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SUMMARY

South Gloucestershire Council began installing vehicle activated signs in October 1998, following successful trials in the early 1990’s in Scole, Norfolk.

Vehicle activated signs had been erected in Scole to reinforce the existing 30mph speed limit. A year after installation, the mean vehicle speed in Scole had been reduced by nearly 6mph and the 85th percentile speed had been reduced by 8mph¹.

At the time of writing this report, thirty-three vehicle activated signs have been erected in South Gloucestershire. The types of signs are as follows:

- 17 signs erected within 30mph speed limits to reinforce the limits;
- 12 signs erected within 40mph speed limits to reinforce the limits;
- 3 signs erected on approaches to junctions to warn drivers;
- 1 sign erected on the approach to a school to warn drivers of the likelihood of the presence of children in the road.

The signs have been erected at sites either where there has been a high level of reported injury accidents relating to speed, or because of concerns about speed expressed by local communities.

An estimated £200,000 has been spent on providing and erecting the signs in South Gloucestershire. The cost of routine sign inspections and maintenance is expected to be about £8000 in 2003/04.

Data collected at the sites before and after the signs were installed show that, on average:

- the percentage of vehicles travelling above the speed limit has reduced by 21%
- eighty fifth percentile traffic speeds have reduced by 4mph
- average traffic speeds have reduced by 4mph, and
- three year accident numbers are estimated to reduce by 7%. (As there is not yet a full 3-year ‘after’ period for the accident data at most sites this figure has been achieved by multiplying the number of accidents that have occurred in whatever ‘after’ period exists into a three year equivalent figure.)

The apparent effectiveness of the signs in reducing traffic speeds is likely to result in requests for more signs to be put up where there are local concerns about speeding. In order to prevent a proliferation of the signs on the highway, it is suggested that guidelines are followed before the installation of a vehicle activated sign will be considered. The guidelines will relate to recorded injury accident numbers and existing traffic speeds.

The Council has purchased two portable vehicle activated signs that can be easily secured to an existing post or lamp column. These can be used to determine the suitability of a site for a permanent vehicle activated sign, collect speed data, and warn speeding traffic to slow down at particular selected sites. Consideration is being given to purchasing more of these signs, subject to provision of a revenue budget for operations and maintenance.

INTRODUCTION

Historical Context

The first of South Gloucestershire’s vehicle activated signs were installed on the A38 at Falfield and the A420 at Hanham in October 1998. There are now a total of thirty-three signs in South Gloucestershire.

Where have the signs been installed?

The signs have been installed at locations either where there has been a high level of reported injury accidents relating to speed or because of concerns about speed expressed by local communities.

What is the aim of the signs?

The aim of the signs is to encourage drivers to reduce their speed to the speed limit or an appropriate speed for the road layout. Research has shown that the lowering of vehicle speeds can reduce the number and severity of accidents.

HOW EFFECTIVE ARE THE SIGNS?

What kind of data is collected?

Appendix 1 summarises the data associated with each of the 33 signs. Data collected includes:
- sign locations
- the speed limit in force and and the speed at which the signs will be triggered
- the date each sign became operative, and
- ‘before’ and ‘after’ accident and speed data.

Results:

The speed data shows that the 85th percentile traffic speeds, average traffic speeds and the percentage of vehicles exceeding the speed limits in force have been reduced at nearly all the sites where data have been collected.

The data show that:
- The reduction in 85th percentile speeds varies from 1mph to 10mph, with an average reduction of 4mph across all sites where data have been collected;
- The reduction in average speeds varies from 1mph to 10mph, with an overall average reduction of 4mph across all sites where data have been collected; and
- The reduction in the number of vehicles exceeding the speed limit varies from 1% to 50%, with an average reduction of 21% across all sites where data have been collected.

Graphs 1 to 6 (Appendix 2) show the ‘before’ and ‘after’ traffic speeds at six sample sites. They demonstrate the reduction in the number of vehicles travelling at speeds in excess of the speed limit.

