CURRENT AND FUTURE ISSUES IN SKID RESISTANCE MANAGEMENT IN AUSTRALIA

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ABSTRACT

This paper will identify and discuss current[1] and future issues in skid resistance management in Australia[2]. Activities and projects that have been commissioned in response to the issues identified are also introduced – with a focus on outputs from the national research (Austroads[3]) program.

The paper is provided for general technical interest and information purposes, and specifically for those operating in this technical field in the Northern hemisphere. References are provided to allow further and more detailed consideration of any of the key concepts and documents, as may be desired.

The author has provided his personal opinions on a number of issues within this paper, and it is important to note that these do not necessarily reflect the views of ARRB Group or Austroads.

[1] For this paper, 'current' is defined as 'emerging since late 2011', following on from the 3rd International Road Surface Friction Conference, held on Queensland's Gold Coast from 15-18 May 2011 inclusive, which attracted some 240 delegates from 15 countries and included a number of papers on strategies, policies, standards and practices in Australia at that time

[2] The author recognises the considerable track record, knowledge, skills and experience in skid resistance management in New Zealand, which is reflected by the volume of papers in the conference program, and has deliberately left that country's practitioners to 'tell their own story'.

[3] Austroads is the association of Australian and New Zealand road transport and traffic authorities. Its members are the six Australian state and two territory road transport and traffic authorities, the Department of Infrastructure and Regional Development, the Australian Local Government Association and the New Zealand Transport Agency

INTRODUCTION - THE ROAD NETWORK OF AUSTRALIA AND ITS MANAGEMENT

The following text provides a very brief summary of the road network in Australia and its management to assist with context and the understanding of issues introduced in the remainder of this paper.

Australia is a vast continent. **Figure 1** provides a visual comparison of its size when compared against mainland Europe.

Figure 1 – Map showing a general comparison of the size (area) of Australia when overlaid on a base map of mainland Europe

Table 1 **below** provides some pertinent statistics regarding the Australian road network:

Characteristic / Parameter	Australia
Population	23.1 million (as at June 2013)[4]
Population density	7 persons per sq.mile[5]
No. of motor vehicles registered	17.2 million (2013)[6]
Average age of motor vehicle	10.0 years (2012)
Road length (km)	815,074 (2007)[7]
% of roads Sealed	≈ 41.0%
Road Fatalities per 100,000 population	5.2 (2013 provisional)[8]
Road Fatalities per 100 mVKT	0.57 (2012)
Road Fatalities per annum	1,193 (2013 provisional)[9]

[4] A population growth rate of 1.8% per annum is currently predicted.

[5] The vast majority of the population in Australia reside on the coastal plains of the Eastern and Western seaboards

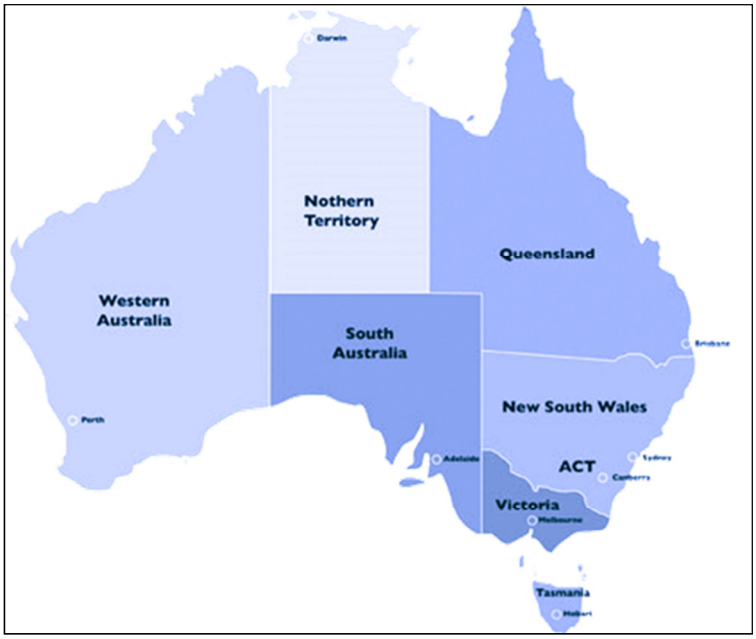
[6] This equates to a growth rate in vehicle registrations of 2.6% on 2012, including an accelerated growth in motorcycle registrations in the last 5 years.

