APPENDIX

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Public Level Crossing Treatment Methodology

NARRABRI TO NORTH STAR SUBMISSIONS PREFERRED INFRASTRUCTURE REPORT

Public Level Crossing Treatment Methodology

Introduction

This notes details the decision making process for determining treatments at level crossings across the Inland Rail program. The key principles guiding this approach include:

- Utilising a risk based decision making process focused on minimising risk so far as is reasonably practicable;
- Consistency in the determination of level crossing treatments across the projects of the Inland Rail program;
- Consistent methodology used in the determination of whether the cost of the potential available treatment is grossly disproportionate to the level of risk to safety and the projected benefits;
- Ensuring the feasibility of the Inland Rail program by proposing cost-effective solutions.

An overview of the process followed in the assessment of level crossings across the Narrabri to North Star (N2NS) project and the methodology followed in the development of level crossing treatments is outlined below.

Process overview - determination of level crossing treatments

Identification of all level crossings within the project area

An important objective of level crossing investigations is the clear and accurate identification of all level crossings within the project area. The development of an initial level crossing listing encompasses a review of existing level crossing datasets including the Australian Level Crossing Assessment Model (ALCAM) database, ARTC's asset management database and any relevant property records. The list of level crossings is then provided to the relevant road manager for review in order to ensure that all level crossings and the associated road infrastructure managers have been correctly identified.

Level crossing closure review

Initial consideration will be given to the elimination of level crossing risks by assessing all level crossings for closure. This is in line with the TfNSW Level Crossing Closures Policy, which notes that *"in order to manage the risks to safety associated with road and rail interfaces, the closure of public and private level crossings in NSW is to be pursued, where it is practical and cost effective to do so",*

In New South Wales formal closure of any level crossing requires ministerial approval and needs to be undertaken in accordance with the requirements of the *Transport Administration Act 1998*.

TfNSW reviews all applications for level crossing closures before they are submitted to the Minister to ensure that the relevant issues have been considered and adequate consultation has been undertaken with the land owner, the local council, emergency services, Roads and Maritime Services (if they are the road authority), and any other relevant parties.

Review whether the Level crossing meets the criteria for automatic grades separation?

ARTC's policy is that rail-road interfaces will be automatically grade separated in the following three instances:

- rail-road crossings with four rail tracks (current)
- rail-road crossings of freeways and highways of four or more lanes (current and committed future plans)
- where grade separation is the logical option for topographical reasons.

All other crossings will be assessed using the Level Crossing Risk Tool.

Level Crossing Risk Tool

Where closure is not feasible a methodology was developed to identify what risk treatments should be implemented at individual level crossings as part of the Inland Rail project scope. This methodology is in the form of a formalised Level Crossing Risk Tool that identifies risk treatments and assists ARTC in being able to demonstrate that risks to safety would be managed So Far As Is Reasonably Practicable (SFAIRP) for both Brownfields and Greenfields interfaces.

In line with Office of the National Rail Safety Regulator (ONRSR's) recommendation around the use of quantitative risk assessment techniques, a decision was made to develop a tool which moved from a "warrant" approach (e.g. decisions around control types based on basic metrics such as road type or traffic volumes) to a cost benefit analysis (CBA) approach for safety risk management. The approach utilises ALCAM as one of the main inputs into the decision process for the recommended level of control at Inland Rail level crossings.

The Australian Transport Council in May 2003 agreed to adopt the Australian Level Crossing Assessment Model (ALCAM) as the only comprehensive level crossing assessment model in Australia. ALCAM is an assessment tool used to identify key potential risks at level crossings and assess the overall effects of proposed treatments. It does not specify what treatment is warranted at level rail-road crossing sites nor attempt to define a 'safe' or acceptable level of risk. This is a decision for each Rail Infrastructure Manager.

Section 10 of ONRSR's Policy on Level Crossings (June 2016) provides support for the use of ALCAM as follows:

> *"ONRSR accepts the use of ALCAM as a tool to help prioritise investment (when used in conjunction with other relevant factors, such as recent occurrence history). This tool has been endorsed by state and territory ministers."*

Consideration of factors other than ALCAM that may influence the recommended level of control are also taken into account where relevant on a case by case basis including:

- Collision and near-collision history;
- Engineering experience (both rail and road);
- Traffic and transport impacts; and
- Local knowledge of driver or pedestrian behaviour.

Level Crossing treatment (control) options considered as part of the process include:

- upgrade of passive (stop sign) level crossings to flashing lights and boom barriers;
- upgrade of existing flashing light controlled level crossings to include boom barriers;
- retain existing passive controls and renew the level crossing infrastructure including signage and road markings to ensure the crossing complies with the Australian Standard;
- grade separation; and
- other treatments identified based on site specific risks.

As per the TfNSW position any upgrades from passive/stop sign controls to active controls will include boom barriers. Active controls are where a device such as flashing lights or boom barriers are activated prior to and during the passage of a train through the level crossing.