Graph 7 (Appendix 2) displays results of speed counts taken adjacent to the sign as traffic approached it in one direction, compared with traffic travelling in the opposite direction. The results clearly show the traffic speed approaching the sign is lower than the speed of the traffic in the non-functioning direction of the sign.

The three-year reduction in accidents across all sites is estimated at 7%. However it must be emphasised that this figure will almost certainly be subject to change, as there is not yet a full three year ‘after’ period for the accident data at most sites.
National research has shown that a 1mph reduction in average speeds can reduce accidents by 5%. As the overall average speed reduction at vehicle activated sign sites in South Gloucestershire is 4mph, it could be expected that accidents at the sites would reduce by 20%. A possible reason why the estimated accident reductions in South Gloucestershire are lower than this figure is because many of the signs have been installed at locations with either a very low or no recent history of injury accidents.

A report published by the TRL in 2000 (TRL548), ‘Vehicle activated signs – a large scale evaluation’ concluded that:
‘Vehicle activated signs appear to be very effective in reducing speeds; in particular, they are capable of reducing the number of drivers who exceed the speed limit and who contribute disproportionately to the accident risk, without the need for enforcement such as safety cameras.’

SIGNS IN USE IN SOUTH GLOUCESTERSHIRE

Two manufacturers, Coeval and Dambach, have supplied vehicle activated signs to South Gloucestershire. Both types of signs have received type approval from the Department for Transport (DfT). This means that the equipment has been authorised for use on the public highway.

The signs display a two-part legend, which may be a 30mph or 40mph roundel (Photo 1) depending on the speed limit of the road, or a standard warning triangle (Photo 2), and a message “SLOW DOWN”. When activated the fibre optics/LED’s light up and alternately display the two messages for a fixed time. Two pairs of amber lights above and below the legend also illuminate alternately.

The majority of the signs in South Gloucestershire have been installed at locations in 30mph and 40mph speed limits and display a message “SLOW DOWN” with a speed roundel showing the road’s speed limit. One sign erected in Yate has been sited on the approach to a school and displays two messages, alternating between “School” and “SLOW DOWN”, and activates at speeds above 20mph.

![Photo 1](image1.jpg) ![Photo 2](image2.jpg)
VEHICLE DETECTION AND TRIGGER SPEEDS

What methods of speed detection are used?

Two methods of detecting a vehicle’s speed have been used to activate the signs in South Gloucestershire:

1. The first employs a microwave, which is continuously beamed out from a detector that is mounted internally or externally on the sign. The beam is then reflected back by the targeted approaching vehicle and is received by the detector.

   This system has been used at sites where the speed limit is 40mph or less, as this appears to be the optimum range for the microwave detector. It has been found that certain characteristics of some vehicles such as their shape and colour can affect detection.

2. The second method uses induction loop technology where wire loops are placed across the carriageway before the sign.

   Induction loops have been installed at sites where speeds exceed 40mph with the loops placed 150 metres before the signs. Signs activated by loops have been used where there is a history of road traffic accidents at a junction and where the approach speeds on the main road are high.

   The A420 Tormarton crossroads at Marshfield (Photo 2) and the A420 at Toghill (Photo 3) are two such sites. Both sites are on fast roads where the national speed limit of 60mph applies. When activated, the signs display the junction warning sign symbol and the message “SLOW DOWN”.

In both systems, the difference between the transmitted and received times is calculated and the sign will be activated if the vehicle is travelling at or above the preset threshold speed.

What is the threshold trigger speed?

The threshold trigger speed is 34mph for sites with a speed limit of 30mph and 44mph for sites with a speed limit of 40mph.

Activation threshold speeds at sites on roads with a higher speed limit and sensitive sites such as schools have been set at 10mph below the speed limit of that road, ie 20mph in a 30mph speed limit and 50mph on roads with a 60mph speed limit.

For how long are the signs activated?

