in creating a safer environment for walking and cycling;
- Form an important part of a strategy designed to encourage modal shift and tackle congestion;
- Improve air quality; and
- Support authorities in their new duty to tackle climate change.

In order to assess the anticipated qualitative impacts of the scheme, a qualitative survey⁶ was undertaken. The survey aimed to obtain residents' views of the scheme and any subsequent changes to travel behaviour. A series of face-to-face interviews were conducted with residents who were randomly approached on streets in areas affected by the scheme (see Appendix C for the format of the questionnaire form used).

Survey Methodology

Interviews were conducted across the six 20mph sectors in Portsmouth as shown in Figure 6.1, to enable examination of any differences in opinions between residents from different sectors. The survey included a screening question, 'Are you a Portsmouth resident living within the area shown on this map?', and hence only those responding positively to the screening question were fully interviewed. The home locations of participants who provided sector postcode data are shown in Figure 6.1.

In total 1,445 interviews took place on the days of 27th & 29th October, 2009 (regular working days i.e. days outside the school holidays) and the 31st October 2009 (Saturday), in order to obtain a mixed representation of residents. The sample of residents was stratified by age, gender and ethnicity, to ensure that a representative sample of residents was interviewed from the study area. The interviews, lasting approximately 15 minutes, asked residents 15 predominantly closed questions about how they travelled around the area to access work, education, healthcare, shopping and visit friends / family.

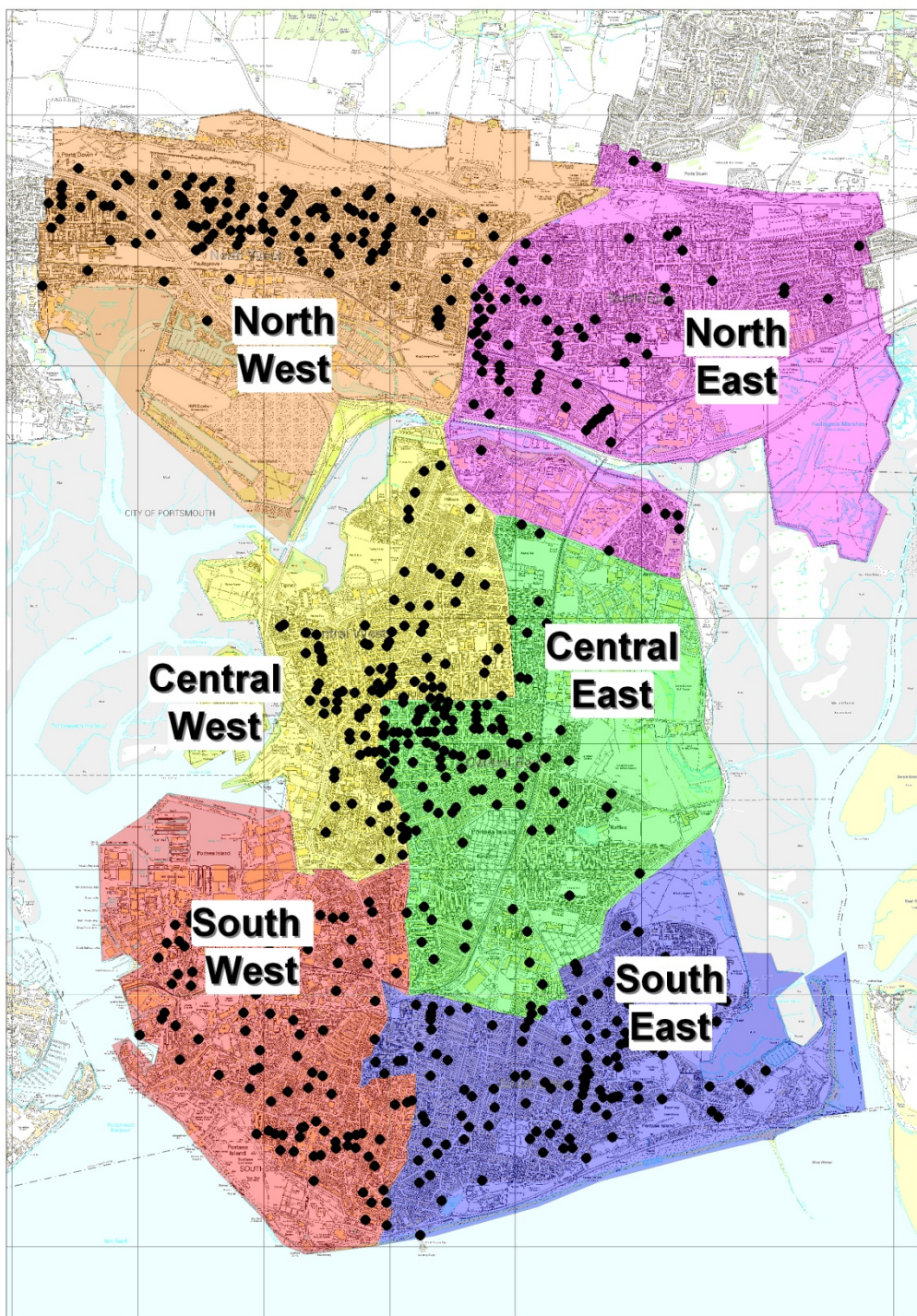
The number of residents interviewed from each sector is shown in Table 6.1. The aim was to complete 250 interviews in each sector, however the sector in which the interview took place wasn't necessarily the same as a resident's home sector, hence the variance in frequency between sectors.

Table 6.1 – Number of respondents living in each sector

	North West (NW)	North East (NE)	Central West (CW)	Central East (CE)	South West (SW)	South East (SE)	Total
Frequency	262	216	233	200	238	268	1,417
Percent	18.5%	15.2%	16.4%	14.1%	16.8%	18.9%	100%

Note: 28 respondents did not disclose their home location and these are excluded from Table 6.1

⁶ Detailed findings of the Qualitative Survey were presented in a separate report produced as part of the Phase 2 Evaluation process 5081761/100914 PCC 20mph Interim Evaluation_Main Report_Final



Note: Multiple respondents may be represented by a single dot

Figure 6.1 – Location of respondents and sectors

Key Survey Findings

Findings from the survey demonstrate the significance of car travel for nearly half of all respondents residing within the six 20mph sectors. The car is more commonly used to access employment and drop off/pick up children at school, with convenience, journey time and comfort stated as key reasons for choosing the car (see Table 6.2).

Table 6.2 – Reason for mode choice

Mode	Reasons provided
Car	Convenience (517 respondents, 83%)
	Comfort (460 respondents, 74%)
	Better journey time (257 respondents, 57%)
Walking	Convenience (396 respondents, 51%)
	Health benefits (192 respondents, 49%)
	Cost (396 respondents, 46%)
Bicycle	Cost (125 respondents 76%)
	Health benefits (106 respondents, 65%)
	Convenience (99 respondents, 60%)
Public Transport	No alternative (303 respondents, 60%)
	Convenience (297 respondents, 59%)
	Cost (168 respondents, 33%)
Motorbike	Better journey time (4 respondents, 29%)
	Cost (4 respondents, 29%)
	Difficulty / cost of parking (4 respondents, 29%)

The last two years have seen little change in travel behaviour for the majority of respondents (84%); however the 16 - 19 year olds group were more likely to state a change, which is most likely to be as a response to gaining driving licences for private vehicles (cars, mopeds and motorcycles).

That said, of those stating a change in travel behaviour over the last two years, just fewer than 30% of respondents (47 respondents) made a change from car to more sustainable modes of transport either walking or using public transport. The reasons given for such changes included traffic levels, could no longer drive or moved house/job (see Table 6.3).

Table 6.3 - How and why respondents have changed the way they travel around the local area

% of Respondents that changed travel behaviour	How they have changed	Reasons provided for stated change
12.3%	From car to foot	<ul style="list-style-type: none"> • Moved house • Changed job • Can no longer drive
11.7%	From car to public transport	<ul style="list-style-type: none"> • Too much traffic • Health reasons • Can no longer drive
11.0%	Increased use of public transport	<ul style="list-style-type: none"> • Retired – free bus pass • Convenience
9.2%	Increased amount of walking	<ul style="list-style-type: none"> • Environmental benefits • To save costs
8.0%	Increased amount of cycling	<ul style="list-style-type: none"> • Convenience • Parking problems
7.4%	From public transport to car	<ul style="list-style-type: none"> • Reliability
5.5%	From public transport to foot	<ul style="list-style-type: none"> • Reliability
4.9%	From car to bicycle	<ul style="list-style-type: none"> • Retired
4.9%	Travel more / longer distance	<ul style="list-style-type: none"> • Moved job
3.1%	Travel less / shorter distance	<ul style="list-style-type: none"> • Moved job

Base: 168 respondents with a change in travel behaviour that provided a reason to the 'open question'

Some of these changes support the wider strategy to reduce congestion through encouraging modal shift and improving the air quality in the local areas as a result of fewer cars.