Cost Benefit Analysis (CBA)

Part of the test as to whether risks have been managed SFAIRP is to determine whether the cost of the additional control is grossly disproportionate to the benefit gained via a Cost Benefit Analysis (CBA).

From a financial perspective to do the CBA, 3 key inputs are required. The basis for these inputs is detailed below:

- *The avoided cost if an additional risk control is implemented* - The risk tool relies on ALCAM which provides a quantitative measure of risk also enables the modelling of risk reduction generated by changing the controls at the level crossing. Risk reduction (benefits) can be calculated by comparing two risk scores for two scenarios – for example one proposal with stop signs and one with flashing lights and boom barriers.
- *The cost of implementing the additional risk control* - This is a combination of the capital cost of the additional control and the annual maintenance and repair cost over the life of the additional control
- *What would be considered grossly disproportionate - From a legal perspective the ONRSR Meaning of Duty to Ensure Safety So Far As Is Reasonably Practicable Guideline* provides some guidance on what would be considered grossly disproportionate in other words guidance on a "Grossly Disproportionate Factor" or GDF. The guideline suggests that the GDF may be dependent on the likelihood and consequence with low risks having a factor of 2 and high risk having a factor of 10.

The use of ALCAM assessments in the determination of level crossing treatments

ALCAM assessments have been undertaken for all public road level crossings in N2NS thus providing a baseline risk score.

The proposal functionality in the ALCAM system is used to model what the ALCAM risk score would be assuming the introduction of Inland Rail. This incorporates forecast changes to train speeds, volumes and train lengths. Updated road traffic counts including a breakdown between light are heavy vehicles are also collected for all public roads and included in this analysis.

If a crossing is assessed as being non-compliant for the existing control, the next level of control will be applied. For example if based on the updated train speeds, sufficient sighting distance for a stop sign crossing as per Australian Standard 1742.7-2016 (Manual of uniform traffic control devices Part 7: Railway crossings) cannot be achieved, then the minimum control will be flashing lights and boom barriers.

Even when a crossing is compliant for the current control, the next level of control is modelled in ALCAM and a cost benefit/grossly disproportionate analysis is undertaken e.g.

- An existing passive crossing would be compared to a boom barrier crossing
- An active crossing would be compared to grade separation.

i.e. additional levels of control are modelled and a cost-benefit/gross disproportionate analysis carried out until the risk factor is reduced and a cost-effective level of crossing protection is established.

In parallel to this ARTC review the ONRSR incident data to determine if there have been any road rail collisions at the respective level crossings.

Preliminary Design

A preliminary level of design is first undertaken to confirm that a level crossing with the proposed control, which complies with the relevant standards can be constructed onsite. This design incorporates any road design standards which have been provided by the relevant road infrastructure manager.

Site specific level crossing treatments are then reviewed with the respective road infrastructure managers as the project progresses through detailed design.

Interface Agreements

In accordance with National and State Rail Safety Law requirements, all current and proposed public road crossings will be subject to an Interface Agreement.

Consultation

Consultation with key level crossing stakeholders including Narrabri, Moree Plains & Gwydir Shire Councils, RMS, adjacent landowners and the emergency services will be ongoing throughout the detailed design process.

Information sharing agreements have been established to enable the prompt transfer of information between councils and the project team. This information can include inputs into the design process including road traffic counts, proposed changes in road usage and feedback on any future development plans.

Typical level crossings designs based on the relevant Australian Standards are provided to the respective road managers for review. The road managers are invited to provide any additional stakeholder specific design requirements as an input into the design process. For level crossing where RMS is the road manager, the project team will work with RMS to execute an RMS works authorisation deed.

Consultation with the relevant road manager about the proposed treatments for public level crossings includes a combination of face to face meetings, the provision of design memos or designs for review, and workshops where required. These communications can include the N2NS design engineers and project team, technical experts and community engagement specialists as required. Key interactions are included below:

- Overview provided to road managers on the Inland Rail methodology for determining level crossing treatments
- Feedback sought from road manager on the typical level crossing designs and key stakeholder specific design inputs
- Following the 1st project milestone, the relevant road managers review the proposed level crossing treatments and have the opportunity to provide comment
- Any proposed public level crossing closure is reviewed by the relevant road manager. Only if the road manager has no objection to the closure do the broader consultation processes commence. This will be undertaken in accordance with the requirements of the *Transport Administration Act 1998*.
- Throughout the design development, workshops are arranged with the road manager where necessary to discuss any location specific design complexities
- Prior to finalising the design, the draft designs are provided to road managers for review, ensuring that time is allowed to incorporate any required changes.

A Level Crossing Fact Sheet has been published. In addition to being made available on the ARTC Inland Rail website, it has been distributed at key project related forums including at all drop in sessions during the EIS display period.

Conclusion

The objective is to develop a consistent methodology in the selection of level crossing treatments which is acceptable to key stakeholders and minimises risk so far as is reasonably practicable.