[7] Arterial roads comprise only 16% of the total road length in Australia, yet carry some 74% of the total traffic.

[8] A reduction of 10.1% over the outcome for calendar year 2012.

[9] A significant fall from 1,303 fatalities in calendar year 2012.

Figure 4 shows the 8 (eight) state / territories of Australia and the positions of the major cities.



In very basic terms, the highway network in Australia is managed at three levels: national (federal), state and local; with the national and state highway networks (i.e. the most strategic roads carrying the highest traffic volumes) being managed by the 8 (eight) state road authorities and the local road network managed by a large number (hundreds) of local councils. Importantly, the local councils fulfil a range of public services, in addition to acting as the local road authority.

The latest Australian National Road Safety Strategy (2011-2020) embraces the principles of the Safe System and sets a target of reducing the number of people fatally and seriously injured on Australia's roads by at least 30%. Effective management of skid resistance will make a direct and positive contribution to one of the key pillars of the strategy - Safer Roads[10].

EARLY STEPS IN SKID RESISTANCE MANAGEMENT

There remains no specific, mandatory require Australian road authorities to manage skid resistance at a network level. However, the potential road safety benefits that can be accrued, as well as a more generic contribution towards successfully demonstrating a duty of care to road users, have been recognised for some time. Indeed, the state road authorities of New South Wales and Victoria started to actively measure and manage skid resistance and surface texture in the mid 1980's. However, it was not until January 2005 that definitive national guidance document on managing skid resistance at a network level (rather than just on a project or site by site basis) was published and disseminated (Austroads, 2005).

The document encouraged all road authorities (i.e including local road authorities / councils) to develop a strategy to manage skid resistance across their network, using the considerable

[10] This pillar is often also referred to as 'Safer Roads and Roadsides'.

practical guidance provided and based on consideration of the characteristics of the network, available resources and knowledge etc. Localised clusters of activity resulted and two further Austroads documents were developed to further support road authorities in their endeavours (Austroads, 2009a 2009b).

Much to the disappointment of the author, awareness and uptake of the early guidance materials was seemingly limited. Upon further and wider investigation, a number of apparent broad 'barriers' to a more widespread implementation of skid resistance management were identified (Hillier, 2011a). A brief summary of the 'barriers' identified is as follows:

- 'true' skidding related crashes were being seen by many as being low in number (comparatively rare) and hence utilising available resources on this might give a low return. This opinion was supported to some extent by Austroads research around that time which identified that only 12% of fatal crashes were occurring on local roads, and of these: 68% occurred on straight, level (low demand) sections of road, 91% occurred in 'clear' weather, and 81% on dry roads. These findings, when linked to the absence of a specific statutory requirement for Australian road authorities to manage skid resistance (prevent skidding related crashes) also contributed to this issue being given a lower priority than other competing demands;

- the extent and remoteness of the local road network to be maintained, including a degree of reluctance to test local / minor roads, at a time when testing was not being considered and/or taking place on significant lengths of the national highway network;

- a perceived lack of knowledge and understanding of the technical principles and practical issues in skid resistance 'below' the state road authority level, and that the national guideline of January 2005 was not written with local road authorities (councils) in mind;

- the costs and resources associated with purchasing, operating and maintaining test equipment in-house or procuring testing from an external provider, and then in considering the data (and in many cases conducting a site investigation and effecting a remedial treatment), were also identified as major considerations[11].

In response to these findings, the author began to actively seek opportunities to further encourage all Australian road authorities to take their first steps in this technical field – explaining that by doing so they could secure worthwhile outcomes within their local resource levels and expertise by utilising the well regarded national guidance already available. For example, the 'key building blocks' approach to the development of a fit for purpose local skid resistance management strategy, which first appeared in the Austroads guide of January 2005, was again actively promoted for both its effectiveness and ease of understanding.