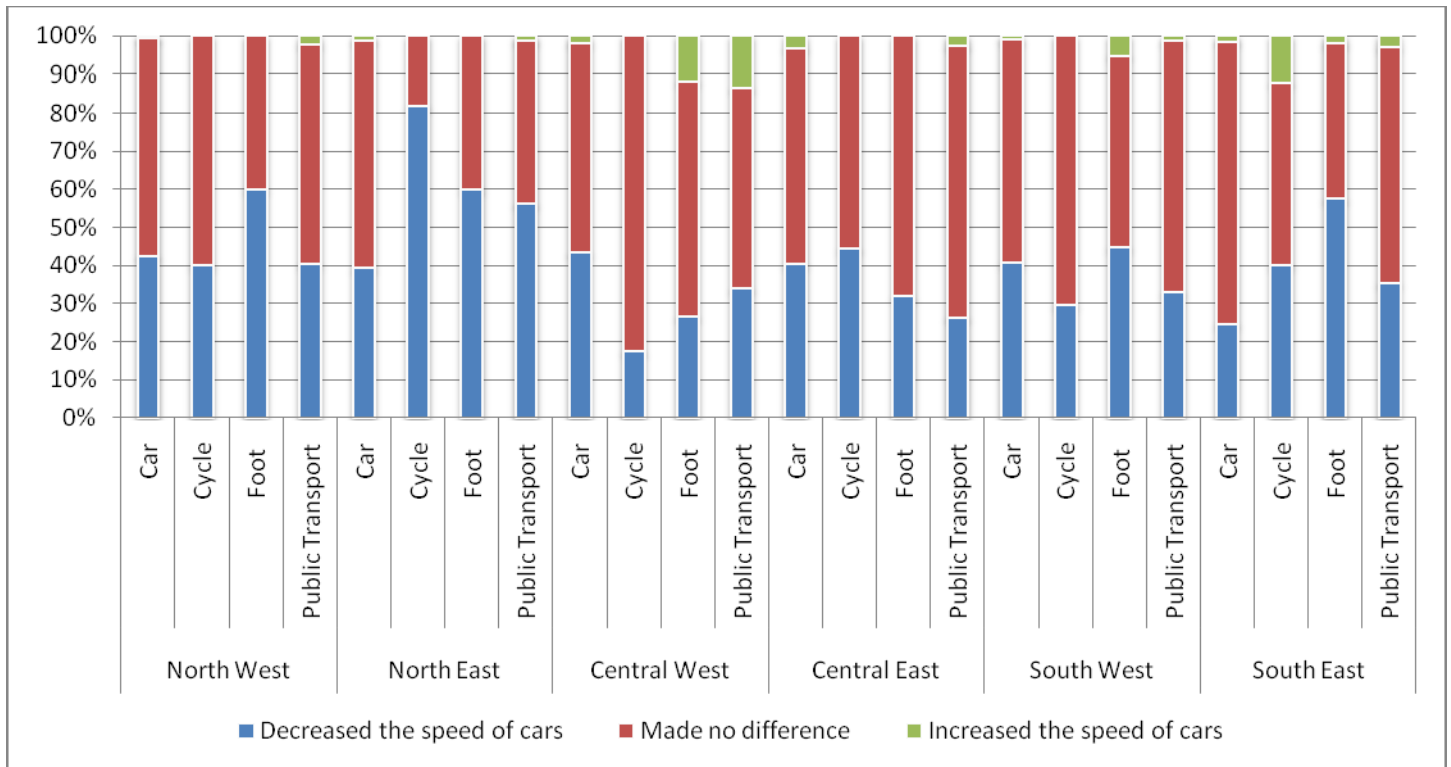
Mode Shift

The survey suggests that the introduction of the 20mph Speed Limit scheme made little difference to the majority of respondents in the amount they travelled by their chosen mode. Encouragingly the level of pedestrian travel, pedal cyclist travel and public transport usage had increased for a small number of respondents.

Impact on traffic Speed

When respondents were asked to consider the impact of the scheme on traffic speeds in the area (see Figure 6.2), just under 40% believed that the scheme had decreased the speed of cars, and over half (54%) considered the scheme to have made no difference.

The impact of the scheme on residents' perception of car speeds in the area varied widely by age group. 44% in the 40-49 age group agreed the speed of cars had been reduced by the scheme whereas the respondents aged 70+ showed the lowest levels of support that the scheme had decreased speeds in the area. Nearly half of all respondents travelling by foot believed the 20mph speed scheme to have reduced traffic speeds in the area. This demonstrates the support for the main objective of the scheme to 'play an important role in creating a safer environment for walking and cycling'.



Base: 1,288 respondents (excludes those that answered 'don't know')

Figure 6.2 – Respondents perceived impact on the speed of cars (by most common mode of transport and sector)

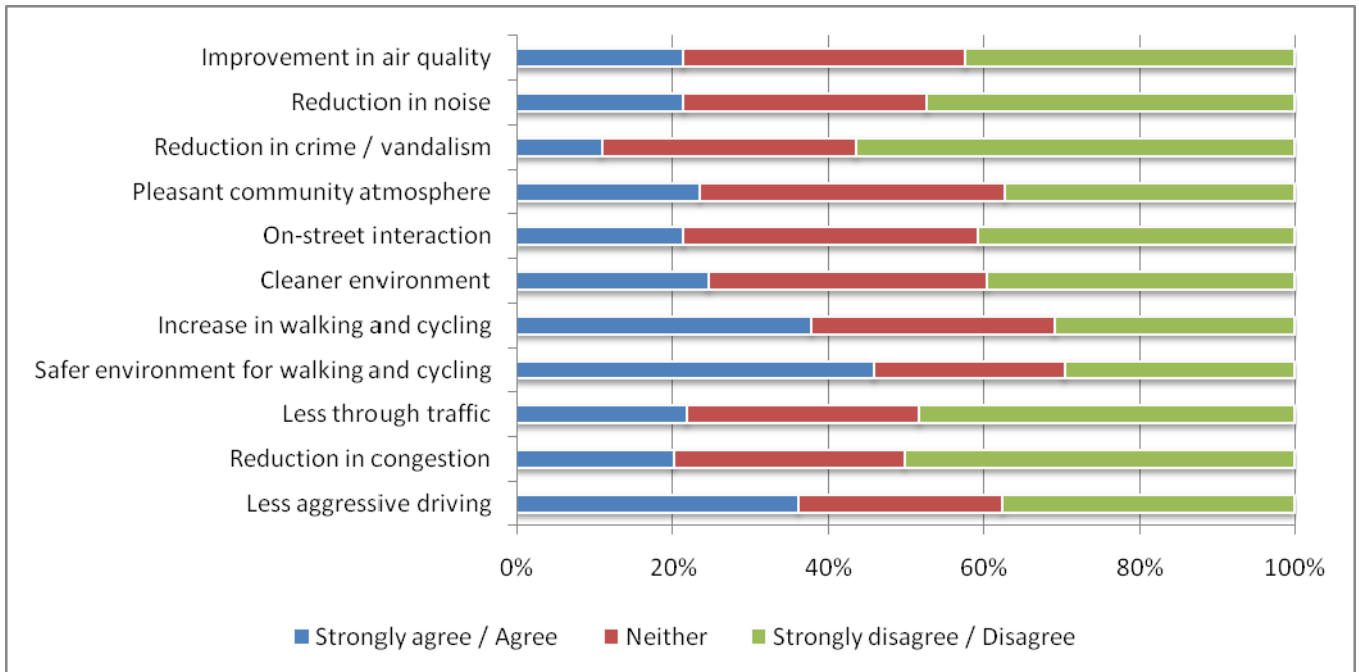
Residents in the North East and North West sectors showed the highest levels of support that the scheme had resulted in a decrease in car speeds in the area.

Wider Benefits and behavioural change

In terms of wider benefits (see Figure 6.3), over 40% of respondents stated that since the introduction of the scheme, there has been a safer environment for walking and cycling; and as a result, around a third of respondents felt that there had been an increase in pedestrian and cyclist activities in the local areas.

Despite this, around half of respondents disagreed that there had been a reduction in congestion, and also disagreed that there was less through traffic. This implies that although the scheme may have created a perception of a safer environment for walking and cycling and encouraged more pedestrian and cycling activities, it had not discouraged car use around the areas.

In terms of driver behaviour and how this may have changed, nearly 40% of respondents viewed there to have been less aggressive driving since the introduction of the scheme. This suggests that although car use has not decreased significantly, people are now perceived to be driving in a more sensible manner within the study area, which should improve overall safety for all.



Base: 1,390 respondents

Figure 6.3 – Impact of scheme on anticipated wider benefits

Generally, the wider benefits of the scheme were noted more in the North East sector, as a higher proportion of residents within this sector showed agreement with the suggested wider benefits of the scheme than in any other sector in the study area. This sector also had the highest proportion of residents agreeing that the scheme had reduced the speed of cars in the area.

Overall, just under half of respondents stated that they were satisfied with the introduction of the scheme (see Figure 6.4), and only just fewer than 15% were dissatisfied. Although older residents showed the least agreement that the scheme had reduced speeds in the area, they did show the highest overall level of satisfaction with the scheme (55%), suggesting that they have noted wider benefits of the scheme. Despite respondents’ views that the scheme had created a safer environment for walking and cycling, those who travelled by foot or bicycle showed the lowest levels of satisfaction with the scheme (38%) compared to those that travelled by car (43%) or public transport (51%).

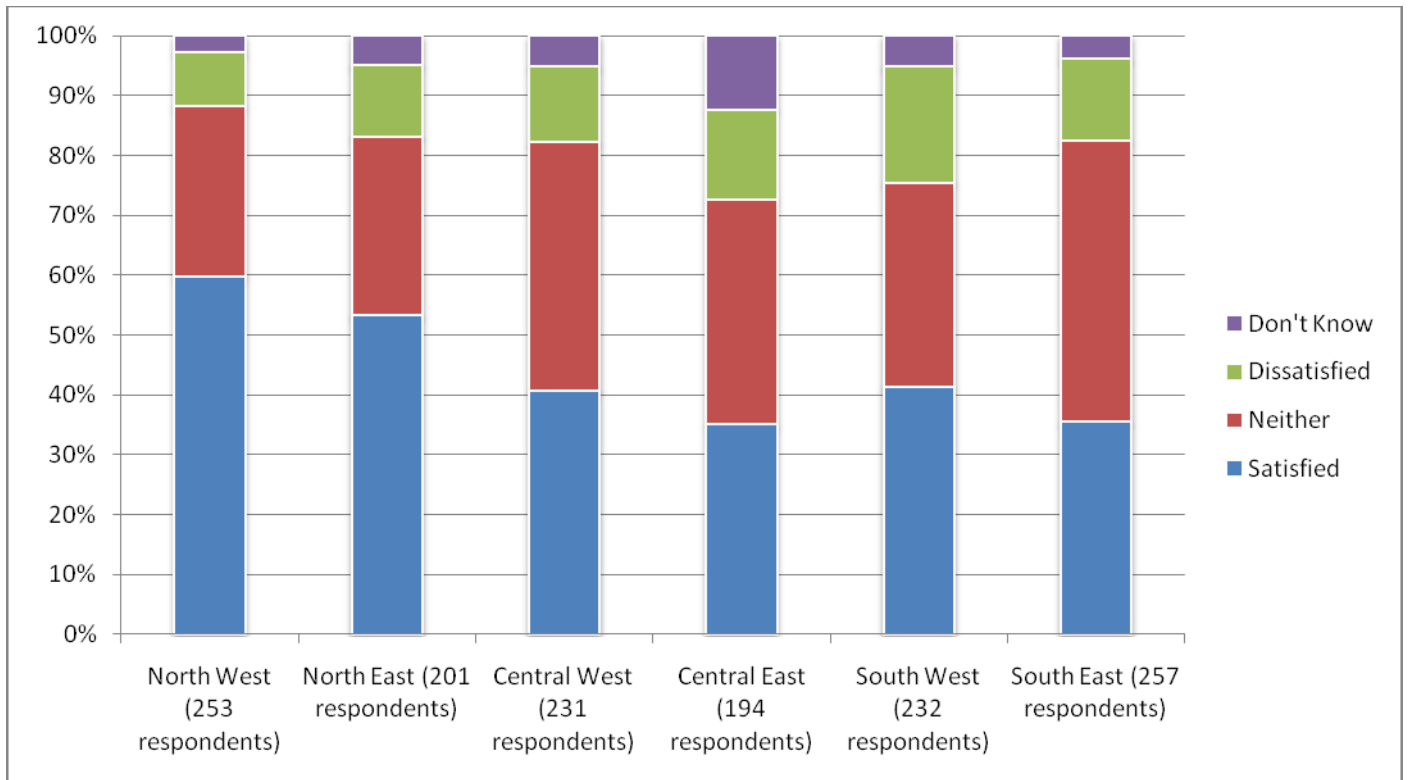


Figure 6.4 - Level of Satisfaction with the 20mph Speed Limit (by Sector)

Residents that had responded to the question relating to the level of satisfaction with the scheme were also asked to provide details on why they were satisfied or dissatisfied with the 20mph Speed Limit scheme. In total, 743 respondents chose to provide a reason and the key points were (in order of popularity):

Satisfied with scheme

- Speed Limit has improved safety (27%) – “People are driving safer, it’s a very good idea”
- The scheme was needed and works well (9%) – “Keep to 20 mph. It is a good idea”
- Slower drivers result in fewer accidents (8%) – “Should be fewer accidents. More awareness due to travelling at low speed”.

