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Policy and Guidelines

Vehicle Activated Signs

D22#526875
June 2024

Authorisation

As Manager Traffic Management Services, I authorise the issue and use of these Policy and Application Guidelines for Vehicle Activated SIgns in Western Australia

MANAGER TRAFFIC MANAGEMENT SERVICES

Date: 25/07/2024

Contents

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Custodian	Traffic Services Manager
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Amendments

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0	October 2021	Document Developed	All
1	May 2022	Local Government Authority	Section 9
2	June 2024	Removal of Requirement for SIDs to be Temporary	Section 9

1 ROLES & RESPONSIBILITIES

Role	Responsibility
Manager Traffic Management Services	Owner of this document. Approves changes and updates.
Traffic Services Manager	Custodian of this document. Reviews and recommends updates.
Regional Offices	Provides advice and information to assist in the assessment of potential VAS sites.
Road and Traffic Engineering Branch	Design of a traffic sign not currently listed in AS1742 or Main Roads sign index
Road Safety Branch	Provide advice and information to assist in the assessment of potential VAS sites.
Principal Electrical Standards Engineer	Ensures design compliance with electrical standards.
Manager Project Development	Considers the suitability of various VAS treatments as per project development and recommends for approval.
Manager Intelligent Transport Systems	Ensures compliance for network operations and connectivity with existing systems.

2 DEFINITIONS

Term	Definition
Activation Condition	A condition or set of conditions that need to be met prior to the sign being triggered
Delivery	The technology used to deliver the message
Local road	A road owned and managed by a Local Government
Road sign	Means a board, plate, screen, road marking, or other device, whether or not illuminated, displaying words, figures, symbols or anything else to direct or warn traffic on, entering or leaving a road.
Speed Indication Device	A sign activated by a vehicle which provides information to the driver or rider of that vehicle about whether they are travelling above or below a trigger speed (which is usually the speed limit).
State Roads	Highways and main roads ("State roads") controlled by Main Roads Western Australia. Maps of State roads can be obtained from Main Roads' website at (www.mainroads.wa.gov.au)
Target	The road user group to which the message on the VAS applies
Traffic Sign	Means one of the road signs, marks, structures or devices set out in Schedule 2 or 3 (of the *Road Traffic Code 2000*) placed, or erected, on or near a road
Trigger	An event that causes the VMS to display.
Vehicle	(a) every conveyance, not being a train, vessel or aircraft, and every object capable of being propelled or drawn, on wheels or tracks, by any means; and (b) where the context permits, an animal being driven or ridden;
Vehicle Activated Sign	A sign activated by a vehicle or third party that imparts information to some or all road-users at a particular location.

3 PURPOSE

The purpose of this Policy document is to guide the application, installation, modification, or removal of Vehicle Activated Signs (VAS) on all roads in Western Australia.

4 SCOPE

This Policy document applies to the approval of all VAS installations or modifications on all roads, with the exception of:

- Side Road Activated Sign Systems
- VAS which are part of a wider road management system, i.e., Smart Freeways.
- Signage installed as part of an approved temporary traffic management plan

As shown in Figure 1, this Policy document is the top-level in a suite of four documents that progressively define VAS in greater detail. In absence of any of these documents not being finalised or being reviewed, advice needs to be sought from Principal Electrical Standards Engineer or Manager Intelligent Transport Systems.

