Chapter 19
Adoption of Low–Cost Rail Level Crossing Warning Devices: An Australian Case Study

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ABSTRACT
The objective of this chapter is to provide rail practitioners with a practical approach for determining safety requirements of low-cost level crossing warning devices (LCLCWDs) on an Australian railway by way of a case study. LCLCWDs, in theory, allow railway operators to improve the safety of passively controlled crossing by upgrading a larger number of level crossings with the same budget that would otherwise be used to upgrade these using the conventional active level crossing control technologies, e.g. track circuit initiated flashing light systems. The chapter discusses the experience and obstacles of adopting LCLCWDs in Australia, and demonstrates how the risk-based approach may be used to make the case for LCLCWDs.

INTRODUCTION
Australia has a large number of passively controlled road rail level crossings on railways. Individually such crossings are relatively low risk, however collectively these passively controlled crossings represent a significant safety issue for Australia. Australia is not unique; there are numerous other countries that have large numbers of passively controlled crossings. The high cost of the conventional active level crossing, e.g. track circuit initiated flashing light control technology, is a significant barrier to upgrading these passively controlled level crossings; the use of conventional high safety integrity technologies
Adoption of Low-Cost Rail Level Crossing Warning Devices means that only a limited number of crossings can be upgraded each year.

The rail industry, both in Australia and internationally, has been trialling a number of low-cost level crossing warning devices (LCLCWDs). These devices use alternative, less-reliable lower integrity lower cost technologies, such that installation could be as low as 25% of the cost of the conventional technologies. These low-cost systems are not intended to provide a low-cost alternative to conventional systems on high exposure crossings, rather to provide active protection to low exposure crossings on low traffic train lines with few passenger services. An example of a level crossing with passive controls suitable for treatment with LCLCWDs is illustrated in Figure 1.

The basis for the argument for the use LCLCWDs is that for a given investment, more level crossings can be treated, therefore gaining much greater safety benefit for the same investment to treat one level crossing using conventional technologies.

In Australia, the current approach for the improvement of level crossing safety involves the incremental upgrade of passively controlled level crossings with active controls, subject to available funding. The prioritization of sites for upgrade is determined using a risk assessment model such as ALCAM (Australian Level Crossing Assessment Model) (Department of Transport NSW, 2010). ALCAM ranks crossings using a consistent basis according to a detailed level of comparable risk, exposure and consequence. The accepted use of models like ALCAM is some recognition by transport safety regulators that it is not always practicable to provide the most effective safety treatment possible; there is acceptance, albeit reluctant acceptance, of crossings with passive controls despite active control treatment technologies existing.

There are several issues that have hindered the adoption of LCLCWDs in Australia. This chapter discusses the key issues including reliability and the legal issues associated with reduced reliability. An Australian case study is provided, based on a high-level risk assessment and cost-benefit analysis.
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