Residents in the North East and North West sectors overall were the most satisfied with the introduction of the scheme. Respondents in these areas also showed the highest levels of support for the scheme reducing car speeds and providing wider benefits, therefore it appears that the greatest perceived impact of the scheme in the study area has been in these two sectors.

Dissatisfied with scheme

- Drivers are exceeding the Speed Limit (31%) – “Cars are still speeding down the roads and take no notice of signs”
- Needs controlling / enforcing (9%) – “Think it is a good idea but nobody enforces it so there’s no point”

When asked to provide comments on the 20mph Speed Limit, generally comments received (185 respondents) defended the implementation of the scheme in the area. The common themes were as follows:

- Positive comments about the scheme (24%) – *“There should be more 20mph limits around Portsmouth”*;
- Requests for the Speed Limit to be enforced, with greater police presence (25%) – *“Install cameras or enforce the policy, then the community will start to benefit”*;
- Concerns that some drivers were exceeding the Speed Limit (16%) – *“20mph is obeyed when the driver can see a speed camera / police car, otherwise it is ignored”*;
- Comments that the scheme has not made a difference (12%) – *“good idea in theory but seems to make no difference”*;
- Some respondents suggested that implementation of speed humps may slow down drivers (10%) – *“Road humps would help keep speed down”*;
- There were comments from some respondents that the scheme had been a waste of money (9%) – *“Pointless and expensive exercise”*.

Summary

Findings from the survey demonstrate mixed outcomes when assessing the level of impact of the 20mph Speed Limit scheme on the anticipated qualitative aspects.

Whilst survey evidence suggests that the scheme has provided a safer environment for walking and cycling and hence viewed as encouraging such modes of travel, this view was not wholly supported by those who currently walk and cycle. These pedestrian and cyclist respondents stated the lowest levels of satisfaction with the scheme.

However, the evidence strongly supports the objectives to create a safe environment for such activities. This outcome also indirectly supports the other objectives by seeking modal shift, reducing car use and hence helping improve local air quality and tackle climate change.

The survey evidence also suggests that the scheme has made a perceived impact on car speeds in the area which will further encourage residents to walk and cycle in the area and support this key scheme objective.

The scheme is generally supported by the residents who responded although many of the respondents would like to see the implemented Speed Limit being enforced.

7. Travel to School

In order to determine the likely impact of the 20 mph Speed Limit on travel to school trips, the study has drawn on findings from the qualitative survey, the school census data as collected by PCC and the recorded accident patterns.

Background to Perceived Travel Patterns in Portsmouth

The responses from the qualitative survey (see Figure 7.1) showed that when taking a dependent to school, car or van is the most common mode of transport used (39%), followed by on foot (29%). When travelling for education purposes, bus or coach was listed as the most common mode of transport used (38%), followed by on foot (25%) and car or van (23%) (See figure 7.1).

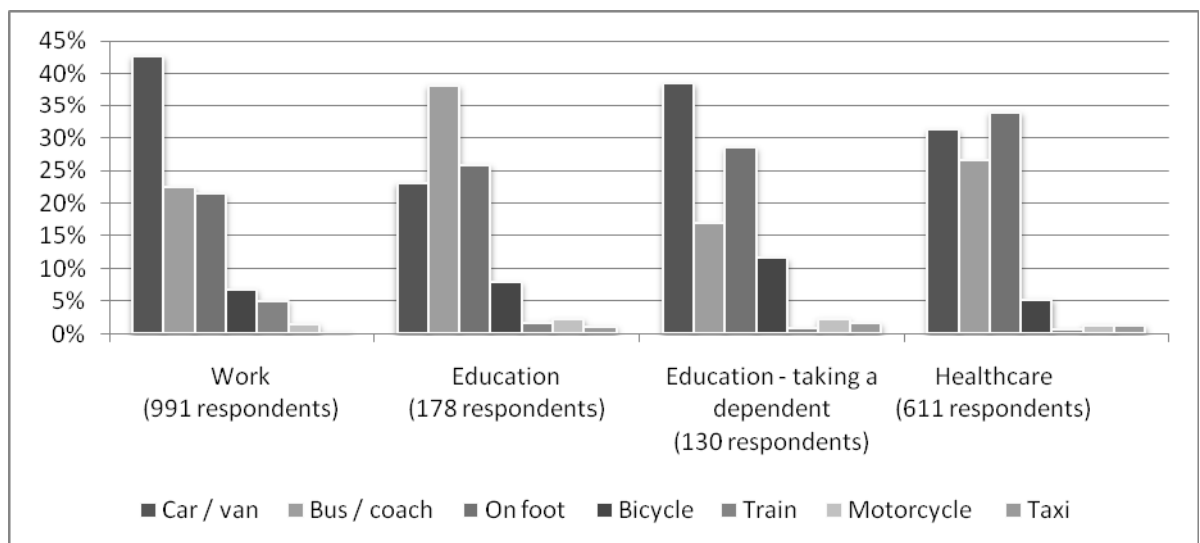


Figure 7.1 – Choice of Travel Mode by Journey Purpose in Portsmouth

Respondents in the survey were asked if they have changed how they have travelled around the local area over the last two years. Of the 1,422 respondents that answered this question, the majority of 1,193 respondents (84%) stated that they have not changed how they travelled around the local area. A change in travel behaviour was reported by 201 respondents (14%), while 28 respondents (2%) did not know. It was more common for someone in a younger age group to report a change in their travel behaviour. Out of 191 who reported a change (and provided age details) in travel behaviour, 24% were in the 16 - 19 age group and 19% in the 20 - 29 age group. In the 30+ age groups, between 9% and 12% reported a change in travel behaviour.

The change in mode of travel (115 respondents with a change in travel pattern and provided a reason) was most commonly away from car use and onto more sustainable modes of travel. The main reasons given were due to moving house or job, convenience and due to costs relating to the economic downturn and the increased cost of petrol.

When the respondents were given details about the 20mph speed limit scheme and then asked about any changes in travel behaviour most, again, did not report a change. 8% of car drivers (of 775 responses) reported that they drove a lot less or a little less. However 11% of car drivers reported that they drove more. 17% of pedestrians, cyclists and public transport users (of 1,662 responses) reported that they had increased the amount that they travelled on foot, bicycle and public transport since the introduction of the scheme.

The scheme was reported to have had no real effect on travel mode choice for the majority of respondents on travel to school / college (83% of the 178 interviewed residents that travelled to school/college) and to work (88% of the 991 interviewed residents that travelled to work).

There was an increase in the number of people walking and cycling, with 17 respondents (7%) answering that they walk more frequently to school / college since the introduction of the scheme, whilst 12 (5%) cycle more frequently.

43% of the 1,390 residents that responded agreed that since the introduction of the scheme there has been a safer environment for walking and cycling. 36% believe there has been an increase in the amount of walking and cycling.

50% of the 1,390 residents that responded disagreed that there had been a reduction in congestion and that the scheme had created less through traffic, suggesting the scheme has not discouraged car use around the area.

School Census data

Portsmouth City Council has collected data on the mode of transport used to travel to school; this data is for 5 to 16 year old pupils.

The school census data (see Figures 7.2 & 7.3) demonstrates that between 2007 and 2009, fewer pupils were travelling to school by car or van and more were travelling on foot or by bicycle. This was evident for Portsmouth as a whole, and on all roads irrespective of whether the road had a 20mph speed limit or not.

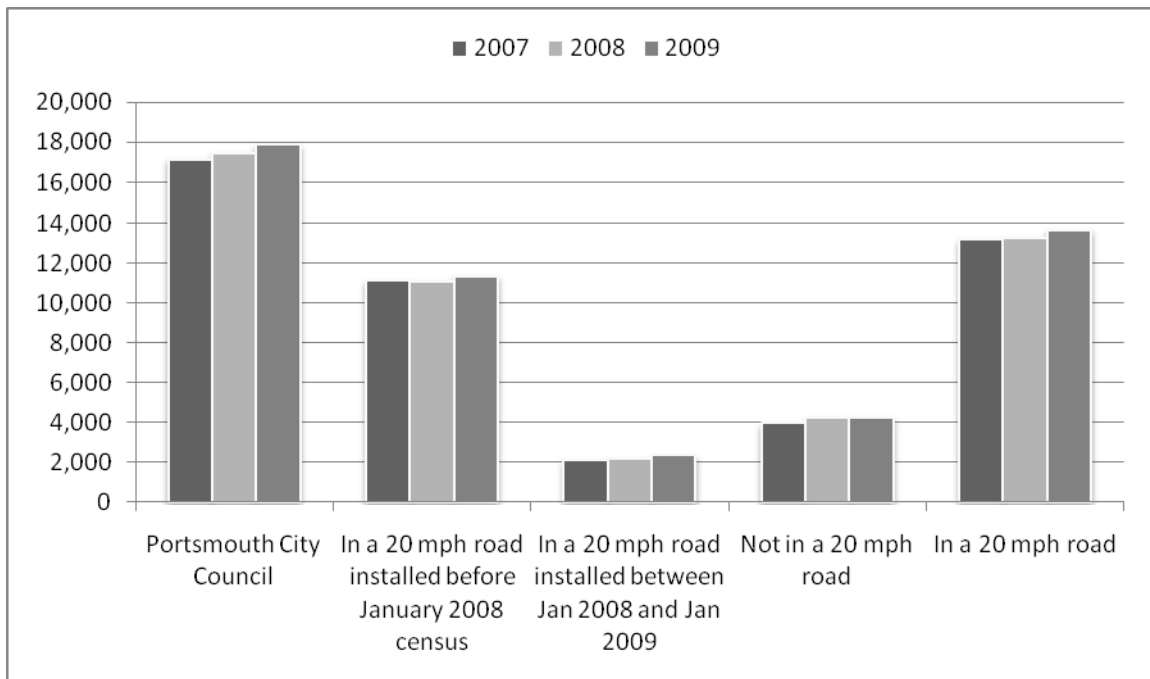


Figure 7.2 – Numbers of pupils (aged 5 to 16) walking or cycling to school (from school census data)

* 'In a 20 mph road' implies that the school the pupil travelled to was located on a 20 mph road

Since 2007, there has been a decrease in proportion of pupils travelling by car or van to school on roads with 20mph limits, with a similar increase in those walking or cycling to school. However, there has been a steady decline in the proportion of pupils cycling to school which corresponded to a steady increase in those walking to school since 2007.