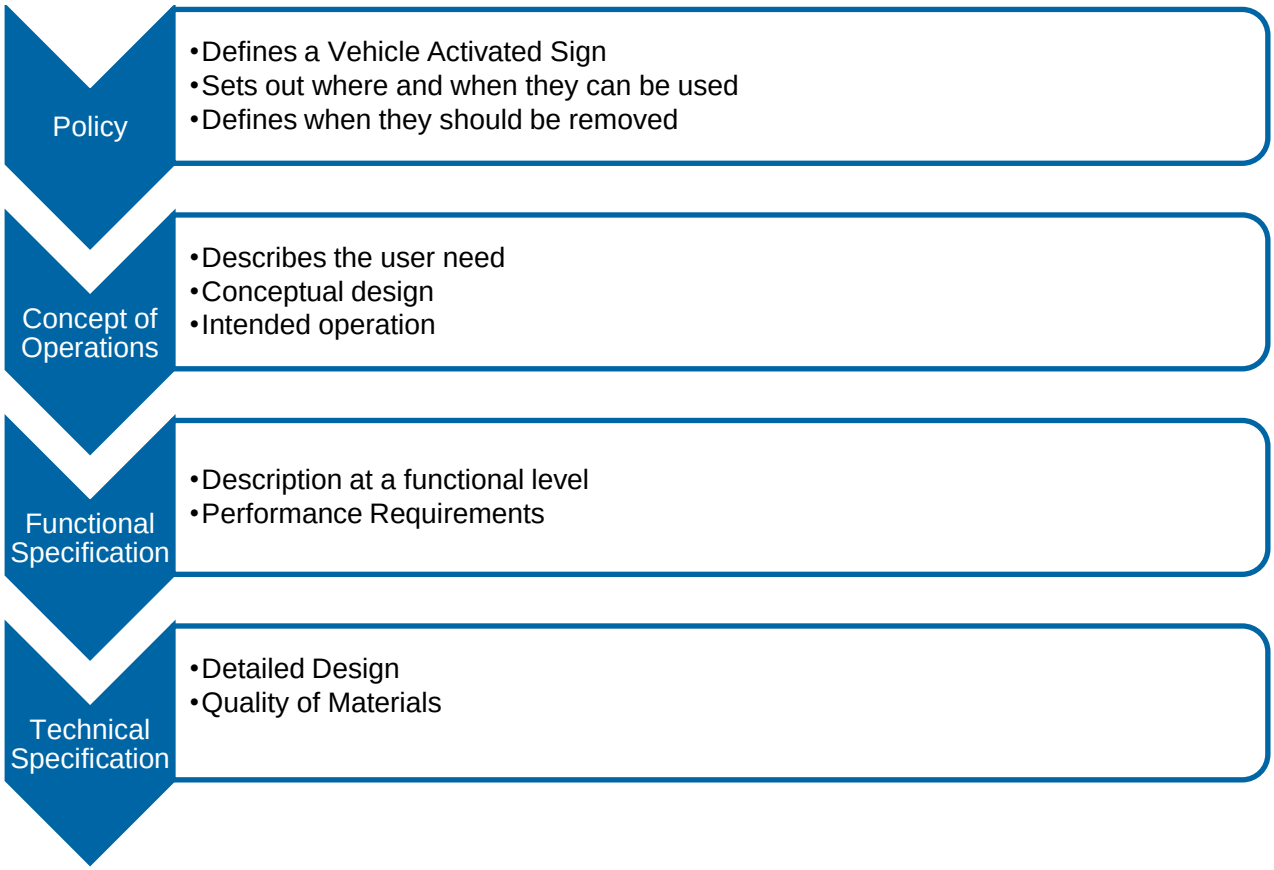


Figure 1: VAS suite of documentation

5 CONTEXT

5.1 What is a VAS?

A VAS is a mechanism for imparting information to road-users that reduces an identified risk by influencing behaviour. Some examples of VAS are shown in
Figure 2. VAS may be used to warn of an upcoming hazard or provide specific instructions to a driver.

Figure 2: Some examples of VAS

VAS is usually activated (triggered) by a vehicle[1] which is approaching a hazardous situation. The sign is then activated for a short period of time before returning to a blank condition after the message is no longer required. Whilst most applications use an LED sign to display the message, this is not a requirement. For example, the hazardous situation can be highlighted through enhancing static road signs with alternately flashing orange lights (wig-wags) as shown in Figure 3.

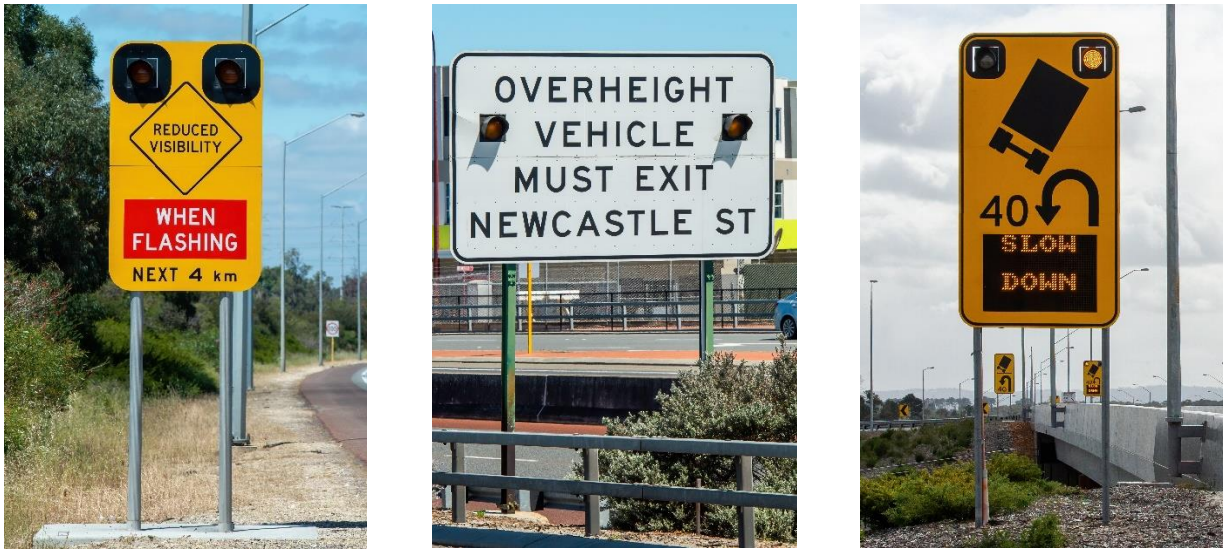


Figure 3: Enhanced static road signs

[1] In this context, a vehicle can include all types of road users, e.g., cyclists and pedestrians

Speed Indication Devices (SID) are a type of VAS that either display the speed of the vehicle or indicate to a driver that they need to Slow Down. These devices are commonly used as part of local area traffic management or temporary traffic management for roadworks. Examples of SID are presented in Figure 4.

Figure 4: Examples of Speed Indication Devices

In terms of technology, there is no practical difference between VAS and SID. However, SIDs are only for use at Roadwork sites or on local roads. Guidance on the use of SID is presented in Section 9.

5.2 What types of VAS are there?

There are three types of VAS:

- Those activated by Vehicle Speed
- Those activated by Vehicle Presence
- Those activated by a Third Party, i.e. a non-road-user (e.g., weather)

5.2.1 Activated by Vehicle Speed

This type of VAS is activated by a vehicle travelling above a pre-determined activation speed. The VAS gives sufficient warning ahead of a known hazard, so the driver can modify their speed to a safe level before encountering the hazard.

The message displayed on the VAS is usually a combination of the words “Slow Down” either with a Speed Limit Roundel or an appropriate warning sign.

