

**Smart SMEs – Market Validation Program  
Technology Requirement Specifications (TRS)**

<b>TRS Title</b>	Railway Level Crossing Warning System (Radio Break-In Technology)
<b>Technology area/s</b>	Remote Warning System
<b>Host public sector entity</b>	VicRoads
<b>Project description</b>	
<b>Background &amp; Purpose</b>	<p>As part of the Victorian Government's initiative to improve safety at railway level crossings, VicRoads is to investigate technologies that could assist in preventing collisions between trains and vehicles, and in particular trucks, at railway level crossings and consequently save lives and reduce injuries. Since 1970 fatalities resulting from accidents between road vehicles and trains at level crossings have reduced by about 70 per cent. However, recently there have been an increasing number of accidents involving heavy road vehicles.</p> <p>In Victoria between 2000 and 2007 there were 35 people killed and 172 injured in vehicle accidents involving collisions with Trains. Of these, 26 were killed and 123 injured in country areas of Victoria. A significant proportion of these accidents occurred at passive level crossings. Level crossing crashes have been shown to result in enormous human and financial cost to society and is a growing concern in both urban and regional locations due to the high loss of life and the cost of permanent injury to the community.</p> <p>Traditional ACTIVE barrier and light systems (current electric hard-wired powered signal and barrier systems installed at railway crossings), require hard-wired electricity to operate and cost in the range of \$350,000 to over \$1,000,000 per installation making them expensive to install. This project seeks to investigate reduced cost alternative approaches.</p> <p>The purpose of this project is to develop and demonstrate an innovative road railway level crossing safety system that can be cost effectively and potentially deployed across the State of Victoria. This project aims to improve level crossing safety to decrease crashes between road vehicles and trains at level crossings. The proposed technology solution must be cost effective, demonstrate driver behaviour change and be robust to meet an acceptable Fail Safe level.</p>
<b>Description of technology need</b>	<p>VicRoads is seeking a technology solution that would warn drivers of approaching trains at level crossings where visibility at level crossings is limited due to various factors such as weather and road geometry.</p> <p>The Project priorities are:</p> <ul style="list-style-type: none"> <li>• Design, create and supply technology and complete a Feasibility Report</li> <li>• Conduct a Proof of Concept: <ul style="list-style-type: none"> <li>○ Trial technology in vehicles to advise drivers of an approaching train</li> <li>○ Trial technology on board trains</li> <li>○ Trial technology at level crossings</li> <li>○ Conduct live trials</li> <li>○ Conduct Human Factors Studies</li> <li>○ Complete a Proof of Concept for operable technology</li> <li>○ Submit final report of Proof of Concept and recommendations</li> </ul> </li> </ul> <p>The Railway Crossing Warning System to be developed will transmit across the vehicle's radio system and potentially any other audio device eg: CD, MP3 etc to deliver a warning that a train is approaching as the vehicle approaches the railway crossing. For break-in radio technology to be effective, it may need to reach a substantial number of vehicles.</p>

<p><b>Description of proposed solution</b></p>	<p>The staged trial will enable the safe testing of the equipment in a realistic environment to ensure it:</p> <ul style="list-style-type: none"> <li>• Transmits and receives effectively and reliably such that the radio signals and is not likely to interfere with any nearby equipment</li> <li>• Provide an appropriate audible warning to vehicle drivers at a distance that enables the vehicle to safely stop</li> <li>• Is able to meet safety requirements of the railway operators and regulators</li> </ul> <p>To activate the warning messages, the transmitter needs to be activated at an appropriate time before the train approaches a rail level crossing. At passive crossings, there is no existing infrastructure to trigger the transmitter and two basic options potentially exist for activating the transmission. One is for a train to activate a switching device fitted on approach to the passive crossing which then activates the transmitter, the other option is for a transponder to be active on a train that either transmits the warning message or activates a trackside transmitter.</p>
<p><b>Proof of Concept Outcomes</b></p>	<p>The Proof of Concept trial should enable all involved parties to assess the suitability and effectiveness of a range of Collision Warning Technologies.</p> <p>The Proof of Concept will assess and require the following outcomes:</p> <ul style="list-style-type: none"> <li>• Develop a prototype system and prove the effectiveness of each of the systems selected</li> <li>• Applicability to both train and vehicle / truck drivers</li> <li>• Ease of use with regard to: <ul style="list-style-type: none"> <li>○ Installation of equipment</li> <li>○ Operator involvement</li> </ul> </li> <li>• Suitability of use in various environments</li> <li>• Test the prototypes / Proof of Concept in an applied environment at urban and regional road rail crossings</li> <li>• Potential interference with other equipment (rail level crossing, train &amp; vehicle)</li> <li>• Potential impact of Collision Warning Technology on equipment (such as domestic radios) in close proximity to the devices</li> <li>• Human Factors Studies: to determine effectiveness of change in driver behaviour and reduced road rail crossing accidents</li> <li>• Undertake independent validation of technology Fail Safe capability of this rail crossing safety system</li> <li>• Present findings and final recommendations in a documented report</li> </ul>
<p><b>Keywords</b></p>	<p>Cost effective, Road Rail Crossing, Collision Warning Systems, Radio Break-In, Transmitters, Switching Device, Trials, Prototype, Proof of Concept, Driver Behaviour modification at rail crossing, Fail Safe.</p>
<p><b>References</b></p>	<p><b>Parliamentary Enquiry - Recommendation 35:</b> Supported in principle. The Government will task VicRoads and the Department of Transport (DOT) to further evaluate the equipment in a live environment. It is intended to trial both fixed railway crossing transmitters and on-board mobile transmitters on trains in conjunction with receiving devices in vehicles. This work will be used to inform an on-road evaluation of the technology and driver responses. More detailed studies of driver behaviour are needed to determine the most effective mechanism to bring out the most appropriate driver responses to the various stimuli provided via the devices.</p>
<p><b>Further information</b></p>	<p>If you require further information about this TRS, please email the MVP project team at: <a href="mailto:mvp@diird.vic.gov.au">mvp@diird.vic.gov.au</a></p>