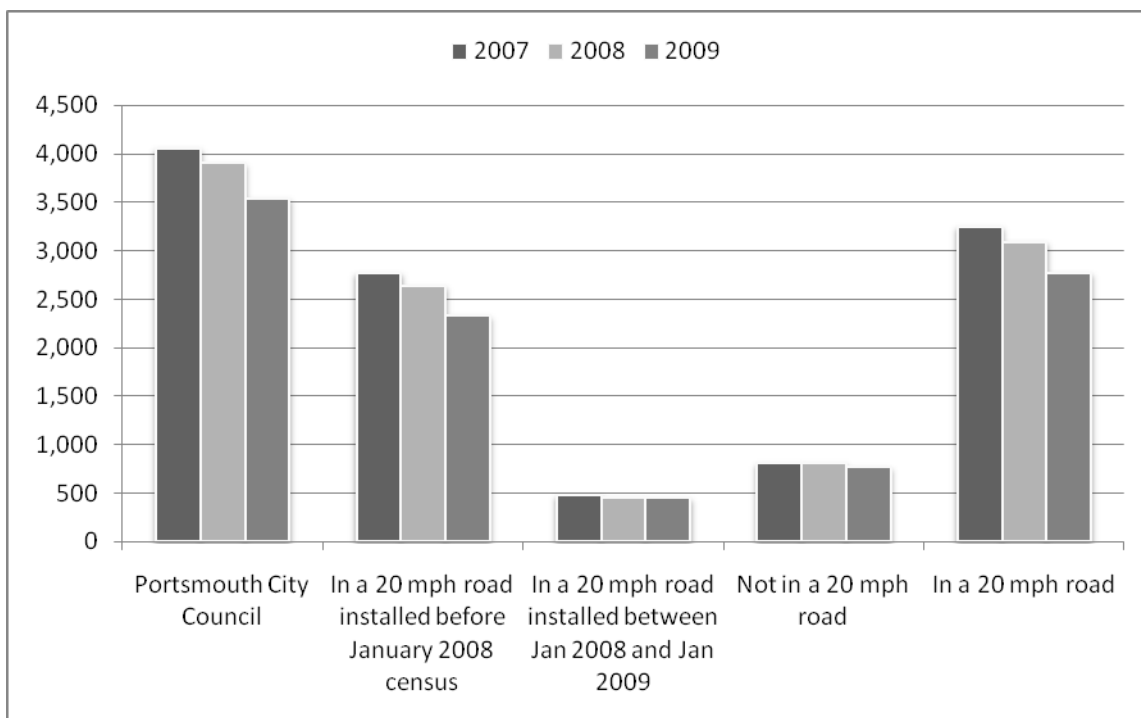


Figure 7.3 – Numbers of pupils (aged 5 to 16) travelling to school by car or van (from school census data)

* 'In a 20 mph road' implies that the school the pupil travelled to was located on a 20 mph road

When looking at the percentage of pupils that travelled to school by bike and on foot separately (see Table A.6 in Appendix A), there is little change in the proportion of cyclists which varies around 3% between 2007 and 2009; whereas pupils walking to school increased from 67.5% in 2007 to 72.5% in 2009.

Therefore there is no clear trend, from the available evidence, to demonstrate how much of an effect the 20mph speed limit scheme has had on influencing the mode of travel used to travel to school.

Casualty analysis

Table 7.1 shows the average annual number of pupil casualties on a journey to or from school at the time of the accident. Before the 20mph speed limit scheme was implemented, there were on average five school pupil casualties annually (2.7% of the total casualties) and afterwards there were seven (5.0% of the total casualties). This is a 40% increase in the number of these casualties, compared to a 22% decrease for all casualties.

The Chi Squared test was carried out to find out the chance that the change in the number of casualties was as a result of the scheme or simply random variation. The results of the test showed that there is a high probability that the change was due to random fluctuation in the casualty numbers.

Table 7.1 – Average annual number of casualties 'Before' and 'After' scheme implementation

	Before	After	Change (%)
School pupil on journey to or from school	5	7	+40.0
All other casualties	178	133	-25.6
Total	183	140	-23.5

Table A.7 in Appendix A gives the severity of the school pupil casualties. In the three years before the scheme was implemented, there were two seriously injured pupils giving an average of 0.7 per year and with a resultant KSI ratio of 0.14. In the year after scheme implementation, all casualties received slight injuries thereby resulting in a reduced KSI ratio of 0.0.

Figure 7.4 shows the proportion of school pupil casualties that were from each age group. Before scheme implementation most casualties were in the 12 to 13 age group (8, 53%), followed by four in the 10 to 11 age group (27%). In the after period there is a greater distribution of casualties into the 8 to 15 age groups, although this change could be due to the overall small number of casualties.

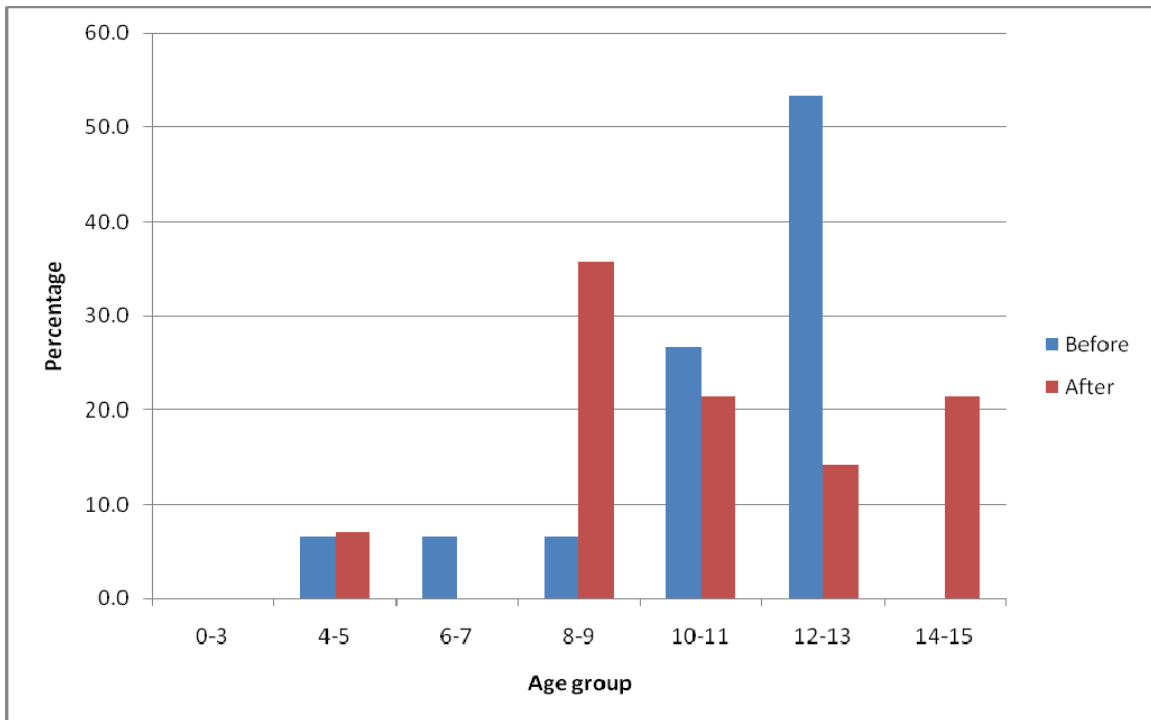


Figure 7.4 – Proportion of casualties from each age group before and after scheme introduction

Table 7.2 shows that most school pupil casualties in both the ‘Before’ and ‘After’ periods were pedestrians, and that there was an increase in the number of pedestrian and passenger school pupil casualties. There was a small decrease in the number of driver/ rider school pupil casualties.

Table 7.2 – Annual average school pupil casualties by casualty class

Sector	Casualty Class	Before (Average of 3 year data)	After (Average of 2 year data)	Total
All Sectors	Pedestrian	3.6	5.5	9.1
	Passenger	0.7	1.0	1.7
	Driver/Rider	0.7	0.5	1.2
	Total	5.0	7.0	12.0

Table A.8 in Appendix A shows that the Central West and North East had the most casualties in the ‘Before’ period (1.3 per year). Both of these sectors experienced a reduction in the number of casualties by 23% and 62% respectively. In all other sectors, there was an increase in the number of casualties ranging from 43% (South East) to 150% (Central East).

A detailed accident analysis, focussing on the accident descriptions and contributory factors (which were recorded for 25 of the 27 accidents involving school pupil casualties), showed that most accidents occurred partly or mainly due to a pedestrian failing to look properly; a contributory factor in 14 of the 25 accidents (5 accidents in the 'Before' period and 9 accidents in the 'After' period, giving an annual increase of 170%). All pedestrian casualties were recorded as being located in the carriageway, crossing 'elsewhere' i.e. not at a formal crossing point. In most instances the school pupil was described as either running into the carriageway or stepping into the carriageway.

The other common contributory factors were: pedestrian failed to judge vehicles path or speed (5 accidents); pedestrian crossing road masked by stationary vehicle (5 accidents); driver failed to judge other persons path or speed (3 accidents); pedestrian careless, reckless or in a hurry (3 accidents) and driver failed to look properly (2 accidents). Speeding was not quoted as being a contributory factor in any cases.

When comparing the 'Before' contributory factors to the 'After' contributory factors, it is evident that a greater proportion of the causes of accidents were attributed to pedestrians. In particular, there was an increase in the number of accidents for which the following factors were recorded: pedestrian crossing road masked by stationary vehicle, pedestrian failing to look properly and pedestrian careless, reckless or in a hurry. However the numbers are low.

The pedal cyclist accidents involved a cyclist hitting a parked car, a car leaving a school car park and colliding with a cyclist, a cyclist moving out from between parked cars and a vehicle overtaking a cyclist too close.

Summary

A comparison of the recorded travel patterns in the school census data and the perceived travel patterns from the qualitative survey to school in Portsmouth indicated that:

- 8% of drivers in the qualitative survey reported that they drive less or a lot less since the installation of the scheme. This is supported by the census data which shows that on 20mph roads between 2007 and 2009, 15% fewer pupils travelled to school by car or van, this is in comparison to just a 5% reduction on roads without a 20mph limit.
- 17% of pedestrians, cyclists and public transport users reported, in the qualitative survey, that they had increased the amount that they travelled on foot, bicycle and public transport.
- 7% of respondents in the qualitative survey answered that they walk more frequently to school or college. The census data showed that on 20mph roads, there was an increase of only 3% in the number of pupils who walk or cycle to school between 2007 and 2009. Interestingly the increase in pupils walking or cycling to school on roads that are not covered by 20mph limits was greater at 8%.
- From the qualitative survey, 5% of respondents cycle more frequently to school or college. However, the school census data, when broken down to show cyclists and pedestrians, shows that there has actually been a decrease in the numbers of pupils travelling to school by bicycle.