Figure 6: Vehicle Speed Warning Device

For SID, the speed of the vehicle and/or a symbol or message is displayed when the vehicle is travelling less than the speed limit. If the vehicle is travelling above the speed limit, only an symbol or message is displayed (see Section 9).

5.2.2 Activated by Vehicle Presence

Activated by the presence of a vehicle, this type of VAS can be used to protect road-users from hazards that are:

- Permanent
- Temporary or Transient.

As shown in Figure 3 (centre image), an example of a permanent hazard is some form of infrastructure, e.g., a tunnel with low height clearance. In this case, the VAS would alert drivers of over-height vehicles that their vehicle is too tall to enter, and that other action is required (to Stop or Divert). The VAS targets vehicles that are too tall for the tunnel.

A further example is presented in Figure 7 where an enhanced static road sign is used to alert drivers of a low bridge.

Figure 7: Height Clearance Warning Device

An example of a temporary or transient hazard is shown in Figure 8 . The hazard only occurs when fog covers the road and visibility is reduced. If there is no fog, then the hazard is not present, and the VAS is not activated.

Figure 8: Temporary Hazard Warning Device

In the above cases, the hazard is the presence of the vehicle, rather than speed.

5.2.3 Activated by Third Party (Non- Motorist)

This type of VAS is activated by pedestrians near crossing locations (e.g., Wig Wags) or wildlife near or on the carriageway. Other events (e.g., inclement weather, smoke) also can trigger/ activate a VAS. While not activated by a vehicle, the basic principle is the same: Imparting dynamic information about a hazard to the motorist.

5.3 What are the benefits of VAS?

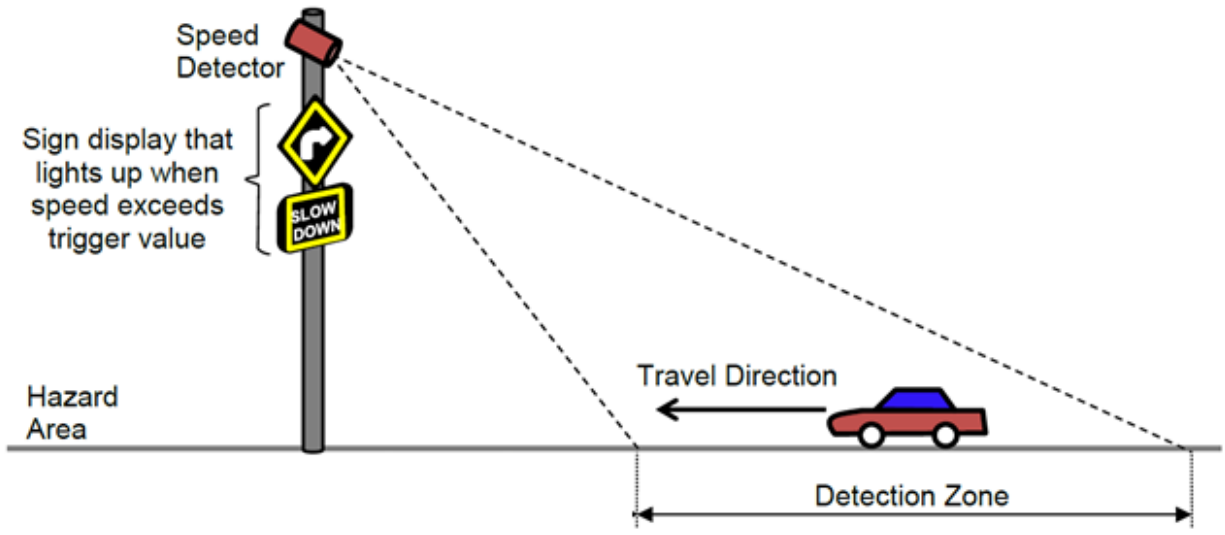
Research[2] has shown that the appropriate installation of VAS results in a decrease in speed (Mean, 85th Percentile) and a significant reduction in serious injuries post installation.

The fundamental benefit of installation of VAS it to alert drivers as they are approaching a hazard and take necessary action to safely navigate through the hazard. The following are situations where VAS installation is typically considered:

- Inclement weather
- Vehicles speeding through a section of road
- Road geometry features identified as unavoidable hazard and cannot be addressed by static signage alone

5.4 What comprises a successful VAS system?

In its simplest form a VAS comprises a detector and an electronic sign or enhanced static sign. When the detector identifies a pre-determined hazardous situation involving a vehicle, it activates the sign to display an appropriate message, or activate flashing lights, for a pre-determined period. Figure 6 shows a typical installation activated by vehicle speed. A VAS triggered by the presence of a vehicle or third party would have a similar arrangement with the speed detector replaced by a vehicle presence detector.



[2] Makawasha and Turner, "Evaluating Vehicle Activated Signs on Rural Roads", ARRB 2014

Figure 9: Illustrative VAS installation

(Figure adapted from NSW Roads and Maritime Services Specification No. TSI-SP-066)

The detector should only trigger the message or flashing lights when the hazardous situation is detected. The message should be simple to understand (limited to two pieces of information, e.g., an image and a short text message) and designed to influence driver behaviour. Ideally, the message needs to be targeted. This means that, depending upon the hazard, the sign is only activated when triggered by a particular group of road users.

6 POLICY GENERAL PRINCIPLES

According to the principle of the Hierarchy of Road Safety Controls (see Figure 7 below) the most effective way of managing a hazard is to eliminate it. VAS do not eliminate the hazard; they reduce the risk of the hazard by influencing behaviour.