The legend displays for 4 seconds and its brightness can vary according to ambient lighting conditions, as a photosensitive cell controls this.
SIGN SITING

The siting of signs is crucial for them to be effective. They need to inform drivers clearly and precisely and allow them to react (ie slow down at an appropriate point). The general principles of sign siting (to be clearly visible and to inform) apply equally to this type of sign, but a number of other factors also need to be considered:

1. The microwave detector system needs a clear straight view of the approaching vehicles so that it can process and clearly display its message to the targeted driver in a suitable time and without confusing following drivers.
2. Good visibility to the signs has restricted their use in some cases, but other technical factors such as suitable power supply, insufficient clearance from the running carriageway and roadside vegetation have also had an effect.
3. To make the use of these signs more flexible they have been installed so that they can be easily relocated from one base site to another. A Poletech base and socket unit with integral power supply (Photo 3) has been employed as a standard means of fixing the post supporting the sign. Other signs have been carefully sited so that they can be rotated through 180 degrees and operate on traffic flowing in either direction. The signs are moved/rotated to an arranged programme throughout the year.

SIGN PURCHASE AND MAINTENANCE

Signs are generally purchased through individual scheme allocations in the Council’s Capital Works Programme. A revenue budget is needed to cover routine inspections and maintenance. Approximately £8000 will be needed for 2003/04 but this will need to be increased in future years as the number of signs on the highway increases.

SITE GUIDELINES

The DfT Traffic Advisory Leaflet 1/03 gives recommendations about the circumstances under which vehicle activated signs should be used. It recommends that:

- the signs should be considered only when there is an accident problem associated with inappropriate speed that has not been satisfactorily remedied by standard signing and where safety cameras and related signs are not a cost effective or otherwise appropriate solution, and
- that vehicle activated signs should only be used when it is clear that the problem cannot be remedied by improving the fixed signing.
The DfT suggest that the proven effectiveness of the signs in reducing traffic speeds is likely to result in requests for more signs to be put up where there are local concerns about speeding. In order to prevent a proliferation of the signs on the highway in the future, it is suggested that the following guidelines are used to assess a site before the installation of a permanent vehicle activated speed reminder sign is considered:

- Existing 85th percentile speeds are at least 10% above the speed limit plus 2 mph (eg 35 mph in a 30 mph zone) or at least 20% of drivers are exceeding the speed limit
- At least 4 personal injury accidents have been reported within 1km of the proposed site of the sign within the last 3 years, some or all of which may be attributed to inappropriate speed, and
- The problem cannot be remedied by improving the existing signing.

THE FUTURE

The following developments are taking place in vehicle activated sign technology:

- LED’s are now replacing fibre optics to display messages. These are brighter, require less energy and thus increase the impact of the sign.

- The next generation of signs will be more intelligent and able to collect and store the speed/date/time data as vehicles activate the sign. Continuous monitoring results would be useful for analytical and remedial purposes.

- Signs powered by solar and/or wind generated energy have been developed. This enables signs to be installed at sites without an electricity supply. One of these has recently been installed on the A46 on its southbound approach to the A433 junction (Photo on front cover of this document).

- New electronics will be more compact resulting in a less bulky and less intrusive sign (Photo 4).
PORTABLE VEHICLE ACTIVATED SIGNS

South Gloucestershire Council has purchased two portable vehicle activated signs. The signs use data collection software for gathering and storing up to 8 days of traffic monitoring information.

They are easily portable by car and, as it has its own integral power supply, it can be quickly and easily secured to an existing post or lamp column.

The portability of the sign makes it suitable for numerous applications. It could be used to determine the suitability of a site for a permanent vehicle activated sign, collect speed data, or warn speeding traffic to slow down at particular selected sites. It may also be used to supplement Police enforcement.

How long can they be left at a site?

The sign is robust and secure, and can be left unattended as it has sufficient battery power to function for up to twelve days before requiring a recharge. (Photo 5)

How do they work?

When operating, the sign detects an approaching vehicle and displays its speed, in LED technology, to the driver. It has been found that displaying the vehicle’s speed makes most drivers reduce their speed.