From the census data and the qualitative survey, it is not evident that the introduction of the 20mph speed limit scheme has had a demonstrable effect on how school pupils get to school. This is summarised in Table 7.3. It is noted that it is not possible to fully demonstrate any cause and effect and any changes may have been due to factors external to the 20mph signing scheme.

Table 7.3 – Summary of effects of travel to school data

Is there evidence to suggest:	Qualitative survey	Census data
Fewer pupils travelling to school by car or van?	✓	✓
More pupils are travelling to school on foot or by bicycle?	✓	✓
More pupils are travelling to school on foot?	✓	? (change is very small)
More pupils are travelling to school by bicycle?	✓	✗

There also appears to have been no demonstrable impact on school pupil casualty numbers or trends following the introduction of the 20mph speed limit scheme.

There were more casualties annually in the two years following the introduction of the 20mph speed limit scheme than the annual average for the three years before. This could be due to increased numbers of people walking and cycling to school, as demonstrated by the qualitative survey and census data thereby increasing the exposure to risk.

However the chi squared test demonstrated that there is a high probability that the change in casualty numbers was due to random variation and therefore not as a result of the implementation of the 20mph speed limit signing scheme.

The observed decrease in the KSI ratio of school pupil casualties may also be simply due to random variation.

An assessment of accident contributory factors showed that there was an increase in the number of accidents which were attributed to pedestrian error mainly where the pedestrian was considered to have 'ran out' or 'stepped out' in front of a car.

8. Comparison with 20 mph Zones

The monitored impacts in PCC were compared with those from London and Hull where 20 mph schemes have been implemented on an area-wide scale. It should however be noted that the road length and environment with 20 mph zones or limits as well as the funding for the various schemes varied in the three areas.

Table 8.1 shows a qualitative comparison between Portsmouth, Hull and London. TfL⁷ provides approximately £10 million per year to the London Boroughs to fund the implementation of 20 mph Zones whilst Hull uses approximately £0.75 million per year on its 20 mph Zone implementation from its Local Transport Plan (LTP) capital programme. PCC spent £0.57 million from its LTP capital expenditure programme to implement the 20 mph Speed Limit scheme covering all the six sectors.

In all the three areas, 20 mph speed limits have been implemented in residential areas, with a focus on safer routes to school initiatives. Hull also provides electronic 20 mph signs (vehicle activated signs) where there is no history of accidents near a school.

The criteria for implementing the scheme varies between the three areas: TfL bases its decision on the potential casualty savings with a First Year Rate of Return (FYRR) greater than 100%, although some areas of deprivation are given special consideration; Hull bases its decision on the recorded personal injury accidents attributed to a speed problem; and PCC's decision was based on public requests and a desire to implement a mass action scheme over a very wide area at low cost.

Table 8.1 – Qualitative comparison between Portsmouth, London & Hull

	TfL 20 mph Zone	Hull 20 mph Zone	PCC 20 mph Speed Limit
Source of Funding	TfL (£10m/year)	LTP (£0.75m/year) + small contributions from local ward funds	LTP (£0.57m)
Funding criteria	>100% FYRR – special consideration given to deprived areas	4 PIAs in 3 years or 3 PIAs in 1 year & speed is main cause	Public requests
Average Speeds before implementation	>25 mph	29 -33 mph	≤24mph
Average Speeds after implementation	17 mph	17 -21 mph	19 mph
Public support	Yes but some opposition from emergency services	Yes but some opposition from bus operators	Yes
Areas of application	Residential areas – majority containing schools	Residential areas, mainly council estates. Recent applications relate to safer routes to school initiatives	Residential areas

⁷ TfL – Transport for London
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Table 8.2 compares the early results of the 20 mph Speed Limit scheme in PCC with the results observed in the London and Hull areas where 20 mph Zones (a combination of signing and traffic calming measures spaced between 50 and 95m apart) have been implemented.

Table 8.2 – Comparison of Portsmouth results with TfL and Hull results

	TfL 20 mph Zone	Hull 20 mph Zone	PCC 20 mph Speed Limit
Change in traffic speeds	-9 mph	-10.5 mph	-1.3 mph
Change in injury accidents	-43%	-56%	-21%
Change in KSI accidents	-56%	-90%	+8%
Change in casualties	-45%	-	-22%
Change in KSI casualties	-54%	-	+6%
Change in pedestrian casualties	-36%	-54%	-16%
Change in pedestrian KSI casualties	-39%	-	+38%
Change in child casualties	-42%	-64%	-20%
Change in child pedestrian casualties	-45%	-74%	-12%

Table 8.2 shows that 20 mph Zones are more effective than 20 mph Speed Limit signed only schemes for casualty and speed reduction. The larger casualty reductions in 20 mph zones may be attributable to the corresponding larger speed reductions of about 9 mph.

Research carried out by TRL Ltd for Transport for London (TfL) as well as observed traffic speeds in some areas in Hull (in 1998) showed that the implementation of 20 mph Speed Limit schemes, with signing alone, only results in about a 1 mph reduction in speed. This is similar to the reduction in speed observed in Portsmouth.

Hull also started an initiative, derived from consultations with bus operators, which limited speeds of buses to 20 mph on bus routes which in turn slowed down traffic using the bus routes to between 22-25 mph without the need for traffic calming measures. However, this is not likely to work effectively in situations where the bus frequency on the route is low.

There appears to be limited agreement over the effects of traffic calming on vehicle emissions. Area-wide studies (in a number of countries) have shown a decrease in N₂O (Nitrous Oxide) emissions as a result of traffic calming. N₂O emissions are part of the National Air Quality Strategy and hence arguably the most important form of exhaust emission. Area-wide studies were less conclusive on the effects on CO (Carbon Monoxide) and HC (Hydro Carbon) emissions. Studies (TRL Report 482) based on single sections of road have shown a wide range of results with a wide variation in the changes of N₂O and CO levels. They did, however, show a reasonably consistent increase in fuel consumption and HC emissions due to traffic calming, albeit with only a small number of studies covering the latter. The quality of local air depends upon the number of vehicles using a road, as well as other sources of pollution in the vicinity. It is therefore possible that in some situations the amount of traffic using a particular road could be reduced following the introduction of a traffic calming scheme.

9. Knowledge Transfer

Although there is a general perception of wide spread public support for the 20 mph schemes, only Hull and Portsmouth have carried out satisfaction surveys using feedback questionnaires. The responses to these questionnaires showed high levels of satisfaction with the 20 mph schemes. In Hull, over 80% of respondents to the survey were in favour of 20 mph Zones; around 75% would recommend implementation of the scheme in other areas; and over 70-95% of respondents were in favour of humps/cushions. Response rates varied from 10% to 40% in individual Zones.

Research undertaken in 2000 (*Kirby, 2000*) identified a range of non-casualty benefits for 20 mph Zones:

- over 25% of respondents said that they walked or cycled more following implementation of the 20 mph Zone;
- over 50% of respondents felt that the 20 mph Zone had made the area a more pleasant place in which to live; and
- 60% of respondents felt that more children played in the street.

In Portsmouth, those that were satisfied with the scheme and provided a reason (51% of the 1,445 respondents) felt that:

- The 20 mph Speed Limit had improved safety (27%) – “People are driving safer, it’s a very good idea”
- The scheme was needed and works well (9%) – “Keep to 20 mph. It is a good idea”
- Slower drivers result in fewer accidents (8%) – “Should be fewer accidents. More awareness due to travelling at low speed”.

Although there are high levels of satisfaction with the 20 mph schemes, all the three areas have received complaints about continuing high speeds on a minority of roads. The authorities have always followed up the complaints although it is still not clear if it is a genuine problem or just perception of high speeds. This was also evident in the qualitative survey findings that indicated that respondents in Portsmouth who were not satisfied with the 20 mph Speed Limit scheme felt that the scheme needed enforcing as drivers were still exceeding the Speed Limit.

Obstacles faced in Portsmouth

PCC has been faced with a number of obstacles during the scheme implementation process. These included:

- Limited resources to design and supervise the scheme’s implementation;
- Illegal removal of signs since implementation. However, the use of secure torque bolts to fix the signs in position may have addressed this problem and is likely to prove to be cost effective in the long term; and
- Sign clutter at junctions has been a problem at some locations. In other locations, roads have very narrow carriageways due to the presence of on-street parking (which obstructs visibility to the signs) and as such it has been difficult to find a suitable location for signs. As a result, some signing has been found to be unlawful (due, for example, to a lack of repeater signs or poor visibility), and has resulted in costly challenges to enforcement activity where the police have responded to speeding concerns.

Lessons learnt

Lessons learnt from the 20 mph Speed Limit scheme implementation have included:

- Publicity, using community engagement and the media, is pivotal to gaining public acceptance/support for the scheme;
- Carrying out a survey and design of each road separately by staff with knowledge of the relevant legislation is key to ensuring suitability of the road environment for implementing 20 mph Speed Limits;
- A comprehensive checking or sign review process should be put in place following implementation, to ensure that signs have been correctly installed and meet legal requirements;
- Local authorities should ensure that appropriate governance arrangements are in place, for the robust management of the scheme. A Project/ Stakeholder Board should be set up at the outset to guide and direct the implementation of the scheme;
- Engagement of stakeholders through the design and implementation of the scheme in order to gain public support and acceptance. For instance better engagement of bus operators and emergency services in order to identify key routes for a coordinated approach is encouraged which would in turn promote closer working relationships;
- The scheme should be based on robust evidence of casualty saving benefits that should be outlined in the early stages of scoping the scheme; and
- There should be a plan for facilitating post-implementation feedback for 20 mph Limit only roads where initial speeds are high.

Transferability

Outside London, PCC considers itself as the most densely populated city in Great Britain. The majority of residential streets are narrow, with terraced housing and cars parked on both sides. As such, the provision of the 20 mph Speed Limit scheme on such roads only formalised an existing practice and possibly helped to reduce the incidences of aggressive driving. It is possible that such a scheme would be ineffective if implemented on an area-wide scale in many other locations without providing complimentary traffic calming measures. However, there are likely to be individual clusters of streets where such an approach could be applied. PCC is considering implementing 20 mph Zones (i.e. adding traffic calming measures and the associated appropriate signage) on roads that have had speed related complaints raised or where average speeds are still in excess of 24 mph since the implementation of the 20 mph Speed Limit scheme. This is likely to add significantly to the costs, but is also expected to improve the safety benefits of the scheme.

Experience from London and Hull suggests that significant safety benefits can be obtained by implementing a targeted area-wide implementation of 20 mph zones in combination with 20 mph speed limit signs, depending on the character and function of each road in the area.

In summary, and considering the fact that the scheme was implemented to formalise the existing average speeds, the effects of implementing the 20 mph Speed Limit scheme (use of signing alone) are as follows:

- The average speed reduction achieved by installing speed limit signs alone is less than that achieved by the introduction of 20 mph zones partly because 20 mph Speed Limits are implemented where existing speeds are already low;
- Within an area-wide application of 20mph sign only limits, those roads with average speeds higher than 24 mph may benefit from significant speed reductions, but not to the extent that the 20mph speed limit is self enforcing;

- Based on the available data for two years after scheme implementation, casualty benefits greater than the national trend have not been demonstrated; and
- The evaluation of area-wide schemes relies on good quality data and an appropriate evaluation design.