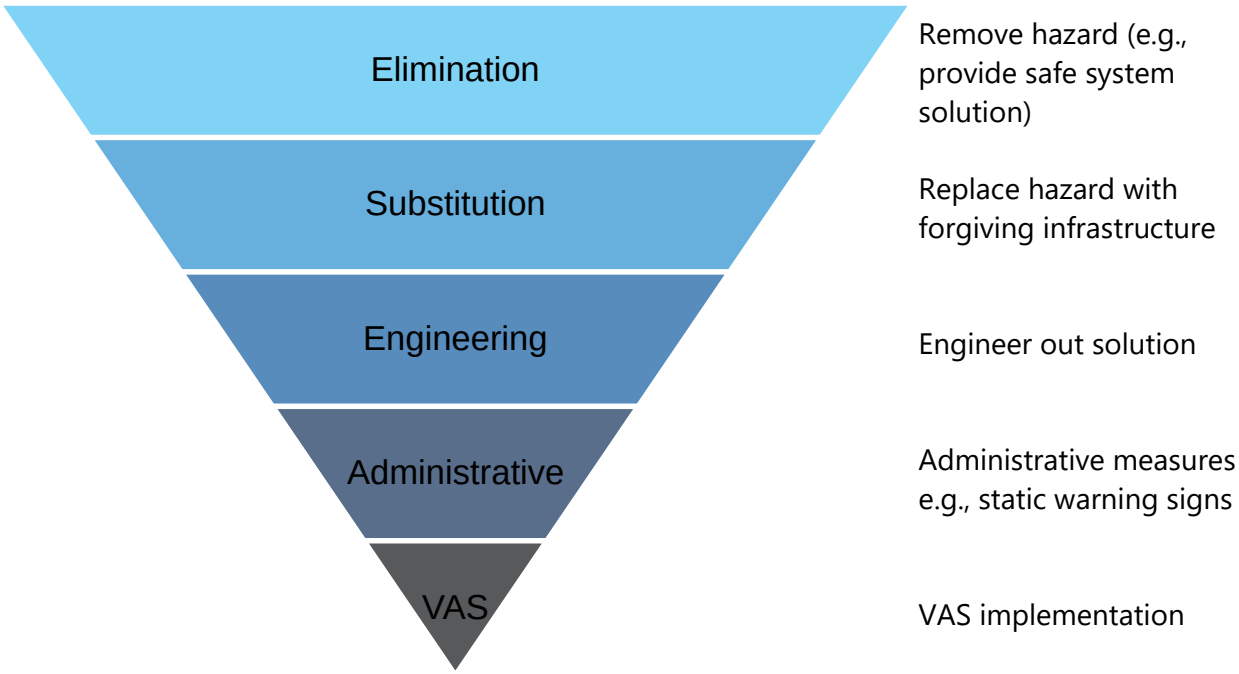


Figure 10: Hierarchy of Road Safety Controls

Therefore, VAS is only to be used at sites with an identified safety risk that cannot be addressed with treatments that would eliminate the hazard, or where there is a constraint that restricts the use of other suitable treatments. It is important to exhaust all reasonable engineering, signing and pavement marking solutions before considering VAS.

VAS may be used at locations where it is highly likely that they will be effective in significantly reducing a clearly identified road trauma risk. There needs to be a clear connection between the VAS and the behavioural change required to manage the hazardous situation.

Main Roads will install VAS in line with three key principles:

Credible

VAS must be effective in addressing identified safety issues that cannot be readily treated in any other way as per Figure .

VAS should be activated temporarily to indicate the presence of a potential hazard. VAS should not be installed in locations where a permanent change in the maximum speed limit should be applied and peak hour volumes need to be considered to ensure over-activation of VAS is not introduced. (This policy and guideline should be read in conjunction with the Main Roads Speed Zoning Policy and Application Guidelines).

VAS must not be installed where it can interfere with or potentially contradict with other Traffic Control Devices (TCD). VAS must only be installed to complement, but do not replace, static signage.

Reliable

VAS must perform their intended role of slowing traffic and/ or reducing crash risk. VAS must continue to operate during typical conditions encountered at the installation location, including weather, access to power and other external factors.

Relevant

VAS should be targeted so that they are activated for the appropriate road-user type when a pre-determined hazardous situation or trigger is detected. This may mean a VAS only activates when particular conditions are present or at certain times of day or under certain conditions, e.g., changes in environmental conditions.

Notwithstanding that, VAS should not be used until all reasonable engineering, signing and pavement marking solutions have been exhausted. VAS may be installed to manage the hazard until committed works have been completed. This should not be used as an excuse for delaying those works and the hazard eliminated, the VAS must be removed.

6.1 Innovation

The uses of VAS, trigger and delivery mechanisms presented in this policy are not exhaustive. This policy is intended to encourage innovation where the need for innovation is justified. However, conventional VAS use and message delivery should be considered first if they adequately address the hazard risk identified.

All types of VAS within this Policy must be approved by the Manager Traffic Management Services. VAS types that have not previously been approved for use must also be approved by Main Roads Road and Traffic Engineering Branch, Principal Electrical Standards Engineer and Network Operations (Manager Intelligent Transport Systems and Manager Traffic Management Services) prior to seeking approval for installation from the Manager Traffic Management Services.

6.2 VAS limitations

Whilst VAS have demonstrated crash reduction benefits, they do not remove the hazardous situation and therefore do not completely resolve the road safety risk. There is also potential for system failure preventing the VAS from displaying. For this reason alone, VAS should not replace static signs.

