Welsh Government
Procedure & Advice Guidance
(PAG) 106/16

Llywodraeth Cymru
Welsh Government

Use of Vehicle Activated Signs and Speed Indicator Devices on the Trunk Road Network

Instructions for Use

This guidance document outlines: The criteria for using Vehicle Activated Signs and Speed Indicator Devices on Trunk roads in Wales; The design and technical specification of these signs and a monitoring regime to assess the effectiveness of these signs. This guidance is prepared by Welsh Government for use on the Trunk Road Network and should be read in conjunction with the Traffic signs Regulations and General Directions.

Document Control					
Version	Date	Status	Written	Checked	Approved
1	May 2016	Approved	AS	BB	RM

Table of Contents

1. INTRODUCTION

1.1 BACKGROUND

1.1.1 This guidance note outlines the criteria for using vehicle activated signs and speed indicator devices on trunk roads in Wales.

1.1.2 There is a well established link between vehicle speeds and road traffic collisions[1]. On rural roads, inappropriate speed is more likely to be a factor in collisions than excessive speed (i.e. speeding), therefore there is benefit in encouraging drivers to travel below the speed limit in certain situations. Welsh Government receives frequent correspondence regarding the speed of traffic, particularly in towns and villages, along with requests for vehicle activated signs and speed indicator devices.

1.1.3 Vehicle activated signs and speed indicator devices are electronic signs that can be used to address speeding, or inappropriate speed on the approach to an isolated highway feature, where there is evidence in support of their use.

1.1.4 Vehicle activated signs can also be used to improve road safety outside schools following the implementation of measures as part of the Safe Routes to Trunk Road Schools programme.

1.2 SPEED MANAGEMENT IN WALES

1.2.1 The Wales Road Casualty Reduction Partnership Site Criteria and Site Management Policy outlines the site types and criteria for speed management by the Police in Wales. That policy outlines the speed and collision criteria for Core sites (i.e. fixed cameras, mobile sites and routes), and Community Concern sites.

1.2.2 That document outlines criteria for a Core site, which is that there must be evidence of personal injury collisions and speeding (defined as 85th %ile speeds recorded at the speed limit plus 10% plus 2mph on urban roads, or 85th %ile speeds at the speed limit plus 5mph on rural roads). However, enforcement at Community Concern sites is possible with only a speeding problem, and concern about traffic speed being raised.

1.2.3 Speed data gathered between 2009 and 2014 as part of the speed limit review of all trunk roads in Wales indicates that around two fifths of the trunk road network would qualify as a Community Concern Site in terms of evidence of speeding. A further quarter of the network would meet the speed criteria for a Core Site.

Enforcement is not justified	Sections which meet the Speeding criteria for a Community Concern site	Sections which meet the Speeding criteria for a Core site
34%	40%	26%

Proportion of sections of the network where speed data meets criteria for enforcement

Note: the personal injury criteria for a Core site has not been applied as part of this analysis of the trunk road network.

1.2.4 The use of vehicle activated signs and speed indicator devices should be used alongside speed enforcement as part of a speed management plan for the trunk road network. This is covered further in section 6 of this document.

1.3 RESEARCH EVIDENCE

1.3.1 There has been limited research on the effect of vehicle activated signs and speed indicator devices, however the following paragraphs summarise the key recommendations from UK research and experience which have influenced the recommendations within this document.

1.3.2 TRL report 'Vehicle Activated Signs – A large scale evaluation'[2] recorded reductions in vehicle speeds of between 1mph and 7mph at sites where vehicle activated signs displaying a speed limit roundel were installed, without a change in speed limit. Vehicle activated signs with junction or bend warning signs achieved reductions of up to 7mph on the approach to these highway features. This report concluded that there was no evidence to suggest that drivers become less responsive to vehicle activated signs with time.

1.3.3 TRL report 'Effectiveness of Speed Indicator Devices on Reducing Vehicle Speeds in London'[3] recorded speed reductions of 1.3mph in the first week of a speed indicator device being installed, reducing to 1.2mph in the second week. This is supported by further research undertaken in 2010[4] which recorded typical speed reduction of 1.4mph with a speed indicator device. In the first week after the sign was removed, there was still a reduction in vehicle speeds of 0.2mph recorded. The report recommends a speed indicator device should be installed as part of a rotational programme for at least 2 weeks and a maximum of 3 weeks, and returned after a 'reasonable gap' that allows drivers to forget about the previous installation; 15 weeks is recommended.

1.3.4 A comparison of the effect of different messages displayed on speed indicator devices[5] shows that those speed indicator devices with a verbal message are most effective in reducing vehicle speed, and the effect was sustained even after the sign was removed.

1.3.5 In 2013, local authorities in Wales were approached for their experience of monitoring the effectiveness of vehicle activated signs and speed indicator devices via the CSS Wales Traffic Services Group. Responses were received from 8 of the 22 local authorities. Although initially successful in reducing driver speeds, the novelty and effectiveness of the interactive signs can soon wear off. The effect of those signs which display the actual speed of a vehicle (speed indicator devices) and flash at every vehicle which passes tend to wear off quickest. Issues raised included ongoing maintenance costs, pushing whole life costs of the signs up to £20,000 per sign for its life.