COMMON ISSUES START TO EMERGE

In the approximate six-year period between 2006 and late 2011 awareness of, and interest in, a number of specific technical issues grew within the industry - most notably:

[11] a large number of local road authorities (councils) in Australia are reliant upon a population of less than 2000 for their core funding

- the limited availability of test equipment at a network level and on-going concerns regarding the 'affordability' of testing;

- the need to improve equipment calibration protocols;

- desire from the surfacing industry for the identification / development of an immediate post-lay (QA/compliance) 'skid resistance' test;

- the 'pros' and 'cons' of macrotexture (surface texture) data being used as a surrogate for skid resistance testing, especially on high speed roads;

- greater consideration of the need to test for skid resistance at low rainfall locations in Australia, including the potential to use rainfall data to determine road sections requiring skid resistance testing;

- on-going applicability and effectiveness of the standard PSV / PAFV test in predicting performance in Australian site conditions and a foreseeable future depletion in the available stock of 'reference stone'

- on-going general availability and quality of surfacing aggregates, and the need for risk mitigation and management strategies to address this;

- how to best manage the extensive spray seal network in Australia – including the development of strategies to better respond to the flushing (bleeding) of spray seals and further understanding the availability and performance of remedial treatments;

- the need to move towards locally developed suites of Investigatory Levels, rather than a continued reliance on levels adopted from overseas or interstate.

A number of the issues above received specific attention under the national research projects, with two useful documentary outputs resulting by the end of 2011:

- *Guidance for the development of policy to manage skid resistance* (Austroads, 2011b), which builds upon the initial Austroads skid resistance management guide of January 2005; and

- *Review of skid resistance measurement methods* (Austroads 2011c), which collates some of the information on test equipment from previous guides and introduces emerging technologies such as ViaFriction and Vericom, as well as introducing the concept of a four-zone model which helps practitioners to determine a default intensity of skid resistance management for a road, based on a number of parameters including annual rainfall and population and traffic density.

CURRENT AND EMERGING ISSUES (2012-2014 AND BEYOND)

Two further Austroads documents were published in 2013:

- *Review of variability in skid resistance measurement and data management* (2013a), which examines and provides commentary on the averaging and processing of skid resistance data by road authorities across Australia, and further examines issues in the testing of surfacing aggregates for polishing resistance;

- *Development of safety related investigatory level guidelines: a worked example of methodology* (2013b), which provides a preliminary methodology for discussion (and ultimately continual improvement) for the development of a suite of skid resistance investigatory levels based on local parameters, e.g. crash data.

Despite the positive contribution of the four Austroads documents published in 2011 and 2013, a number of the original issues identified have yet to be fully resolved or have evolved slightly in scope and/or priority. A small number of new or emerging technical challenges has also developed, such that the author believes that the following items require prompt industry attention in Australia:

- consideration of effective ways to evaluate and actively demonstrate the current and future contribution, value and 'affordability' of routine skid resistance testing;

- development of a national or regional equipment calibration protocol/s;

- identification and site trialling of an immediate post-lay (QA/compliance) 'skid resistance' test/s;

- further investigation into the modification of the standard (current) PSV / PAFV test to ensure that it more accurately predicts performance in Australian site conditions, using the newly sourced stock of 'reference stone'

- development of a national (Australian) strategy regarding the general availability and quality of surfacing aggregates, including the development of risk mitigation and management policies / processes;

- further consideration of how to best manage the extensive spray seal network in Australia – including the development of strategies to better intervention and response to the flushing (bleeding) of spray seals and further understanding the type, availability and in-situ performance of remedial treatments commercially available;

- provision of national guidance to help a road authority to review its current suite of Site Categories and Investigatory Levels to determine, for example, whether the number of Site Categories can be consolidated / simplified;

- provision of further national guidance in raising or lowering the Investigatory Level at a location – why this might be done, what are the implications etc.;

- how to better ensure that the most appropriate Investigatory Level is being assigned to a road section that is to be tested, using geometric data etc., rather than having over-reliance on the testing contractor making a visual assessment; and

- development of the most effective local protocol for the deployment and removal of 'slippery road' warning signs.