7 APPROVAL PROCESS

All requests for installation of VAS must be referred to Traffic Management Services (TMS) at Main Roads for the Metropolitan Region or the Network Manager or Network Operations Manager in the Regional Office.

As shown in Figure 8, there are three steps in the approval process for a VAS:

- Warrants for Installation
- Site Assessment
- VAS Design and Operation

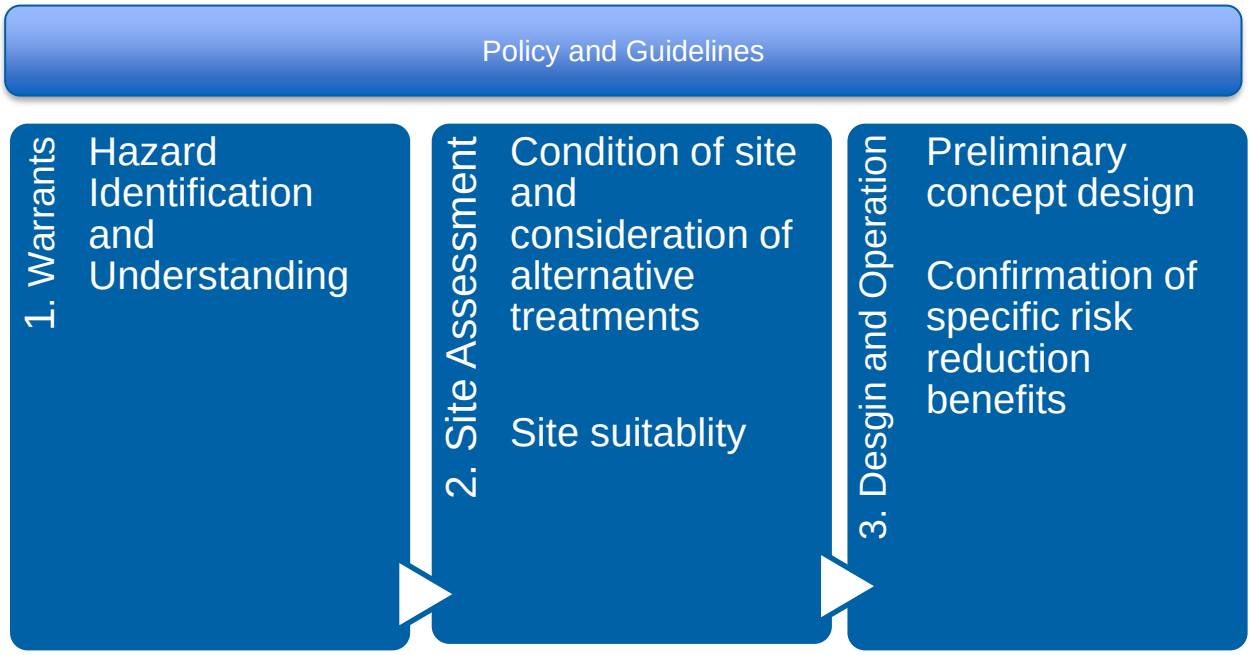


Figure 11: Approvals Process

The applicant to provide all the above information together during the submission to obtain approval from by TMS or the appropriate Regional Manager prior to installation of the VAS.

As shown in the flow-chart in Figure 12, the process initially considers if a site meets the criteria for VAS (i.e., whether it meets the appropriate warrants). Where warrants are met, the process moves on to assess the condition of the site and its suitability for VAS. If after this, a VAS is recommended, the process considers the design and operation of the proposed VAS and whether it is likely to successfully manage, through behavioural change, the hazard or risk identified at the site.