1.4 PERMITTED VEHICLE ACTIVATED SIGNS AND SPEED INDICATOR DEVICES

1.4.1 Based on the research and evidence above, vehicle activated signs with speed limit roundels or bend warning signs have been effective in reducing vehicle speeds and are recommended for use where speeding or inappropriate speeds on the approach to an isolated highway feature are identified as a road safety problem on the trunk road network. Vehicle activated signs shall be implemented as a permanent solution to address speed related collisions and speeding.

Photo: Vehicle Activated Sign with 30mph roundel

1.4.2 Speed indicator devices are more effective in reducing lower end speeding, and are recommended for use on the trunk road network in temporary installations where the signs are rotated across a number of sites, thereby maximising the effect on vehicle speeds.

1.4.3 The psychology of drivers has been considered in establishing choice of sign face to be displayed. A positive message is more likely to have the desired affect on driver and rider behaviour, therefore setting the activation level is key (refer to 4.5). Use of standard sign faces such as the speed limit roundel at sites where speeding is the issue to be addressed is recommended. Similarly at isolated highway features such as junctions where inappropriate approach speed results in collisions, a standard warning sign shall be used.

1.4.4 The table below shows the type of problem to be solved, with the appropriate sign type and message to be displayed:

Problem	**Display**	**Sign type**
Speeding	Speed limit roundel	Vehicle Activated Sign
	Text e.g. 'Diolch/Thank you'	Speed Indicator Device
Highway feature e.g. Junction or bend	Warning sign	Vehicle Activated Sign

Generally the signs are activated by approaching vehicles travelling faster than the trigger level set for the sign. The message will only display for a proportion of motorists, therefore vehicle activated signs and speed indicator devices shall only be used where all traditional engineering measures have been exhausted (refer to section 2.2).

1.5 EXCLUSIONS

1.5.1 This document does not cover the use of portable variable message signs at road works.

1.5.2 This document does not cover the use of vehicle activated signs or speed indicator devices on motorways or dual carriageways.

1.6 FUNDING

1.6.1 Capital funding for vehicle activated signs and speed indicator devices shall be sourced from Community Safety Programme, and the sites for all signs meeting the criteria in this guidance shall be prioritised in line with that programme.

2 SCHEME DEVELOPMENT

2.1 PROCESS

2.1.1 The need for a vehicle activated sign or speed indicator device to address a speed related road safety problem shall be identified by the Welsh Government, or it's Trunk Road Agents following analysis of personal injury collisions, or from complaints raised by members of the public. The process for considering whether a vehicle activated sign or speed indicator device should be provided follows the same methodology, set out in the flowchart in Figure 1 below.

