BREAKING THE SILENCE ABOUT ROAD SURFACES AND ACCIDENT RATES

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ABSTRACT

During 2008-09, a committee of the Tasmanian Legislative Council sought expert opinion in Tasmania and in other Australian states as to the cause of road accidents and the means whereby they could be reduced. Apart from the author's evidence, no other submission identified road surfaces as a significant factor. This paper argues for transparency by road authorities on the risks to road users arising from low road friction and for community consultation in the setting of Investigatory Levels ILs. It contends that in the setting of ILs, the risks to road users must be set "As Low as Reasonably Practical". It questions, on both common sense and ethical grounds, the primacy given to the policy of equal risk throughout the network and suggests a mix of criteria in the setting of ILs.

A data set developed and used by the consultants WDM in their "*Review of Investigatory Levels used in Tasmania for Skid Resistance*" is used to explore the relationship between road surface friction and wet road accident rates. The analysis suggests that low skid resistance contributes to between 15 and 35% of wet road accidents on manoeuvre free roads.

INTRODUCTION

The motivation for this paper lay in perceptions that:

1. The public had been provided with a very lop-sided and inadequate picture about road safety. While road safety matters have been the regular fare of the news media, the community has remained largely unaware that the probability of accidents is significantly influenced by road surface properties.
2. Road users were exposed to unnecessary risks because the Investigatory Levels (ILs) used by some Australian States, including Tasmania, were inconsistent with the principle that risks to road users should be set at 'As Low as Reasonably Practical" (ALARP).

The paper has a number of underlying themes.

1. The community, as road users, has an unqualified right for transparency by the road authority concerning risks posed by low friction road surfaces
2. An inappropriately low road surface friction is a public health risk which should be treated with the same vigour, rigour and openness as all other public health risks.
3. Unless road authorities take the community into their confidence, an inappropriately low allocation of funds for road surfaces will result with increased risks to road users.
4. Whatever principle/approach is applied to the determination of ILs, the ALARP principle has to be satisfied. It is what we owe to those who come within our care.

The paper presents, analyses and discusses a data set developed and used by the consultants WDM Ltd (Bristol UK) in their 2008 report '*Review of Investigatory Levels used in Tasmania for Skid Resistance*'. It questions the primacy of the policy of "*equal risk throughout the network*" in the setting of ILs and suggests a mix of criteria.

The following is concerned primarily with the Sideways Force Coefficient (SFC) and wet road accident rates. Road safety issues associated with texture depth, surface spray, dry road accident rates and night-time visibility are not addressed.

THE SILENCE

While the advertisement for this conference referred to "*the undoubted contribution that effectively managed road surface friction can make to achieving positive road safety outcomes"* this is not accepted knowledge within Australia as evidenced by the advice given to the Tasmanian Legislative Council Select Committee on Road Safety during 2008 and 2009.

The seven (7) Terms of Reference of the committee included three (3) terms where road surface properties were of potential significance

No. (1) "The main causes and effects of road traffic crashes in Tasmania.

No. (3) The adequacy and effectiveness of current road safety measures in Tasmania.

No. (5) The methods and means whereby road traffic crashes in Tasmania may be reduced".

The committee received 76 written submissions. It had hearings throughout Tasmania and travelled to Melbourne, Adelaide, Sydney and Canberra in a quest to seek the best expert opinion. It heard verbal evidence on eighty-three (83) occasions involving over 130 participants.

The author supplied a written submission followed by verbal evidence. His contribution concerned the effect of road surface properties on skid resistance and night time visibility. At the time of his verbal evidence, the committee had listened to over 50 submissions. When asked *"How many people have been talking to you about skid resistance"* the Chair replied " *You're the first*". It is understood that none of the evidence that followed gave significance to road surface properties.

The WDM report had been commissioned by the Tasmanian Department of Infrastructure, Energy and Resources, DIER. DIER did not include the report as evidence, yet it was a sound report and very relevant to the terms of reference.