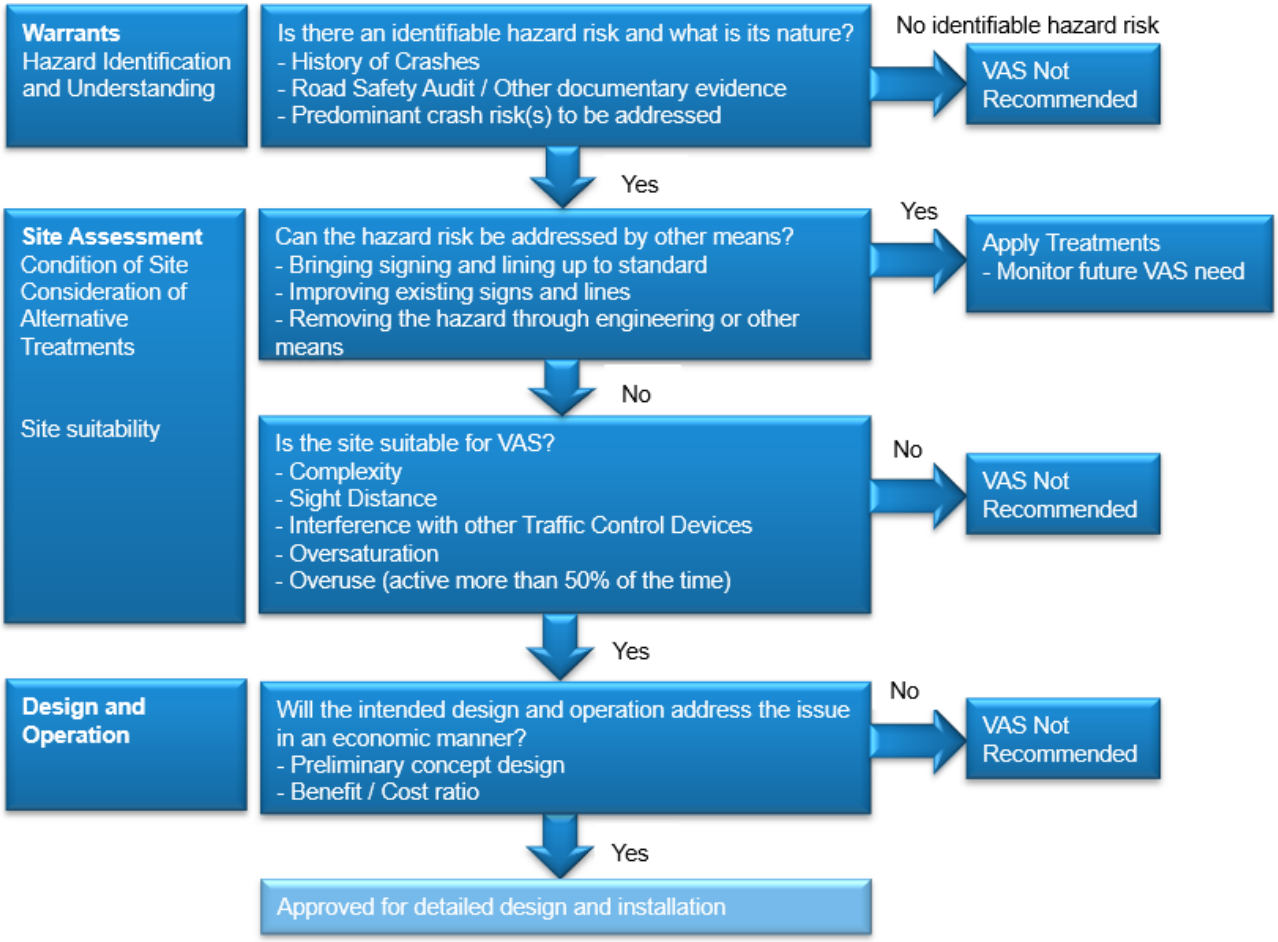


Figure 12: Approvals Flow-chart

7.1 Hazard identification and understanding

VAS is only to be installed where there is an identifiable safety risk. For an existing site, this can be demonstrated through:

- Examination of the existing crash record
- Road Safety Audit or inspection

For new sites, this can be demonstrated through a Road Safety Audit or inspection or ROSMA analysis. However, generally all other controls, i.e., engineering needs to be explored first as a solution.

The proposed site must:

- Have a demonstrated history of killed or serious injury crashes (KSI crashes) within the most recent 5-year timeframe, or
- Have a high or medium high KSI Crash Metric, or
- Meet criteria for black spot funding, or
- Have a credible risk identified by a Road Safety Audit or inspection that could result in an elevated risk of killed or serious injury risk.

Traffic Management Services can provide preliminary advice on the suitability of the site in line with this policy document, and other Main Roads policies as required.

7.2 Condition of site and consideration of alternative treatments

VAS must not to be installed where an alternative treatment can be implemented to achieve an equivalent or better safety outcome. Existing signing and pavement marking should be reviewed to see if it is up to current standard. Further, improvements to signing and pavement marking, and safe system and engineering solutions should also be considered.

7.3 Site suitability

Speed activated VAS should not be used where there is more than one lane of traffic approaching the sign. This is because it can be unclear which driver is being targeted by the VAS.

In all cases, there needs to be sufficient forward visibility to allow drivers to react to the message on the sign. Sight distances (as per AS1742.2) should be the same as those required for equivalent static signs.

To maintain its effectiveness, it will be necessary to ensure that there is not overuse of VAS in the vicinity of the site and the VAS is not activated continuously. Generally, the VAS should only be activated for less than 50% of the time when the hazardous situation is present.

7.3.1 KSI Crash Risk

For the installation of VAS, the following KSI crash risk criteria must be met:

- At least one KSI crash in the past five years related to the hazard being addressed by proposed VAS.
- *Crash Density* (*KSI Metric*) is a measure of the total crash incidence at a location. Locations where VAS installation is being considered should have a *KSI Metric* of *high* or *medium-high*, to ensure that only sites with maximum potential for risk reduction are selected. Please refer to the Road Trauma Risk Analysis Guidelines for further information on this metric.
- Eligible for funding under the State Black Spot Program and/or the Australian Government Black Spot Program. Please refer to Main Roads CARS (Crash Analysis Reporting System) which contains the current list of eligible sites.
- Road Safety Audit or Inspection demonstrating a credible KSI crash risk (to be used if the traffic profile is likely to change or if the site is new) or other type of documentary evidence such as analysis of near misses.

Further information is available in Appendix 1.

7.3.2 Crash type

Existing sites should have a demonstrated history of crash types likely to be reduced by VAS. All types of any crash severity can be considered in meeting this criterion.

This requirement may not be applicable for sites where significant changes in traffic demand profile is expected to occur. In this case, the Road Safety Audit or Inspection should indicate what type of crash is likely to occur in this circumstance.

7.4 Site Assessment Process

The required values for the Site Assessment will be recorded by Main Roads in Appendix 1 - Table 2.

Before Site Assessment is undertaken, a Road Safety Audit or Inspection will be required at the site to ensure there are no underlying safety issues that can be addressed through other measures, e.g., signing, pavement marking improvements and/or an engineering solution.

Even if a site complies with quantitative warrants, it is essential that a thorough site assessment is conducted by Main Roads to avoid major problems occurring during the detailed design phase. The depth of the investigations will depend upon the complexity of site conditions.