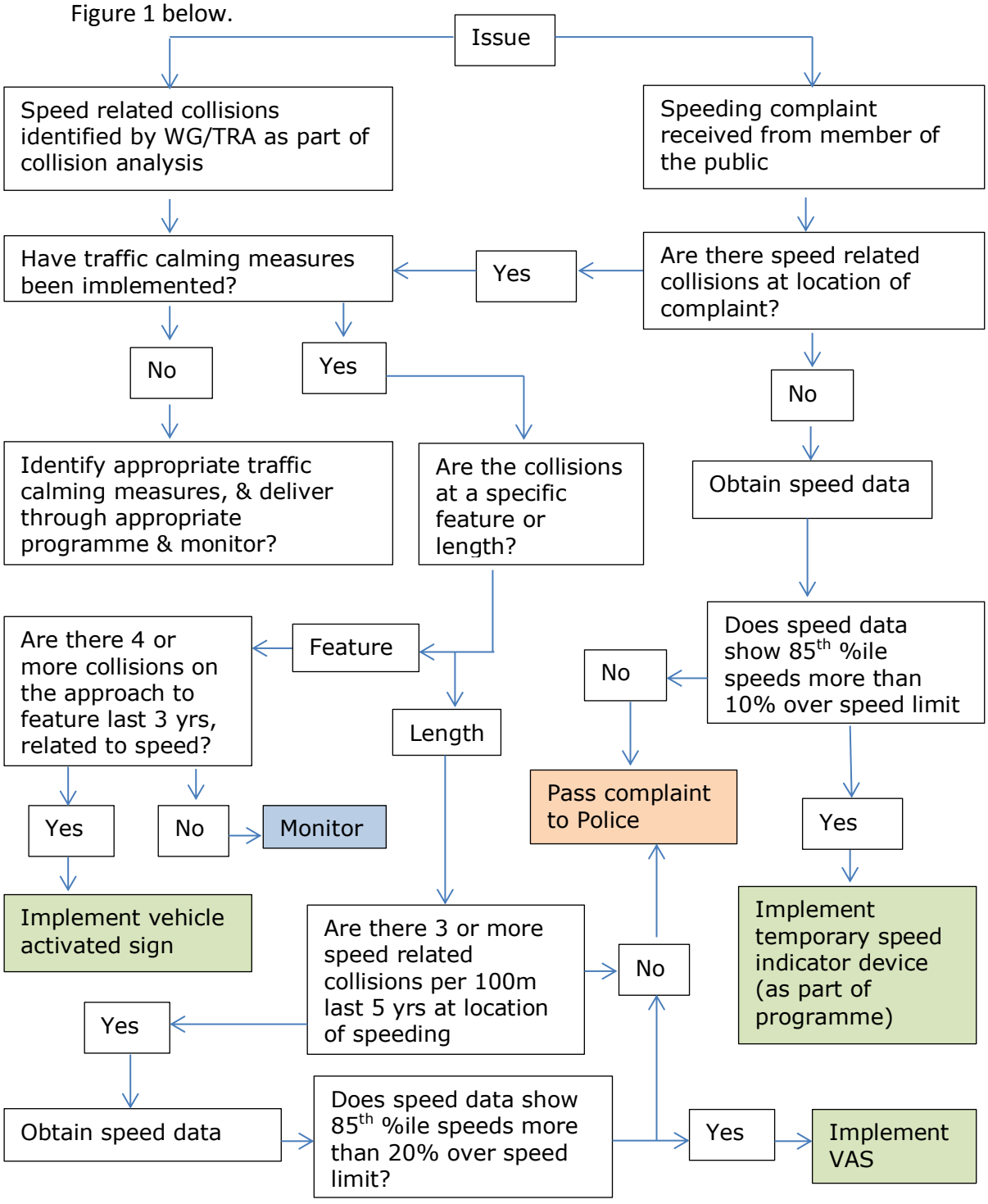

Figure 1 - Process for establishing whether a vehicle activated sign or speed indicator device should be provided at a location on the trunk road network

2.1.2 The need for a vehicle activated sign outside a school is not identified by analysis of speed related collisions, therefore the use of vehicle activated signs at schools on the trunk road sits outside the process in Figure 1. Refer to sections 2.2 and 3.4.

2.1.3 At sites where loss of control collisions are identified, SCRIM values should be checked. If the site is at or above the intervention level, then carriageway treatment should be considered before a vehicle activated sign or speed indicator device. If collisions remain following treatment, or the SCRIM intervention level is not met, a vehicle activated sign or speed indicator device may be considered in line with the above process.

2.2 TRAFFIC CALMING MEASURES

2.2.1 Traffic Signs Manual Chapter 4[6] makes reference to vehicle activated signs not being considered as a first phase of traffic calming or road safety measures; the same is true of speed indicator devices. Their use should be evidence led and in general terms they must only be used once all other 'standard measures' e.g. signing and road markings have been exhausted and are therefore limited to key sites.

2.2.2 If excess vehicle speeds are a problem then consideration needs to be given to implementing traffic calming features following the sequence below, before vehicle activated signs or speed indicator devices are used;

- Within towns and villages 'basic' traffic calming features must be considered in the first instance, i.e. speed limit, gateway signing and road markings.

- In order to reinforce the speed limit, preference must be given to using carriageway speed limit roundels, diag. 1065, at the gateways rather than 'ARAF SLOW'.

- At isolated highway features warning signs should be present and enhanced with backing boards and supported by 'ARAF SLOW' carriageway markings if appropriate. High friction carriageway surfacing should be considered in line with current guidance and policy.

- In the case of schools on the trunk road, Safe Routes to Trunk Road School schemes shall be implemented & monitored as part of a discrete programme of works prior to a vehicle activated sign being considered. A vehicle activated sign with sign face to diagram 545 shall not be provided on sections of trunk road where a part-time 20mph is has been provided as part of the Safe Routes to Trunk Road Schools programme.

- If the basic traffic calming features and warning signs have not achieved a reduction in vehicle speeds and additional measures are required, then physical features (such as horizontal narrowing of the carriageway

through refuges, islands or build outs) will provide longer-term speed reduction and must be considered as the second phase, in preference to vehicle activated signs, if road geometry permits. A minimum lane width of 3.65m shall be maintained in line with the Design Manual for Roads and Bridges (DMRB).

- In cases where vehicle speeds remain high entering the town or village, consideration must be given to enhancing gateway features or providing advance warning of speed limit, e.g. speed limit buffer zone.

2.2.3 If all of the above measures have been investigated and/or implemented and vehicle speeds or speed related collisions remain a problem, vehicle activated sign or speed indicator device can be considered. These signs must only be considered as supplementary measures to traffic calming.

2.2.4 Inappropriate speed at highway features shall be treated in a similar way, with all other standard signs and road markings relevant to the collision types being implemented and exhausted prior to a vehicle activated sign being considered.

3 CRITERIA FOR USE OF VEHICLE ACTIVATED SIGNS AND SPEED INDICATOR DEVICES

3.1 OVERVIEW

3.1.1 The following criteria have been developed to improve speed management on the trunk road network following the review of established enforcement options on the trunk road network and evidence outlined in 1.2 and 1.3 respectively.

3.1.2 Both the Welsh Government and the Police hold speed data for parts of the trunk road network. Speed data used in the assessment of the need for a vehicle activated sign or speed indicator device shall be less than 12 months old at the time of the assessment.

3.1.3 The data period used in support of a vehicle activated sign or speed indicator device must start after any collision mitigation or traffic calming works were implemented.