Following the analysis of the available data, it is recommended that an evaluation study that takes account of 3 years of 'After' data to monitor the long-term impacts of the 20 mph scheme in PCC would offer stronger evidence of outcomes.

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Appendix A

Table A.1 - Number of monitored sites by specified average speed range and PCC sector

Sector	'Before' Average Speed	'After' Average Speeds			
		≤20 mph	21 to 24 mph	>24 mph	Total
Central West	≤20 mph	22	4	1	27
	21 to 24 mph	6	7	1	14
	>24 mph	4	1	1	6
	Total	32	12	3	47
South East	≤20 mph	34	3	-	37
	21 to 24 mph	6	6	2	14
	>24 mph	1	3	5	9
	Total	41	12	7	60
Central East	≤20 mph	31	6	1	38
	21 to 24 mph	3	3	2	8
	>24 mph	4	1	1	6
	Total	38	10	4	52
North East	≤20 mph	15	1	-	16
	21 to 24 mph	2	1	-	3
	>24 mph	1	-	-	1
	Total	18	2	-	20
South West	≤20 mph	20	-	-	20
	21 to 24 mph	5	3	-	8
	>24 mph	2	1	-	3
	Total	27	4	-	31
North West	≤20 mph	2	1	-	3
	21 to 24 mph	1	1	1	3
	>24 mph	-	3	4	7
	Total	3	5	5	13
All Sectors	≤20 mph	124	15	2	141
	21 to 24 mph	23	21	6	50
	>24 mph	12	9	11	32
	Total	159	45	19	223

Table A.2 – Number of monitored sites by average speed changes, specified speed range and sector

Before Speeds	Average speed change	Speed Change Band	After Speeds			
			≤20 mph	21 to 24 mph	>24 mph	Total
≤20 mph	-0.7 mph	Decrease 11-15 mph	2	-	-	2
		Decrease 6 -10 mph	4	-	-	4
		Decrease 1-5 mph	47	-	-	47
		No change	23	-	-	23
		Increase 1-5 mph	45	10	-	55
		Increase >5 mph	3	5	2	10
21 to 24 mph	-2.3 mph	Decrease 11-15 mph	1	-	-	1
		Decrease 6 -10 mph	11	-	-	11
		Decrease 1-5 mph	11	7	-	18
		No change	-	6	-	6
		Increase 1-5 mph	-	8	5	13
		Increase >5 mph	-	-	1	1
>24 mph	-7.4 mph	Decrease >15 mph	2	-	-	2
		Decrease 11-15 mph	3	-	-	3
		Decrease 6 -10 mph	6	2	3	11
		Decrease 1-5 mph	1	7	4	12
		No change	-	-	1	1
		Increase 1-5 mph	-	-	3	3

Table A.3 - Change in casualty numbers in PCC sectors by road user type and injury severity

Sector	Casualty Class	Before (Average of 3 year data)			After (Average of 2 year data)			%change	
		KSI	Slight	Total	KSI	Slight	Total	KSI	Total
Central East	Pedestrian	1.7	8.7	10.3	1.0	8.0	9.0	-40%	-13%
	Passenger	0.3	2.7	3.0	0.0	3.0	3.0	-100%	0%
	Driver/Rider	4.0	21.3	25.3	3.5	18.5	22.0	-13%	-13%
	Total	6.0	32.7	38.7	4.5	29.5	34.0	-25%	-12%
Central West	Pedestrian	1.0	6.0	7.0	1.5	4.5	6.0	50%	-14%
	Passenger	0.3	3.3	3.7	0.0	4.0	4.0	-100%	9%
	Driver/Rider	1.7	15.7	17.3	2.5	12.0	14.5	50%	-16%
	Total	3.0	25.0	28.0	4.0	20.5	25.0	33%	-11%
North East	Pedestrian	0.0	4.7	4.7	1.0	2.0	3.0	N/A	-36%
	Passenger	0.0	4.3	4.3	0.0	2.5	2.5	N/A	-42%
	Driver/Rider	2.7	18.7	21.3	2.5	9.0	11.5	-6%	-46%
	Total	2.7	27.7	30.3	3.5	13.5	17.0	31%	-44%
North West	Pedestrian	0.3	3.7	4.0	0.0	3.0	3.0	-100%	-25%
	Passenger	0.3	1.7	2.0	0.0	1.5	1.5	-100%	-25%
	Driver/Rider	1.0	10.7	11.7	1.0	6.5	7.5	0%	-36%
	Total	1.7	16.0	17.7	1.0	11.0	12.0	-40%	-32%
South East	Pedestrian	1.3	7.7	9.0	3.5	4.5	8.0	163%	-11%
	Passenger	0.0	8.7	8.7	0.0	2.5	2.5	N/A	-71%
	Driver/Rider	1.0	18.3	19.3	0.5	17.0	17.5	-50%	-9%
	Total	2.3	34.7	37.0	4.0	24.0	28.0	71%	-24%
South West	Pedestrian	2.0	8.3	10.3	1.7	7.4	9.1	-14%	-12%
	Passenger	0.0	4.7	4.7	0.0	4.6	4.6	N/A	-2%
	Driver/Rider	1.0	15.3	16.3	1.1	12.0	13.1	14%	-20%
	Total	3.0	28.3	31.3	2.9	24.0	26.9	-5%	-14%
All Sectors	Pedestrian	6.3	39.0	45.3	8.7	29.4	38.1	38%	-16%
	Passenger	1.0	25.3	26.3	0.0	18.1	18.1	-100%	-31%
	Driver/Rider	11.3	100.0	111.3	11.1	75.0	86.1	-2%	-23%
	Total	18.7	164.3	183.0	19.9	122.5	142.4	6%	-22%

Table A.4 – Change in casualty numbers by casualty age, injury severity and user type

Casualty Class	Casualty age	Before (Average of 3 year data)			After (Average of 2 year data)			%change	
		KSI	Slight	Total	KSI	Slight	Total	KSI	Total
Pedestrian	0 - 15	4.7	20.0	24.7	2.5	19.3	21.8	-46%	-12%
	16 - 19	0.0	2.7	2.7	0.5	2.2	2.7	N/A	2%
	20 - 69	1.0	14.3	15.3	4.1	6.4	10.4	307%	-32%
	70+	0.7	2.0	2.7	1.6	1.6	3.2	146%	21%
	Total	6.3	39.0	45.3	8.7	29.4	38.1	38%	-16%
Passenger	0 - 15	0.7	7.0	7.7	0.0	5.6	5.6	-100%	-26%
	16 - 19	0.3	2.3	2.7	0.0	3.7	3.7	-100%	39%
	20 - 69	0.0	14.7	14.7	0.0	7.2	7.2	N/A	-51%
	70+	0.0	6.0	6.0	0.0	6.1	6.1	N/A	1%
	Total	1.0	22.3	23.3	0.6	14.1	14.6	-43%	-37%
Driver/Rider	0 - 15	2.3	12.7	15.0	1.0	9.6	10.6	-57%	-29%
	16 - 19	4.3	30.0	34.3	2.5	25.8	28.3	-42%	-18%
	20 - 69	4.3	52.0	56.3	6.6	37.5	44.1	52%	-22%
	70+	1.3	19.0	20.3	1.6	13.5	15.1	23%	-26%
	Total	13.3	113.0	126.3	12.9	87.0	99.9	-4%	-21%
All casualties	0 - 15	7.7	39.7	47.3	3.5	34.6	38.1	-54%	-20%
	16 - 19	4.7	35.0	39.7	3.0	31.7	34.7	-36%	-12%
	20 - 69	5.3	81.0	86.3	10.6	51.1	61.7	100%	-29%
	70+	2.0	27.0	29.0	3.3	21.1	24.4	64%	-16%
	Total	20.7	174.3	195.0	22.1	130.5	152.6	7%	-22%

Table A.5 - Change in no. of vehicles involved in accidents in PCC by vehicle type & severity

Sector	Vehicle Type	Before (3 year av.)			After (2 year av.)			%change	
		KSI	Slight	Total	KSI	Slight	Total	KSI	Total
Central East	Pedal Cycle	2.3	8.0	10.3	2.5	7.5	10.0	7%	-3%
	PTW	1.7	4.7	6.3	1.0	4.5	5.5	-40%	-13%
	Car/Taxi	6.7	40.0	46.7	4.5	34.5	39.0	-33%	-16%
	Other	0.0	3.0	3.0	0.5	3.0	3.5	N/A	17%
	Total	10.7	55.7	66.3	8.5	49.5	58.0	-20%	-13%
Central West	Pedal Cycle	1.0	4.3	5.3	1.0	4.0	5.0	0%	-6%
	PTW	0.7	3.0	3.7	1.0	2.0	3.0	50%	-18%
	Car/Taxi	3.3	26.0	29.3	3.5	21.0	24.5	5%	-16%
	Other	0.0	3.0	3.0	1.0	3.5	4.5	N/A	50%
	Total	5.0	36.3	41.3	6.5	30.5	37.0	30%	-10%
North East	Pedal Cycle	0.0	5.3	5.3	1.0	3.0	4.0	N/A	-25%
	PTW	1.7	6.3	8.0	1.5	2.0	3.5	-10%	-56%
	Car/Taxi	2.7	29.0	31.7	3.5	13.0	16.5	31%	-48%
	Other	0.0	5.0	5.0	0.0	1.5	1.5	N/A	-70%
	Total	4.3	45.7	50.0	6.0	19.5	25.5	38%	-49%
North West	Pedal Cycle	0.3	2.7	3.0	0.0	2.5	2.5	-100%	-17%
	PTW	1.3	1.7	3.0	0.5	0.5	1.0	-63%	-67%
	Car/Taxi	1.0	16.0	17.0	3.5	14.0	17.5	250%	3%
	Other	0.3	2.7	3.0	0.0	1.5	1.5	-100%	-50%
	Total	3.0	23.0	26.0	4.0	18.5	22.5	33%	-13%
South East	Pedal Cycle	0.7	5.7	6.3	0.5	5.5	6.0	-25%	-5%
	PTW	0.0	3.3	3.3	0.5	3.5	4.0	N/A	20%
	Car/Taxi	2.3	38.3	40.7	3.5	29.0	32.5	50%	-20%
	Other	0.3	6.3	6.7	0.0	2.5	2.5	-100%	-63%
	Total	3.3	53.7	57.0	4.5	40.5	45.0	35%	-21%
South West	Pedal Cycle	0.7	8.7	9.3	0.6	5.7	6.3	-14%	-33%
	PTW	0.3	2.0	2.3	0.6	2.9	3.4	71%	47%
	Car/Taxi	2.7	31.0	33.7	2.3	24.6	26.9	-14%	-20%
	Other	0.3	2.0	2.3	0.0	0.6	0.6	-100%	-76%
	Total	4.0	43.7	47.7	3.4	33.7	37.1	-14%	-22%
All Sectors	Pedal Cycle	5.0	34.7	39.7	5.6	28.2	33.8	11%	-15%
	PTW	5.7	21.0	26.7	5.1	15.4	20.4	-11%	-23%
	Car/Taxi	18.7	180.3	199.0	20.8	136.1	156.9	11%	-21%
	Other	1.0	22.0	23.0	1.5	12.6	14.1	50%	-39%
	Total	30.3	258.0	288.3	32.9	192.2	225.1	9%	-22%

'Other' represents all buses, minibuses, goods vehicles, other motor vehicles, other non-motor vehicles and unknown vehicle types.