7.4.1 Condition of existing signing and pavement marking

The provision and condition of the existing pavement marking and signage needs to be evaluated to ensure it meets current standards and specifications. It is important to identify if any static signs are missing. VAS must not be used to replace static signs that should be present.

Consideration should also be given to whether the signing and pavement line marking can be improved to address an identified hazard. For example, replacing existing painted edge lines with audible edge lines to address the issue.

7.4.2 Alternative and Future Works

It is important that all reasonable engineering treatments have been considered to resolve hazardous situations. A clear explanation for why these cannot be undertaken must be stated in the application.

Consideration of the expected lifetime of a VAS installation can influence decisions on whether VAS installation may be appropriate, particularly where significant future traffic growth may be expected. Consideration of committed future works is also an important input in the decision process. As noted previously, VAS may be a good short-term solution to manage a hazard/ risk until a more permanent engineering solution is implemented.

7.4.3 Comprehension by Road User

There is a need to establish that the site does not have a complex environment which could compromise the performance of the VAS. Speed Activated VAS cannot be installed where the information would be imparted to more than one lane of traffic. It is important the sight distance to the proposed VAS is sufficient; meeting the standards for static signs (AS1742.2). VAS must not be installed at locations where they could interfere with or reduce compliance with other traffic control devices.

7.4.4 Effectiveness

VAS are most effective when they are used sparingly as overuse can diminish their effectiveness. Therefore, it is necessary to review the use of similar VAS in the vicinity of the proposed site. The expected level of activation needs to be stated.

8 VAS DESIGN AND OPERATION

To obtain approval, the proposed design and operation of the VAS, as well as the expected Benefit /Cost ratio (see Section 8.3), shall be recorded in the template presented in Appendix 2.

8.1 Nature of hazard

For effective VAS Design and Operation, it is necessary to demonstrate the crash risk which should confirm the predominant crash types that will be addressed by the VAS. For existing sites this can only be demonstrated by undertaking a thorough analysis of the crash history or near misses using time to collisions (or similar) analysis. It is also necessary to state when the hazard is present and to which road user group, the hazard applies.

8.2 Preliminary Concept Design

To facilitate final approval for the VAS, it is necessary to define in general terms the following features of its design and operation:

- What condition(s) are associated with activation of the VAS?
- What will trigger the VAS?
- Which road user group will be targeted by the VAS?
- How the message will be delivered?
- What message will be delivered?

If the proposed signs do not meet existing sign standards for Western Australia, then agreement from Manager of Road and Traffic Engineering branch must be sought. If proposed triggering devices are not an accepted device by Electrical Services at Main Roads, then approval is required from Principal Electrical Standard Engineer.

8.2.1 Activation Condition

The Activation Condition is a condition or set of conditions that need to be met prior to the sign being triggered. For example, if the hazard only occurs during certain environmental conditions, e.g. during wet weather. Activation Conditions ensure the VAS is only triggered when required, which maintains its effectiveness and avoids confusion.

8.2.2 Trigger

Whilst it is more usual for the VAS to be triggered by the recipient of the message, this is not always the case. There can be situations where the intended recipient is not the entity triggering the device. (Refer to Section 5.2.2).

Also, the trigger could be limited to a particular class of vehicle or road user. For example, a VAS may only be triggered by an over-size vehicle.

The proposed entity triggering the device needs to be clearly stated.

8.2.3 Target

To prompt the right behavioural response, it is important to ensure the message is delivered to the correct class of road user and does not confuse other classes of road user.

The proposed entity triggering the device needs to be clearly stated.

8.2.4 Delivery

Delivery considers the device and the message. The proposed delivery mechanism needs to be clearly stated, e.g., LED sign.

The message should be simple to understand. Where possible it should replicate (but not replace) approved static warning signs. Where possible the message should consist of only two elements: a symbol (replicating the warning sign) and a short message approved by Main Roads.

The symbol should comply with either the Main Roads Road Sign Index or with Australian Standard AS 1743. All other symbols will require approval from Road and Traffic Engineering.

8.3 Identification of Benefits (BCR)

A basic calculation of the Benefit-Cost Ratio of installing VAS at the identified site must be undertaken to enable confirmation of VAS use at the site.

This assessment should be based on the method provided in the Road Trauma Risk Assessment Guideline. This assessment should assume no changes to other crash types unless there is evidence to support an alternative assessment.

8.4 Installation

Prior to installation, the proposal will be progressed to detailed design and reviewed by Main Roads directorates to ensure compliance with all applicable standards. Reference should be made to the appropriate technical documents if available.

9 GUIDANCE ON SPEED INDICATION DEVICES

Main Roads has provided all Local Governments with the authority to erect, establish, alter and remove SID on local roads under its control, subject to the following conditions being applied:

Speed Indicator Devices (SID) are only to be considered for use on local roads or for temporary road works. They can be installed as part of an area-wide speed reduction initiative.

SID should be used in locations where there is an identified speeding issue (where operating speed is 10km/h or more above the posted speed limit), as use at sites where speed compliance is high can diminish their effectiveness. They need to be located where they will not interfere with the comprehension of existing TCD (must be at least 0.6V away from the closest TCD – where V is the posted speed limit e.g 50km/h x 0.6 = 30m).

When a driver is travelling under the speed limit, the speed at which they are travelling can be displayed and/ or a symbol/ message affirming the positive driver behaviour. When travelling above the speed limit, the sign must not display the vehicle's speed. In this case, a message (e.g., "Slow down") or symbol should be used to influence drivers to reduce their speed.