3.2 CRITERIA – VEHICLE ACTIVATED SIGNS FOR SPEEDING

3.2.1 Vehicle activated signs can be used to address speeding complaints along a length, but there must be

- a history of three or more speed related collisions in five years in 100m, and
- speed data must show recorded 85th percentile speeds at 20% over the speed limit.

3.2.2 Relevant speed related collisions are those where the police refer to speed in the description of the collision, or with contributory factor: 306 Exceeding the speed limit.

3.3 CRITERIA – VEHICLE ACTIVATED SIGNS AT HIGHWAY FEATURES

3.3.1 At isolated highway features, such as junctions or bends, there must a record of at least four speed related personal injury collisions in three years connected with the operation of the feature before a vehicle activated sign can be implemented. These sites are likely to have inappropriate approach speeds rather than speeds above the speed limit, therefore approach speed data is not part of the criteria, but is needed as part of the design process. Refer to section 4.5 on setting trigger points.

3.3.2 Relevant speed related collisions are those where the police refer to speed in the description of the collision, or with contributory factors:

306 Exceeding the speed limit;
307 Travelling too fast for conditions;
410 Loss of control; or
602 Careless, reckless or in a hurry.

3.4 CRITERIA – VEHICLE ACTIVATED SIGNS OUTSIDE SCHOOLS

3.4.1 Vehicle activated signs can be provided outside schools where there is evidence of one or more personal injury casualty of school age on the trunk

road within 100m of the frontage of the school in the last 5 years, and 5 years since road safety works (including Safe Routes to Trunk Road Schools programme) have been implemented.

3.4.2 Collisions outside a school do not need to be speed related, and there does not need to be a speeding issue.

3.4.3 Vehicle activated signs shall not be provided outside schools where part time 20mph speed limits are planned or have been implemented. Refer to 2.2.

3.5 CRITERIA – SPEED INDICATOR DEVICE

3.5.1 The criteria for implementing Speed Indicator Devices is more relaxed:

- there must be a record of complaints regarding speeding either received by Welsh Government or the police, and
- 85th percentile speeds recorded at more than 10% over the speed limit.

3.5.2 Speed Indicator Devices shall be erected temporarily as part of a programme across a number of trunk road sites which meet these criteria. Refer to section on time before rotation in 4.6.

3.6 AFFECT ON TRUNK ROAD SPEED MANAGEMENT

3.6.1 These criteria ensure that vehicle activated sign or speed indicator device can be provided at sites where speeding is more significant problem, and that their use is restricted such that the signs maintain the desired affect on drivers, i.e. drivers don't start ignoring the signs. Vehicle activated sign or speed indicator device can be used as part of the toolkit to reduce speeding and speed related collisions on the network.

<table>
<tr><td>Enforcement is not justified

34%</td><td colspan="2">Sections which meet the Speed criteria for a Community Concern site

40%</td><td>Sections which meet the Speed criteria for a Core site
26%</td></tr>
<tr><td colspan="2">Use of interactive signs is not supported

60%</td><td>Sections which meet the Speed criteria for a SID
20%</td><td>Sections which meet the Speed criteria for a VAS
20%</td></tr>
</table>

Table 2: Percentage of the network which potentially meets the speed criteria for enforcement, speed indicator devices or vehicle activated signs

3.6.2 Where speed related collisions are identified through analysis, or complaints about speeding are received from members of the public at sites which do not meet the criteria in 3.2 and 3.4, Welsh Government shall liaise with the Police over enforcement. Enforcement is unlikely to be appropriate where speed related collisions are recorded on the approach to an isolated highway

feature, as these are likely to be inappropriate speeds rather than speeds above the speed limit.

4 DESIGN

4.1 VEHICLE ACTIVATED SIGNS - SPEEDING

4.1.1 Vehicle activated signs planned to address speeding and speed related collisions over a length shall display the relevant speed limit roundel to diagram 670 of the Traffic Signs Regulations and General Directions[7] e.g. '30', '40', or '50'.

4.1.2 Reference shall be made to regulation 58 of the Traffic Signs Regulations and General Directions.

4.1.3 At sites where a 30mph roundel is proposed, this does not constitute a repeater as the sign will only be activated for those vehicles travelling faster than the trigger speed.

4.1.4 Only one vehicle activated sign shall be provided in each direction of trunk road travel.

4.2 VEHICLE ACTIVATED SIGNS – ISOLATED FEATURE

4.2.1 A vehicle activated signing scheme for an isolated highway feature should be designed along the following guidelines:

- Vehicle activated signs must display a warning sign appropriate to the hazard, for example, diagram 504.1, 505.1, 506.1, 507.1, 510, 512, 512.1, 512.2 or 513 as outlined in regulation 58(7) of Traffic Signs Regulations and General Directions.

- Vehicle activated signs can display 'ARAF SLOW' in conjunction with these symbols as this gives additional warning of the hazard.

4.2.2 Reference shall be made to regulation 58 of the Traffic Signs Regulations and General Directions.

4.2.3 It is possible to design a dual use sign with the warning sign illuminating for one scenario (e.g. when there are queuing vehicles) and 'ARAF SLOW' illuminating for vehicles travelling above the set trigger level.