Table A.6 – Percentage of Pupils cycling or walking to school

	Cycling (%)	Walking (%)
2007	3	67.5
2008	3.1	69.2
2009	2.75	72.5

Table A.7 – Average annual severity of school pupil casualties before and after scheme implementation

	Before	After	Total
Fatal	0	0	0
Serious	0.7	0	0.7
Slight	4.3	7	11.3
KSI ratio	0.14	0.00	0.06
Total	5	7	12

Table A.8 - Annual average school pupil casualties by casualty class

Sector	Before	After	Change (%)
Central East	1.0	2.5	150.0
Central West	1.3	1.0	-23.1
North East	1.3	0.5	-61.5
North West	0.0	1.0	100.0
South East	0.7	1.0	42.9
South West	0.7	1.1	57.1
Total	5.0	7.0	40.0

Appendix B

B.1 Accident Trends and Causation factors

Trends

Time of Day & Day of Week

Figure B.1 shows that the total number of accidents by time of day is very similar in the 'Before' and 'After' periods.

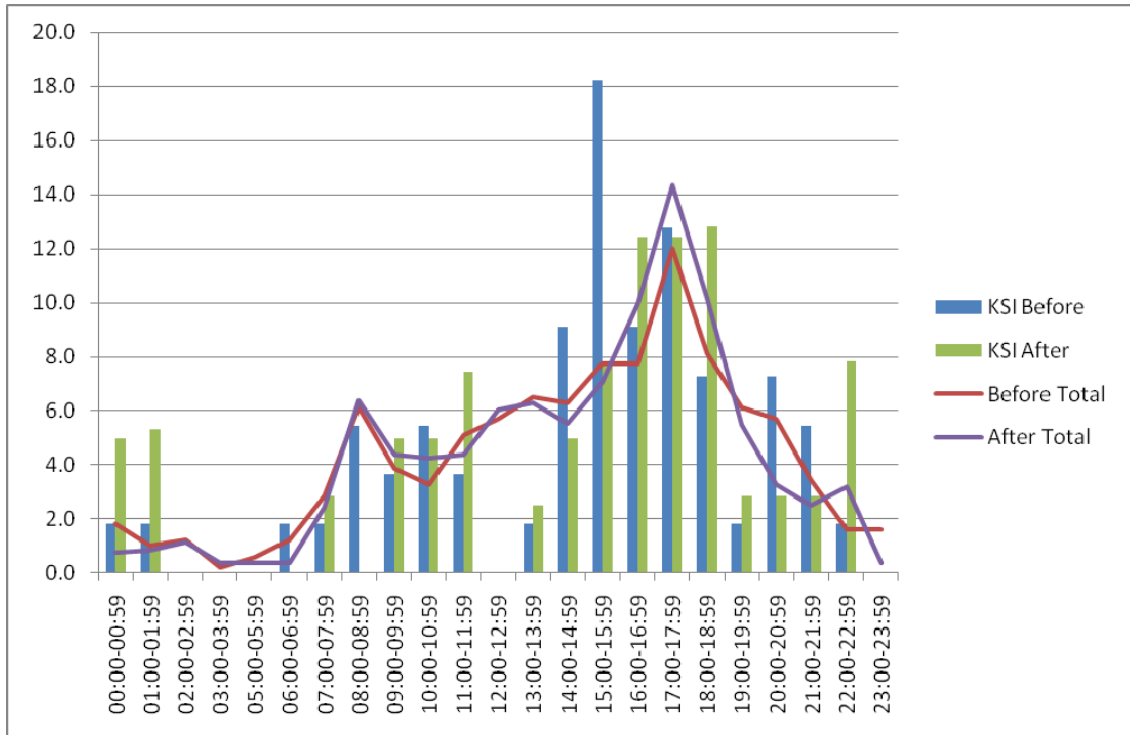


Figure B.1 – Accidents in PCC 20 mph sectors by time of day and severity

The distributions of accidents by time of day are similar before and after the scheme's implementation. There are some changes for the smaller numbers of KSI accidents, although they may be random variations.

In the 'Before' period, there was a large proportion of KSI accidents occurring between 14:00-15:59 whilst in the after period there was a greater proportion of KSI accidents in the periods 11:00-11:59, 18:00-18:59, 22:00-22:59 and 00:00-01:59.

There was no evident change in trend in the distribution of the accidents on 20 mph roads by day of week. Although the proportion of KSI accidents is highest on Mondays, this is unaffected by the scheme.

Journey Purpose

Table B.1 shows that there has not been any significant reduction in the proportion of vehicles undertaking school related journeys in accidents.

The largest increase in accident involvement was in the proportion of vehicles commuting to/from work although this proportion was small. Given the small numbers involved, these figures are susceptible to variations.

Table B.1 - Proportional split of vehicles by Journey Purpose and severity of accident

Severity	Journey Purpose	Before (3 years)	After (2 years)	% change
KSI	Other/Unknown	7.9% (68)	12.7% (56)	4.8%
	Journey as part of work	1.4% (12)	0.9% (4)	-0.5%
	Commuting to/from work	1.0% (9)	1.1% (5)	0.1%
	Taking school pupil to/from school	0.1% (1)	0.0% (0)	-0.1%
	Pupil riding to/from school	0.1% (1)	0.0% (0)	-0.1%
Slight	Other/Unknown	71.8% (621)	62.8% (277)	-9.0%
	Journey as part of work	10.1% (87)	11.1% (49)	1.0%
	Commuting to/from work	6.6% (57)	9.5% (42)	2.9%
	Taking school pupil to/from school	0.6% (5)	1.6% (7)	1.0%
	Pupil riding to/from school	0.5% (4)	0.2% (1)	-0.3%

Causation factors

A detailed investigation into the accident causation factors, as recorded on STATS19 forms and taking into consideration both probability A and B contributory factors⁸, indicated that there was generally no significant change in the proportion of all accident severities influenced by speed related contributory factors in the 20 mph PCC sectors. Table B.2 indicates relatively small changes in the proportion of accidents where 'Careless, reckless or in a hurry', 'Aggressive driving', 'Driver failing to judge another person's speed or direction' and 'Disobeying a 'Given Way' or 'Stop' sign or markings' were recorded as possible causation factors. There was also a small change in the proportion of accidents influenced by the 'passing too close to cyclist/pedestrian' causation factor. Other than for the 'Aggressive driving', 'Driver careless, reckless or in a hurry' and 'pedestrian failed to judge other person's path or speed', all the changes were increases in the proportion of accidents influenced by the perceived speed related causation factors.

The influence of the causation factors on the occurrence of KSI accidents was also seemingly limited with no clear observable trend in the realised relatively small changes. For instance although there was a 4% reduction in the proportion of KSI accidents influenced by the 'Aggressive driving' factor, there was an increase of 3% in the proportion of accidents influenced by the 'Passing too close to cyclist, horse rider or pedestrian' factor which may also be attributed to aggressive driving. The proportion of KSI accidents influenced by the 'Exceeding speed limit' factor increased by 3% whereas those influenced by the 'Travelling too fast for conditions' reduced by 1%.

There are also notable small increases in the proportion of KSI accidents attributed to 'Disobeyed Give Way or Stop sign or markings' (4%), 'Driver failed to look properly' (4%) and 'driver impaired by alcohol' (3%) causation factors.

In pedal cycle accidents, there was no change in the proportion of KSI accidents attributed to 'cyclist entering road from pavement' factor although there was an overall increase of 1% in the influence of this factor in accident occurrence.

⁸ The contributory factors recorded on STATS19 forms are based on the subjective judgement of the recording police officer and hence should be treated with caution.

Table B.2 - Proportional split* in PCC 20 mph sectors accident contributory factors by severity

Contributory factor	Before (3 years)			After (2 years)			Change (%)	
	KSI	Slight	Total	KSI	Slight	Total	KSI	Total
Slippery road (due to weather)	1%	0%	0%	1%	2%	2%	0%	1%
Road layout (e.g. bend, hill, narrow carriageway)	0%	0%	0%	0%	1%	1%	0%	1%
Disobeyed 'Give Way' or 'Stop' sign or markings	0%	2%	2%	4%	4%	4%	4%	3%
Disobeyed pedestrian crossing facility	1%	0%	0%	0%	0%	0%	-1%	0%
Exceeding speed limit	0%	1%	1%	3%	2%	2%	3%	2%
Travelling too fast for conditions	1%	1%	1%	0%	3%	2%	-1%	1%
Following too close	0%	0%	0%	0%	2%	1%	0%	1%
Cyclist entering road from pavement	4%	1%	1%	4%	2%	2%	0%	1%
Junction overshoot	2%	2%	2%	3%	2%	2%	1%	0%
Junction restart (moving off)	1%	1%	1%	3%	0%	1%	2%	0%
Poor turn or manoeuvre	4%	4%	4%	6%	4%	5%	3%	1%
Driver failed to look properly	10%	15%	14%	14%	20%	19%	4%	5%
Driver failed to judge other person's path or speed	5%	6%	6%	5%	9%	8%	1%	2%
Passing too close to cyclist, horse rider or pedestrian	0%	1%	1%	3%	2%	2%	3%	1%
Sudden braking	3%	1%	1%	0%	1%	1%	-3%	0%
Swerved	1%	0%	0%	0%	0%	0%	-1%	0%
Loss of control	2%	2%	2%	3%	1%	1%	1%	0%
Driver impaired by alcohol	0%	2%	1%	3%	1%	1%	3%	0%
Not displaying lights at night or in poor visibility	0%	0%	0%	1%	0%	1%	1%	0%
Aggressive driving	4%	2%	2%	0%	1%	1%	-4%	-1%
Driver careless, reckless or in a hurry	6%	5%	5%	3%	3%	3%	-4%	-2%
Vision affected by stationary or parked vehicles	3%	3%	3%	1%	3%	2%	-1%	0%
Vision affected by vehicle blind spot	1%	0%	1%	0%	0%	0%	-1%	0%
Pedestrian crossing road masked by stationary or parked vehicle	8%	2%	3%	4%	4%	4%	-4%	1%
Pedestrian failed to look properly	12%	6%	6%	10%	7%	7%	-2%	1%
Pedestrian failed to judge other person's path or speed	2%	2%	2%	4%	0%	1%	2%	-1%
Other	8%	12%	12%	12%	11%	11%	3%	-1%
Unknown	24%	30%	29%	15%	15%	15%	-8%	-14%

*The proportional split takes into consideration both probability A & B contributory factors recorded for each accident in PCC. The severity split is within a particular severity category whilst the Total split is proportional split in all the 20 mph sectors. Contributory factors in bold represent those factors that ought to have been directly affected by the 20 mph speed limit scheme.