SID must not display any messaging that replicates a regulatory traffic sign.

A register of all SID installations must be maintained and provided upon request by Main Roads (refer to the Appendix 4 for example of Register of SID)

Examples of Speed indication devices are presented in Figure 4.

10 VAS REVIEW AND REMOVAL

The performance of VAS should be reviewed every three years by the road authority to ensure the crash reduction benefits of each installation are realised. This will include an immediate post implementation review of speed compliance and video-based analysis of near misses, crash analysis accompanied by speed surveys undertaken at 1 and 3 years post implementation. Reviews must also consider whether the operation of VAS is aligned with this policy.

Reviews may also be undertaken as required due to changing site or traffic conditions. All requests for reviews will be directed to Traffic Management Services or the Region in the first instance.

Warrants for removal are presented in Appendix 3 and Section 10.1.

10.1 Warrants for Replacement / Removal

VAS may be removed if they are no longer operating in alignment with the principles outlined in this document (Credible, Relevant, Reliable). If decommissioning of a VAS site is proposed, the following Warrants must be evaluated. Any one warrant may sufficiently justify removal of the VAS installation.

A Road Safety Audit or Inspection or traffic survey shall be completed prior to the removal of VAS unless approved reconfiguration works have themselves been the subject of a Road Safety Audit.

10.1.1 CRASH DENSITY (KSI METRIC)

VAS should be replaced with an alternative treatment if the *KSI Metric* (see Section 7.3.1) does not improve from pre-installation levels for a period exceeding three years. In this instance, VAS should generally not be removed until alternative treatment has been put in place.

10.1.2 ALTERNATIVE TREATMENT

VAS must be removed or updated as required as per this policy wherever the location or hazard is modified or reconfigured.

11 REFERENCES AND RELATED DOCUMENTS

Document Number	Description
1	Makwasha and Blair (2014))

12 APPENDICES

Appendix	Title
Appendix 1	Warrants and Site Assessment Items for Installation
Appendix 2	VAS Design and Operation
Appendix 3	Warrants for Removal
Appendix 4	Register for Speed Indication Devices

Appendix 1: Warrants and Site Assessment Items for Installation

Sites must comply with all warrants and have a crash history that has or is likely to result in KSI crash types which VAS would address. Sites must also meet one of the criteria in the following table: except where indicated and for where there is likely to be a significant change of traffic profile which is likely to significantly increase crash risk.

Table 1: Warrants for Installation

Hazard Identification and Understanding Warrants			
Criteria	**Required Value**	**Comment**	**Criteria Met? (Yes / No)**
KSI Crashes	A record of KSI crashes at the site*		
KSI Metric	High or medium high*		
Black Spot Funding	Site meets the criteria for State or Australian Government Black Spot funding*		
Road Safety Audit/ Inspection or other documentary evidence	A credible risk of KSI crashes*		
		Passed warrant screening (yes / no)?	
*			

Where the above criteria are not met but there is going to be a significant change of traffic profile which is likely to significantly increase crash types addressed by VAS, then the site can also be considered to meet the warrants.

The below criteria must be considered through the detailed site assessment. These criteria are advisory and should be considered as one part of a broader assessment process. An overall recommendation must be made through consideration of each assessment item.

Table 2: Site Assessment Items

Site Assessment (Complete only if Hazard Identification warrants are met)		
Assessment Item	**Detail**	**Finding (Supportive / Not Supportive)**
All pavement marking and signage up to standard		
All additional static pavement marking, and sign enhancements undertaken		
Engineering solutions (considered/planned)		
Complexity: Number of lanes		
Sight distance		
Comprehension: Interference with Traffic Control Devices		
Effectiveness: Oversaturation		
Effectiveness: Overuse		
Overall recommendation (suitable/not suitable):		

Appendix 2: VAS Design and Operation

Table 3: Nature of Hazard

Nature of Hazard		
Assessment Item	**Comment**	**Finding (Supportive / Not Supportive)**
What is the nature of the hazard?		
When is the hazard present?		
Under what conditions is the hazard present?		
Who is impacted by the hazard?		
How often will the VAS be activated?		

Table 4: Design and Operation

VAS Design and Operation		
Assessment Item	**Comment**	**Finding (Supportive / Not Supportive)**
If relevant, condition(s) for VAS activation		
Trigger (What will trigger the device?)		
Target (What class of road user?)		
Delivery (What device will be used?)		
Delivery Message: Proposed symbol		
Delivery Message: Proposed text		
Identification of benefits (BCR calculation)		
Overall recommendation (suitable/not suitable):		

Appendix 3: Warrants for Removal

Removal must be reviewed if any of the below criteria are met.

Table 5: Site Review Checklist

Quantitative Warrants			
Criteria	**Warrant for Removal**	**Comment**	**Criteria Met? (Yes / No)**
KSI Metric	No reduction compared to pre-installation over a three-year period.		
Conditions at site	Other works have occurred so the original warrants for installation are no longer valid.		
Alternative Treatment Installed	Planned enhancement installed.		
		Any criteria met? (yes/no)	
		Road Safety Inspection completed? (yes/no)	

Reviews should also consider enforcement issues, stakeholder comments, actual maintenance costs, and any other issue raised by the Main Roads Regional office or other directorate.

Appendix 4: Register for Speed Indication Devices

Register for Speed Indication Devices					
Council	**Location**	**Posted Speed Limit**	**85th Percentile Speed**	**Installation Date**	**Removal Date**