4.3 SPEED INDICATOR DEVICES

4.3.1 The use of speed indicator devices should comply with the criteria detailed below:

- Speed indicator devices showing actual vehicle speeds are least effective in changing driver behaviour and are not commended in this guidance.

- Speed indicator devices can display either bilingual text such as 'Diolch/ Thank you' (to vehicles travelling below the speed limit), or

'Araf/ Slow' or 'Rhy gyflym/ Too fast' (to vehicles travelling above the speed limit).

- The use of red and green LEDs on a speed indicator device sign face are not prescribed.

4.4 SITING OF VEHICLE ACTIVATED SIGNS AND SPEED INDICATOR DEVICES

4.4.1 Vehicle activated signs displaying speed limit roundels must not be sited closer than 75m – 90m from the speed limit terminal signs due to the radar picking up vehicles outside the speed limit zone.

4.4.2 Speed indicator devices must be located within 400m of the site of recorded speeding.

4.4.3 The visibility criteria for any vehicle activated sign must be checked to establish that the sign will be activated over an adequate distance in advance of the feature and there is optimum visibility to the sign.

4.4.4 Vehicle activated signs in advance of isolated highway features shall be located at a distance from the feature specified in Appendix A, Chapter 4 Traffic Signs Manual. The sign must not interfere with visibility to existing warning signs.

4.5 ACTIVATION LEVEL FOR VEHICLE ACTIVATED SIGNS AND SPEED INDICATOR DEVICES

4.5.1 In order to be as effective as possible, it is advised that vehicle activated signs and speed indicator devices only activate for a proportion of drivers.

4.5.2 For vehicle activated signs and speed indicator devices targeting drivers travelling in excess of the speed limit, the sign needs to activate at a speed slightly below that at which enforcement would be carried out i.e. speed limit + 10%.

4.5.3 For vehicle activated signs warning of isolated highway features the signs need to be activated at a speed slightly above the speed at which it is judge appropriate to safely navigate the feature i.e. the speed at which an advisory speed limit would be set (refer to Traffic Signs Manual Chapter 4).

4.6 SPEED INDICATOR DEVICE - SIGN ROTATION

4.6.1 Evidence suggests that speed indicator devices provide a benefit in reducing vehicle speeds over the short term; approximately 1-2 weeks (refer to 1.3.3).

4.6.2 Speed indicator devices shall only be in place at a site on the trunk road network for a maximum of two weeks, and not returned within 3 months. Each shall have a speed indicator device operating on site for a minimum of 3 times per year.

4.6.3 In establishing the programme for rotating the speed indicator devices, consideration shall be given to sites on tourist routes, which are subject to

seasonal flow. Details of seasonal tourist routes are shown in Traffic Signs for Tourist Destinations on Trunk Roads and Motorways in Wales[8]. Speed indicator devices should be in place at times of year when they are likely to have most impact on drivers, i.e. highest AADT.

4.6.4 Once a site has been established, meeting the criteria in 3.5, the site shall be added to a programme of all sites in their area. The programme shall be developed giving consideration to the Trunk Road Agent boundaries, and their supply chains.

4.6.5 The programme shall be developed giving consideration to the initial Capital cost of establishing a speed indicator device site, and the Revenue cost of moving the signs. Capital costs shall be funded through Community Safety Programme.

5 TECHNICAL REQUIREMENTS

5.1 TRAFFIC DETECTION

5.1.1 Some vehicle activated signs and speed indicator devices have the facility to record traffic speeds. This is a useful tool in measuring the effectiveness of the sign and gathering general traffic information which has multiple uses for managing the trunk road network, speed limit review, informing future policy and decisions to retain this type of asset and planning development control. It is preferable to be able to obtain this data through remote monitoring, removing the need for a site visit. All vehicle activated signs and speed indicator devices used on the trunk road network in Wales shall have this capability.

5.2 LEGAL STATUS

5.2.1 Vehicle activated signs are classed as supplementary signs to the existing signs designated within the Traffic Signs Regulations and General Directions because they only activate for a certain percentage of the traffic passing the sign and therefore they can not replace the existing warning or speed limit signs.

5.2.2 In the same way if a collision occurred when the sign had not activated, the stated position is that the sign only activates for a proportion of the traffic and is therefore not providing primary warning of the hazard or feature.

5.2.3 In addition the sign plate, legend and LED colours forming the sign must comply with the Traffic Signs Regulations and General Directions.

5.3 OWNERSHIP

5.3.1 Vehicle activated signs and speed indicator devices placed in the highway are part of the highway authority asset. They are owned by the highway authority, or in certain cases by a safety partnership (highway authorities and police authority) and their use and site location must be authorised by the highway authority in the same way as any other traffic sign. In the case of the trunk road and motorway network in Wales the highway authority is the Welsh Government. The Welsh Government does not permit the installation of any signs owned or part owned by community councils or local groups. Signs erected outside the highway require planning permission and the planning authority would need to consult with the highway authority. In such circumstances if adjacent to the trunk road the Welsh Government will direct the planning authority to refuse permission as these signs would replicate or conflict with highway signs.