In pedestrian accidents, there was no significant change in the proportion of pedestrian causation factors in all accidents. Although there was an increase of 1% in the proportion of accidents influenced by; 'pedestrian failed to look properly' and 'pedestrian crossing road masked by

stationary or parked vehicle', there were reductions of 2% and 4% respectively in their influence in KSI accident occurrence.

It is important not to make strong inferences from this data as it is affected by random variations and the numbers of crashes with some of the contributory factors are relatively low.

Appendix C

C.1 Survey Questionnaire

Introduction: Good morning/afternoon/evening. My name is and I work for the market research company Count-On-Us. I'm conducting some research on behalf of Portsmouth City Council gathering people's experiences and opinions of their travel in the local area. Please can you spare some time to take part?

I'd like to ask you some questions about how you usually travel around the area (over the last 2 years) to access services such as work, education, healthcare, shopping and visiting friends and family.

SCREENING:

Are you a Portsmouth resident living within the area shown on this map? *Interviewer – show map.*

<input type="checkbox"/> ₁	Yes (note which zone) _____
<input type="checkbox"/> ₂	No

If **Yes**, continue to Q1.

If **No**, thank respondent for their time, and terminate interview.

Q1. Can you tell me how you usually travel for each of the following purposes? *Interviewer – present show card*

	Work	Education	Education (taking a dependent)	Healthcare
Train	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁
Bus or coach	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂
Motorcycle, scooter or moped	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃
Car or van	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄
Taxi/minicab	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅
Bicycle	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆
On foot	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇
Other (specify)	<input type="checkbox"/> ₈	<input type="checkbox"/> ₈	<input type="checkbox"/> ₈	<input type="checkbox"/> ₈
Do not travel for this purpose	<input type="checkbox"/> ₉	<input type="checkbox"/> ₉	<input type="checkbox"/> ₉	<input type="checkbox"/> ₉

Q2. I would now like you to think about you're most typical or common journey (the one you make most frequently in a week). Please can you tell me how you travel for this journey and why you chose to travel in this way?. [*Interviewer – Code as appropriate.*]

	Car	Foot	Cycle	Public Transport	Other (please specify)
1) Better journey time	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁
2) Better reliability	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂
3) Bus priority measures	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃
4) Comfort	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄
5) Convenience	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅
6) Cost	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆
7) Difficulty / cost of parking a car	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇
8) Habit/Always used this mode	<input type="checkbox"/> ₈	<input type="checkbox"/> ₈	<input type="checkbox"/> ₈	<input type="checkbox"/> ₈	<input type="checkbox"/> ₈
9) Health benefits	<input type="checkbox"/> ₉	<input type="checkbox"/> ₉	<input type="checkbox"/> ₉	<input type="checkbox"/> ₉	<input type="checkbox"/> ₉
10) Less stressful	<input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁₀	<input type="checkbox"/> ₁₀
11) Need for car at destination	<input type="checkbox"/> ₁₁	<input type="checkbox"/> ₁₁	<input type="checkbox"/> ₁₁	<input type="checkbox"/> ₁₁	<input type="checkbox"/> ₁₁
12) Reduced speed limit in the area	<input type="checkbox"/> ₁₂	<input type="checkbox"/> ₁₂	<input type="checkbox"/> ₁₂	<input type="checkbox"/> ₁₂	<input type="checkbox"/> ₁₂
13) No alternative	<input type="checkbox"/> ₁₃	<input type="checkbox"/> ₁₃	<input type="checkbox"/> ₁₃	<input type="checkbox"/> ₁₃	<input type="checkbox"/> ₁₃
14) Other (please specify)	<input type="checkbox"/> ₁₄	<input type="checkbox"/> ₁₄	<input type="checkbox"/> ₁₄	<input type="checkbox"/> ₁₄	<input type="checkbox"/> ₁₄

Q3. Have you changed how you have travelled around the local area over the last two years? This can be for any of the journeys you have mentioned previously - for work, education, or healthcare.

Yes	<input type="checkbox"/> ₁
No	<input type="checkbox"/> ₂
Don't know	<input type="checkbox"/> ₃

If Yes – go to Q4
 If No – go to text and Q5

Q4. Can you please describe how you have changed your travel habits during the last 2 years (e.g. travelling further by car) and why these have changed (changed jobs, moved house, bought a car?)

How have they changed	Why have they changed

Portsmouth City Council implemented a 20mph speed limit in six residential sectors between June 2007 and March 2008, one of which we are located in at the moment. The following set of questions aims to understand if and how your travel habits have changed as a result of this intervention.

Q5. Since the introduction of the 20mph scheme, has the amount you travel by the following methods increased, decreased, or stayed the same? Interviewer – present show card and code one option as appropriate. In the case that the respondent is unable to walk / cycle, or does not walk/cycle as a mode of transport (i.e. around the study area, implying a further distance than simply walking to a car etc), both before and after the implementation of the scheme, please select – ‘have never used this mode of transport’]

	Car	Foot	Bicycle	Public transport	Other (please specify)
Increased a lot	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁
Increased a little	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂	<input type="checkbox"/> ₂
Made no difference	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃	<input type="checkbox"/> ₃
Decreased a little	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄	<input type="checkbox"/> ₄
Decreased a lot	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅	<input type="checkbox"/> ₅
Don't know	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆	<input type="checkbox"/> ₆
Have never used this mode of transport	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇	<input type="checkbox"/> ₇

Q6. In your opinion, what impact has the implementation of 20mph speed limit made on the speed of cars in your area? [Interviewer – select one response only]

Decreased speeds a lot	<input type="checkbox"/> ₁
Decreased speeds a little	<input type="checkbox"/> ₂
Made no difference	<input type="checkbox"/> ₃
Increased speeds a little	<input type="checkbox"/> ₄
Increased speeds a lot	<input type="checkbox"/> ₅
Don't know	<input type="checkbox"/> ₆

Q7. Please tell me whether you agree with the following, using a scale of strongly agree to strongly disagree. Since the introduction of the 20mph speed limit in this area there has been:
[Interviewer, go through each in turn and code as appropriate]

	Strongly agree	Agree	Neither	Disagree	Strongly disagree	Don't know
a) Less aggressive driving	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
b) A reduction in congestion	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
c) Less through traffic	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
d) A safer environment for walking and cycling	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
e) An increase in the number of people walking and cycling	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
f) A cleaner environment	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
g) More on-street social interaction (i.e. talking to neighbours, children playing in street etc)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
h) A more pleasant community atmosphere	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
i) A reduction in crime and vandalism	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
j) A reduction in noise levels	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
k) Improvements in air quality	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

If respondent stated they travel to school or college in Q1, ask Q8, else go to Q9:

Q8. What impact has the introduction of the 20mph speed limit had on your travel to school/college? *[Interviewer – DO NOT PROMPT. Allow respondent to answer and code as necessary. If needed, probe using the following.]*

20mph speed limit has had no real effect on how I travel to school/college	<input type="checkbox"/> ₁
I walk / walk with my children more frequently	<input type="checkbox"/> ₂
I cycle / cycle with my children more frequently	<input type="checkbox"/> ₃
I now walk / walk with my children to the school/college,	<input type="checkbox"/> ₄
I now cycle / cycle with my children to the school/college	<input type="checkbox"/> ₅
I now let my children walk to school on their own	<input type="checkbox"/> ₆
I now let my children cycle to school on their own	<input type="checkbox"/> ₇
I drive / drive my children more frequently	<input type="checkbox"/> ₈
Other (please specify) _____	<input type="checkbox"/> ₉

If respondent stated they travel to work in Q1, ask Q9, else go to Q10:

Q9. What impact has the introduction of the 20mph speed limit had on your travel to work? *[Interviewer – DO NOT PROMPT. Allow respondent to answer and code as necessary. If needed, probe using the following.]*

20mph speed limit has had no real effect on how I travel to work	<input type="checkbox"/> ₁
I walk more frequently to work	<input type="checkbox"/> ₂
I cycle more frequently to work	<input type="checkbox"/> ₃
I drive more frequently to work	<input type="checkbox"/> ₄
I have reduced the amount I drive to work	<input type="checkbox"/> ₅
I use public transport more frequently to get to work	<input type="checkbox"/> ₆
Other (please specify) _____	<input type="checkbox"/> ₇

Q10. How satisfied are you with the implementation of a 20 mph speed limit in your area?

Very satisfied	<input type="checkbox"/>	1
Fairly satisfied	<input type="checkbox"/>	2
Neither satisfied or dissatisfied	<input type="checkbox"/>	3
Fairly dissatisfied	<input type="checkbox"/>	4
Very dissatisfied	<input type="checkbox"/>	5
Don't know	<input type="checkbox"/>	6

Q11. Can you tell me why you are [satisfied / dissatisfied] with the 20mph speed limit? [Interviewer – note respondents comments on scheme]

Now I would just like to ask you some classification questions:

Q12. Which of the following age groups do you fall under?

Interviewer: ask age group and complete gender.

	Male	Female
16-19	<input type="checkbox"/>	<input type="checkbox"/>
20-29	<input type="checkbox"/>	<input type="checkbox"/>
30-39	<input type="checkbox"/>	<input type="checkbox"/>
40-49	<input type="checkbox"/>	<input type="checkbox"/>
50-59	<input type="checkbox"/>	<input type="checkbox"/>
60-69	<input type="checkbox"/>	<input type="checkbox"/>
Over 70	<input type="checkbox"/>	<input type="checkbox"/>

Q13. Which of the following ethnic backgrounds describes you? [Interviewer – show card and code as necessary]

White (White British, White Irish, or any other white background)	<input type="checkbox"/>	1
Mixed (White and Black Caribbean, White and Black African, White and Asian, Any other mixed background)	<input type="checkbox"/>	2
Asian or Asian British (Indian, Pakistani, Bangladeshi, any other Asian background)	<input type="checkbox"/>	3
Black or Black British (Caribbean, African, any other black background)	<input type="checkbox"/>	4
Chinese or other ethnic group (Chinese, or any other ethnic group)	<input type="checkbox"/>	5
Refused	<input type="checkbox"/>	6

Q14. Please could you provide me with your home postcode? This will only be used to map the geographical representation of respondents taking part in the survey and for no other purposes.

Refused 99

Q15. Finally, do you have any further comments regarding the 20mph Limit scheme in your area?

Those are all of our questions, thank you for taking the time to participate in our research.

Details of Interview:

Location Zone		Date	
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