The author is aware that at the time of writing only one national project is on-going in this technical field, and this is fundamentally a minor update of an existing document, the Austroads *Guide to Asset Management, Part 5F – Skid Resistance* which was originally published in 2009. The guide focuses on the data collection aspects of skid resistance management and it is hoped that an update will be ready for endorsement and publication in mid to late 2014.

THE NEED TO RENEW INTEREST AND CREATE A NEW MOMENTUM

In addition to the above listing of issues / challenges, the author has detected that the level of commitment to, and interest and action in, skid resistance management matters between individual road authorities has also varied considerably in the period late 2011 to date.

Locally, this fact can be mitigated to some extent by extraordinary floods throughout the state of Queensland in the period December 2010 – January 2011 and again in September 2012, which have had a massive effect in that state, given the unprecedented volume of emergency, temporary and rehabilitation works required.

More widely, an extended period of road authority cut-backs and reorganisations has also led to a number of long-standing, industry respected experts being 'lost to the cause' in a relatively short space of time (examples include: David Pratt of RMS New South Wales, Justin Weligamage of TMR Queensland, Ed Baran of RoadTek Queensland, Grant Mackey of DTPI South Australia, Ian Cossens of VicRoads, and Ian Hickson of Roads, Australian Capital Territory). Although their very capable deputies now have a chance to step up and lead the debate, and a number of talented officers have joined the 'industry', a rebuilding phase is somewhat inevitable. Expanding, retaining and enhancing the current pool of knowledge, skills and experience in skid resistance principles, issues and management practices will all be critical.

Being conscious of the loss of expertise, ARRB embarked on the delivery of a series of five, one-hour webinars on skid resistance in October 2013. Support for the series was encouraging and feedback received praised the series' practical focus. It is likely that a decision will follow to run the series again during 2014. A workshop on the development of a local suite of skid resistance Investigatory Levels is also being considered, possibly in connection with the ARRB Conference in Sydney in October 2014.

Where the author is aware of practical developments occurring in most recent years, they have tended to come from state road authorities that already had a notable track record (e.g. TMR Queensland, RMS New South Wales, DIER Tasmania, and DTPI South Australia). Efforts are most typically on the fine tuning of highly specific parts of existing policies and processes (e.g. methods to help prioritise sites to receive investigation). Unfortunately evidence of action by those embarking on the 'journey' seems to be harder to detect at this time. Although statistics concerning the total length of road subject to skid resistance testing per annum are not readily available, the author senses that the extent of routine, network level testing of roads has fallen slightly in recent years.

The author firmly believes that it is time to renew interest and create a new momentum in the management of skid resistance and surface texture in Australia, given that such undertaking has remained the domain of the larger, state road authorities for too long. Even what might be considered a relatively modest skid resistance strategy can lead to highly significant and positive road safety returns, and is totally consistent with the Safe System paradigm.

National guidance published on skid resistance strategy development in 2005 and 2011 remains highly regarded and encourages all road authorities to take action - it provides a reliable and usable framework to help practitioners come up with and implement a strategy that is 'fit for purpose' - in that it focuses on addressing key issues, yet remains in tune with local conditions and very importantly, available resources.

Saving lives, and in more specifically, preventing road users having skidding related crashes on our roads in the first instance, must remain the goal.

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AUTHOR BIOGRAPHY

Paul Hillier is ARRB Group's National Technical Leader in Incident Investigation and Strategic Reviews. He has some 24 years' experience in road safety and highway management and maintenance fields. He has been with ARRB for 9 years, and prior to that gained experience with TRL (in both Australia and UK) and a large UK road authority. He is experienced in investigating and reporting upon highway provision and maintenance related legal cases, and has led or been part of a number of recent Austroads projects on skid resistance. He has assisted a number of road authorities in Australia and overseas with the development of strategy and practice in this technical area. Paul has presented, & had papers published, on highway management, skid resistance & risk related (legal liability) issues throughout the world & regularly provides training in these fields.