5.4 BILINGUAL SIGNS

5.4.1 All text used on vehicle activated signs and speed indicator devices must be bilingual and the Welsh language text displayed as to be read before the English language text[9]. This applies to both fixed text on the sign face and any LED message used as part of the activated display.

5.5 ENVIRONMENTAL CONSIDERATIONS

5.5.1 Warning signs by their very nature need to have visual impact to be effective to road users. However this visual impact needs to be considered in the context of the setting of the road either within the landscape or streetscape, from a "face on" and "sideways" perspective. This consideration should include longer vistas as electronic signing can be seen from considerable distances and therefore may have a visual impact beyond the road corridor. In addition their impact on any statutory or policy designations, such as areas of outstanding natural beauty, conservation areas, historic monuments, landscapes of historic interest, special landscape areas and designated dark skies need to be considered and addressed.

5.5.2 The environmental impact of vehicle activated signs and speed indicator devices must be considered and the 'pros and cons' judged against standard features taking into account sign proliferation, excessive use of red surfacing and road markings.

5.5.3 Within the Snowdonia National Park, Brecon Beacons National Park and Pembrokeshire National Park the National Park Authority must be consulted on the final proposal, prior to implementation.

5.6 ELECTRICITY SUPPLY

5.6.1 The Trunk Road Agent's Street Lighting Engineer should be consulted with regard to new sites, especially in relation to power supplies. Vehicle activated signs and speed indicator devices must be added to the street lighting asset inventory database for energy, data management, inspection and maintenance purposes. Electrical safety inspections must be carried out at the required frequency.

5.6.2 Battery life is dependant upon the number of times the sign is activated. Generally units can operate up to 14 days with a standard battery pack and so this should also be incorporated into any program for deployment of speed indicator devices.

5.6.3 It is preferable therefore to provide vehicle activated signs and speed indicator devices with a mains power supply, e.g. with a connection to a nearby lighting supply cabinet.

5.6.4 To facilitate moving speed indicator devices it is recommended that the sign posts are fitted with a socket allowing signs to be plugged in rather than having to carry out specialist electrical connections each time. Consideration should be given to the use of vandal proof sockets as appropriate. It is desirable for the sockets to be at a minimum height of 2.6m.

5.6.5 Attachment of vehicle activated signs and speed indicator devices to lighting columns will not normally be permitted, advice must be sought from the Trunk Road Agent's Street Lighting Engineer. New lighting columns are specified in accordance with BS EN 4014 and are only designed to accept the wind loading of a $0.3m^2$ attachment fixed at a minimum of 2.1m height.

Existing lighting columns on the trunk road network vary in age, height and type of material. There is no way to determine the level of fatigue or predict the premature ageing of columns as a result of additional load and stress induced by attaching a sign.

5.6.6 Safety inspections in accordance with Trunk Road Maintenance Manual requirements must to be carried out on permanent vehicle activated signs by the Trunk Road Agents and shall include noting any loss, damage or malfunction.

5.7 ROAD SAFETY AUDIT

5.7.1 A road safety audit in line with HD 19 will need to be carried out at new sites.

5.8 VEHICLE RESTRAINT SYSTEMS

5.8.1 The sign shall be assessed in line with TD 19 to establish the need for a vehicle restraint system.

6 SPEED ENFORCEMENT

6.1 ENFORCEMENT AND INTERACTIVE SIGNS

6.1.1 A combination of vehicle activated sign or speed indicator device plus enforcement is likely to be quite powerful in changing driver behaviour, however there is a balance in achieving the right number of vehicle activated sign and speed indicator device sites and enforcement on the network.

6.1.2 At sites where enforcement does not currently take place, the appropriate data shall be assessed in line with the criteria at 3.2 and 3.5 for a vehicle activated sign or speed indicator device. If these criteria are met, the vehicle activated sign or speed indicator device shall be provided and the effect monitored (see section 7) prior to a decision about the need for enforcement is taken.

6.1.3 At sites where enforcement currently takes place, and the criteria in 3.2 and 3.5 are met Welsh Government shall discuss the level of enforcement with the Police prior to making a decision on the need for a vehicle activated sign or speed indicator device.

6.1.4 Any combined effect of education through signs, and enforcement should be monitored through the annual site reviews, and any decision to remove the vehicle activated sign or speed indicator device must be evidence led.

6.1.5 Where traffic speeds do not meet the threshold for implementing a vehicle activated sign or speed indicator device (refer to 3.2 and 3.5) Welsh Government shall discuss the site with the Police to establish whether enforcement can be introduced. The effect of this enforcement shall be monitored and managed in line with a separate process, outside the remit of this document.

6.2 POLICE OWNED SPEED INDICATOR DEVICES

6.2.1 Note that Neighbourhood Policing Teams across Wales have speed indicator devices which they deploy temporarily at sites where they have received speeding complaints, including across the trunk road network. That activity is down to individual police force protocol, and therefore outside the remit of this document.

7 MONITORING

7.1 VEHICLE ACTIVATED SIGNS

7.1.1 Vehicle activated signs are permanent solutions to an ongoing established problem. Their effectiveness in reducing vehicle speeds and speed related collisions shall be monitored for 3 years post implementation. Speed data shall be collected on an annual basis to monitor the effectiveness of the sign.