The sign also records details of its activations such as time, date, and speed of the vehicle. The message part of the sign can be switched off so that it can be used in its data-recording mode. The data can be downloaded on site to a computer or via a modem and used for analysis purposes.
## Appendix 1

### Monitoring of Vehicle Activated Signs

#### Sign Details

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<th>Accs After</th>
<th>3yr Equivalent</th>
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<td>B4060</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>0</td>
<td>1</td>
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<td>3</td>
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<td>-1</td>
</tr>
<tr>
<td>SPNN30</td>
<td>40</td>
<td>40</td>
<td>44</td>
<td>18.08.02</td>
<td>Gloucester Rd, Alveston</td>
<td>A38</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>4</td>
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<td>4</td>
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<td>-1</td>
</tr>
<tr>
<td>SPNN31/32</td>
<td>40</td>
<td>40</td>
<td>44</td>
<td>23.08.02</td>
<td>A38, Greatenend nr Thornbury</td>
<td>A38</td>
<td>2</td>
<td>13</td>
<td>15</td>
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<td>1</td>
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<td>-1</td>
</tr>
<tr>
<td>SPNN33</td>
<td>30</td>
<td>30</td>
<td>07</td>
<td>08.09.02</td>
<td>Brook Way,Brady Sb, SBNB, Kemperley Way</td>
<td>Uncld</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2,3</td>
<td>-1</td>
</tr>
</tbody>
</table>

### Summary of Interactive Sign Effectiveness

- % Reduction in Accs: 4
- % Above Spd Lmt: -21
- Av Mean Diff: 4

Av % Diff: 4.0mph
Appendix 2

GRAPH 1

A432 Badminton Road, Downend (southbound): 24 hour

No of vehicles

Speed bands (mph)

Vehicle Activated Signs in South Gloucestershire

10
Vehicle Activated Signs in South Gloucestershire

GRAPH 2

Shorthill Rd, Westerleigh (northbound): 24 hour speed data

No of vehicles

before 30.01.01

after 07.03.01

Speed bands (mph)
Vehicle Activated Signs in South Gloucestershire

**A420 Toghill (eastbound): 24 hour speed data**

- **24hr count (average)=5266**
- **85thile before = 63**
- **85thile after = 56**

- **Sign commissioned:** 21.08.01
- **Loops installed:** 08.04.02
- **Sign set:** 60mph
- **Speed limit:** National (60 cars)
  - **% above 60mph before:** 19
  - **% above 50mph after:** 4

---

**Graph 3:**

- **No of vehicles**
  - x-axis: Speed bands (mph)
  - y-axis: Number of vehicles

- **Lines:***
  - **-before 09.02.00**
  - **-after 29.08.01**
  - **-after 17.04.02**
  - **-after 08.08.02**

---

*Vehicle Activated Signs in South Gloucestershire*
Graph 4: A420 Marshfield (eastbound): 24 hour speed data

Graph showing speed distribution before and after the implementation of vehicle-activated signs. The x-axis represents speed bands (mph) and the y-axis represents the number of vehicles. The graph indicates a decrease in the percentage of vehicles exceeding 60 mph after the signs were commissioned.

Sign commissioned: 05.02.02
Sign speed setting: 50 mph
Speed limit: 60 mph
% above 60 mph before: 20
% above 60 mph after: 12
GRAPH 6

A431 Bath Road, Swineford (eastbound): 24 hour speed data

24hr count: 3515
85% before: 35mph
85% after: 36mph
Sign commissioned: 21.08.02
Speed limit: 30mph
% above 30mph, before: 49
% above 30mph, after: 43
Graph 7: B4465 Westerleigh Road, Pucklechurch (north and south bound): 24 hour speed data
(sign active in southbound S/B direction only)

Sign commissioned: 16.04.02
Sign speed setting: 34mph
Speed limit: 30mph
85% before: 38
85% after: 36
% above 30mph before: 67
% above 30mph after: 43

No of vehicles
0 200 400 600 800 1000 1200 1400 1600
Speed bands
0-16 16-21 21-26 26-31 31-36 36-41 41-46 46-51 51-56 56-60 >60

- before 26.09.01 S/B
- after 18.04.02 S/B
- after 23.08.02 S/B
- after 18.04.02 N/B
- after 27.08.02 N/B

Vehicle Activated Signs in South Gloucestershire