7.1.2 Care shall be taken to ensure that comparison of before and after collision data considers the same collision types. In the case of isolated highway features, the speed data obtained during the design stage shall be compared to speed data post implementation.

7.1.3 If there has been a positive effect on speed and/or speed related collisions, the sign shall be retained.

7.1.4 If speeds and/or collisions have increased, then this solution has not been effective/achieved the desired outcomes. The following questions should be asked:

- Is the sign in the right place – check visibility
- How often is the sign being triggered? Is the activation speed correct?
- Is the sign giving the right message to drivers i.e. is it relevant to the collision types?
- Is speed enforcement appropriate and justified at this location (working with the Police)?

Action shall be taken accordingly before the site is decommissioned.

7.1.5 At sites where speeds remain above the speed limit, the need for enforcement shall be assessed in line with the Wales Road Casualty Reduction Partnership Site Criteria.

7.2 SPEED INDICATOR DEVICES

7.2.1 Speed indicator devices are temporary solutions to an established problem. Their effectiveness is likely to be short term; therefore any monitoring which takes place needs to be undertaken at both the time of operation, and within a month of the sign being removed.

7.2.2 Sites shall be part of a speed indicator device programme for at least 3 years before consideration is given to removing the site from the programme.

7.2.3 Data for the three years prior to the site being on the speed indicator device programme and three years after shall be compared to establish the effect of the speed indicator device.

7.2.4 If there is a reduction in 85th percentile vehicle speed the site shall remain on the speed indicator device programme.

7.2.5 If there has been no change in 85th percentile vehicle speeds, or if the speeds have increased, the site will be discussed with the Police with a view to introducing enforcement.

7.3 DECOMMISIONING SIGNS

7.3.1 Communities are generally reluctant to loose this asset type once it has been provided, therefore expectations must be managed particularly in terms of temporary sites, and any decisions to remove 'permanent' signs must be must be evidence led and explained to communities before signs are removed.

7.3.2 Guidance must be sought from the Trunk Road Agent's Street Lighting Engineer prior to decommissioning of signs in order to update asset inventory and decommissioning any electrical supplies to the equipment.

7.3.3 Note that where vehicle activated signs and speed indicator devices are provided at speed enforcement sites, the Police may also collect speed data/wish to share Welsh Government's speed data for that section of road.

7.4 GUIDANCE UPDATES

7.4.1 The affect of this guidance on road safety and speed management through the implementation of vehicle activated signs and speed indicator devices on the trunk road network shall be monitored, and where necessary changes will be made accordingly.

8 CASE STUDIES

8.1 BACKGROUND

8.1.1 The following paragraphs outline case studies where vehicle activated signs have been used on the trunk road network, prior to the criteria in this document being established. Their purpose varies from collision mitigation to speed management. The case studies are provided for information only, demonstrating different applications and effects.

8.2 A40(T) LLANDEWI VELFREY

8.2.1 The A40 through Llanddewi Velfrey is a single carriageway with narrow footways on either side. Complaints have been received over the years regarding speed of traffic and concerns for the safety of pedestrians using the footways being clipped by passing HGV traffic.

8.2.2 Two permanent vehicle activated signs displaying the 40mph warning sign and 'ARAF SLOW' were erected on the side of the A40 at either end of Llanddewi Velfrey, just within the gateway to the 40mph limit.

8.2.3 The change in recorded speeds showed a decrease in 85th %ile speeds at either end of Llanddewi Velfrey following the installation of the vehicle activated signs at all but one location.

Location	Dir.	Recorded Speed (MPH)	
		Mean	85%ile
Before Data (July 2009)			
Near sign at eastern edge of village	w/b	40.1	46.6
Near sign at eastern edge of village	e/b	41.3	46.5
Near Commercial Cross (western edge of village)	w/b	N/A	46.0
Near Commercial Cross (western edge of village)	e/b	N/A	42.0
After Data (July 2010)			
Near sign at eastern edge of village	w/b	37.8	44.1
Near sign at eastern edge of village	e/b	38.5	44.7
Near Commercial Cross (western edge of village)	w/b	33.9	38.9
Near Commercial Cross (western edge of village)	e/b	40.1	45.6

8.3 A470(T) TAN LAN, NORTH OF LLANRWST

8.3.1 Tan Lan was established as a site as it had a poor accident record (8 injury accidents including a fatal) and the existing warning signs did not appear to have reduced the number of collisions occurring on a sharp bend located south of relatively straight section of the A470 where traffic speeds were high. A major improvement scheme was planned within the trunk road

forward program and therefore further on site improvements would not be cost effective.

8.3.2 A permanent vehicle activated bend warning sign was installed with the level of activation set by using a police advanced driver to drive the bend on numerous passes and set the activation level for the sign accordingly.

8.3.3 On completion of the major improvement scheme this section of the A470 was de-trunked and the sign removed.

Location	Dir.	Recorded Speed (MPH)	
		Mean	85%ile
Before Data (August 2005)			
Tan Lan vehicle activated sign	s/b	38.4	45.0
Tan Lan vehicle activated sign	n/b	39.9	45.6
After Data (April 2006)			
Tan Lan vehicle activated sign	s/b	35.5	40.9
Tan Lan vehicle activated sign	n/b	34.7	42.9

8.4 A470(T) DOLWYDDELAN

8.4.1 An environmental traffic management scheme was implemented in Dolwyddelan due to the sensitive environmental setting of the village with the Snowdonia National Park. The traffic calming scheme relied on textural differences in the carriageway surfacing and whilst visually in keeping with the setting did not produce significant reductions in vehicle speeds.

8.4.2 Instead of installing further traffic calming it was judged that 1 vehicle activated sign would be visually less intrusive than other features, such as red coloured carriageway surfacing. Whilst the trunk road alignment was predominantly straight through the village the main activity centred around a cross road junction in the village centre.

8.4.3 The permanent vehicle activated sign was installed prior to the junction in order to ensure traffic speeds were brought down at the location most critical in terms of potential traffic conflicts.

8.5 A494(T) / A5(T) JUNCTION DRUIDS, WEST OF CORWEN

8.5.1 At this site there was a problem for vehicles emerging from a side road access close to the signalized junction, which had very poor visibility towards the junction. Due to its location and alignment the side road junction could not be included within the timing phases of the signalized interchange.

8.5.2 A vehicle activated sign was designed to warn motorists on the main carriageway of a vehicle waiting at the side road junction. A vehicle waiting in the side road would trigger a sensor which would then initiate the warning sign on the main carriageway to activate if a vehicle was approaching the junction on the main carriageway. This alerted the driver on the main

carriageway to the presence of the waiting vehicle so that they could modify their speed approaching the junction. If the waiting vehicle pulled out of the side road the vehicle on the main carriageway would be travelling at a speed slow enough to stop in time.

8.5.3 Since implementation there have not been any further collisions to date.

8.6 A40(T) KESTREL INN, SOUTH OF BWLCH

8.6.1 This site had a history of serious and fatal collisions. Collisions were a combination shunts and loss of control. The site is within a national speed limit section of highway, on a bend and has a public house restricting visibility on the inside of the bend with a side road and private accesses on the outside of the bends. The shunt type collisions involved vehicles waiting to turn right into the junction and accesses with following vehicles unable to stop safely, with loss of control collisions being due to inappropriate speed around the bend.

8.6.2 Prior to a proposed major carriageway realignment scheme and as part of a range of interim measures including anti-skid and enhanced signing, carriageway loops were fitted at to cover the right turn manoeuvres and linked to a vehicular activated sign to the east of the Kestrel Inn, before the bend. In the event of stationary vehicles waiting to turn right off the trunk road and into the substandard side road and accesses, a 'Queues Likely' warning was triggered to illuminate for approaching vehicles. The vehicle activated sign also includes a 'Bend Ahead' warning sign, which illuminates when the 'queues likely' sign is not activated and the integrated speed radar identifies vehicles travelling in excess of 50mph. In both cases an 'ARAF/SLOW' plate illuminates with the warning sign.

8.6.3 This provided an opportunity for motorists in the higher speed percentiles to adjust their speed accordingly for reduced stopping distance in the eventuality of slow moving vehicles accessing the trunk road via the pub car park or side road junction.

8.6.4 In the 11 years since installation of the measures there have been 2 fatalities, neither of which were related to the type of collisions the measures were designed to prevent.

Annex A

Welsh Government
Vehicle Activated Sign and Speed Indicator Device – Screening Checklist

Date of completion:

Name of site:

Speed Limit Review Site ID:

Within towns and villages, have the following 'basic' traffic calming features been implemented:

	Y/N
Speed limit	
Gateway signing	
Road markings	
Carriageway speed limit roundels, diag. 1065, at the gateways rather than 'ARAF SLOW'	
Physical features (such as horizontal narrowing of the carriageway through refuges, islands or build outs)	
If not already provided, is there sufficient road width for these be provided?	
Enhanced gateway features (anything more than basic terminal signs is considered 'enhanced')	
Advance warning of speed limit, e.g. speed limit buffer zone	

At isolated highway features, are the following measures in place:

	Y/N
Warning signs should be present and enhanced with backing boards	
'ARAF SLOW' carriageway markings if appropriate	
High friction carriageway surfacing (should be considered in line with current guidance and policy)	

Submit completed checklist to Welsh Government.

References

1 Inappropriate Speed, RoSPA, January 2011

2 Vehicle-activated signs – a large scale evaluation, TRL Report TRL548, 2002

3 Effectiveness of Speed Indicator Devices on Reducing Vehicle Speeds in London, TRL Published Project Report 314, 2008

4 Effectiveness of speed indicator devices: An observational study, L Walter, j Broughton, 2010

5 Evaluation of different types of dynamic speed display signs, T Gehlert, C Schulze, B Schlag, 2011

6 Traffic Signs Manual Chapter 4

7 Traffic Signs Regulations and General Directions

8 Traffic Signs for Tourist Destinations on Trunk Roads and Motorways in Wales, Welsh Government, 2013

9 Welsh Language Measure, 2011