The final report of the committee had sixty-nine (69) findings and fifty-two (52) recommendations, none of which directly or indirectly was concerned with road surface properties. It reported that:

"*the evidence received establishes that the main factors contributing to crashes are inexperience, inattention, alcohol and excessive speed",* all driver behaviour factors**.**

Both the community's and the government's roles in road safety are critically dependent on sources of reliable information. Reliable information on the roles that road surfaces play has not been forthcoming. The reasons for this probably lie in perceptions by road authorities that an unfavourable connection between road surface properties and accident rates will result in increased exposure to litigation and increased demands on budgets and time. In Salt's review of "*Research on Skid Resistance at the Transport and Road Research Laboratory (1927 – 1977)*" he observes, in relation to the adoption in 1970 of mandatory skid resistance standards "*one major deterrent to the adoption of such mandatory standards is common throughout the world, and that is the legal consequences of such action"*.

Silence though will not result in funds for improvements. Without a full account of the reasons for the skid resistance standards and the potential consequences of non compliance there is no basis for funds. Furthermore, and of greater concern, the silence results in a hidden risk to road users.

Background to Investigatory Levels and Site Categories

The Vicroads/RTA document "*A guide to the measurement and interpretation of skid resistance using SCRIM"* has been the de-facto standard for DIER and for several other Australian States in relation to:

- The method of measurement of the Sideways Force Coefficient (SFC). Readings are taken in both wheel paths. The SFC for any 100m section is the minimum four-point rolling average of measurements taken at 5m intervals within the 100m section.
- The classification of road network sites. There are seven (7) categories.

The site categories are defined in Fig 1, together with the advised Investigatory Levels (ILs). DIER has subsequently developed a new set of ILs for SFC based on the WDM report.

Investigatory levels are defined in the guide as "*the level of skid resistance at or below which a site investigation is to be undertaken'*. Unlike the definition in HD28/04, it makes no claim that the IL "*represents a limit, above which the skid resistance is assumed to the satisfactory'*. While not stated, it seems that the ILs have been based on a policy of equal risk to all road users.

Site Category	Site Description	INVESTIGATORY LEVELS OF SFC_{50} (at 50 km/h or equivalent)						
		0.30	0.35	0.40	0.45	0.50	0.55	0.60
		CORRESPONDING RISK RATINGS						
		1	2	3	4	5	6	7
1 (see notes)	Traffic light controlled intersections Pedestrian/school crossings Railway level crossings Roundabout approaches		INVESTIGATION					
2	Curves with radius =< 250m Gradients => 5% and => 50m long Freeway/highway on/off ramps		ADVISED					
3 (see notes)	Intersections							
4	Manœuvre-free areas of undivided roads							
5	Manœuvre-free areas of divided roads							

Site Category	Site Description	INVESTIGATORY LEVELS OF SFC_{20} (at 20 km/h or equivalent)						
		0.30	0.35	0.40	0.45	0.50	0.55	0.60
		CORRESPONDING RISK RATINGS						
		1	2	3	4	5	6	7
6	Curves with radius =< 100m			INVESTIGATION				
7	Roundabouts			ADVISED				

KEY TO THRESHOLDS AT OR BELOW WHICH INVESTIGATION IS ADVISED:

Figure 1; Site Category Descriptions and Investigatory Levels. (Vicroads/RTA Guide)

The ALARP Principle

In HB 436:2004, the companion document to the Australian Standard AS/NZS 4360; 2004 "Risk Management", the following definition of "reasonably practical" by Lord Justice Asquith 1949 is provided.

"*Reasonably practical" is a narrower term than "physically possible" and it seems to me to imply that a compilation must be made by the owner, in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time and trouble) is placed in the other; and that if it be shown that there is a gross disproportion between them – the risk being insignificant in relation to the sacrifice – the defendants discharge the onus on them".*

The quote indicates that in order to justify an IL, the road authority is required to show by computation that the sacrifice is much greater than the safety benefits that would result from the adoption of a higher SFC as the IL. The author's argument is simply that we all have a duty not to expose any one or thing in our care to unnecessary risk.

With respect to the ILs in Figure1, it is the author's contention that an IL of 0.35 for manoeuvre free dual carriageways is inconsistent with the ALARP principle. To demonstrate compliance, it would need to be shown that the adoption of a higher IL, at say 0.40, 0.45 etc, values that are adopted for other categories, involves a cost that is grossly disproportionate to the benefit.

WDM'S REVIEW OF INVESTIGATORY LEVELS

The WDM report was based on a comparative analysis of SFC and wet road traffic accidents recorded over a four year period, 2003 to 2006 (inclusive). A total of 2145 accidents were involved. Table 1 provides a summary of the number of wet road accidents, lane lengths and travel distances covered in WDM's analysis.

Table 1, Wet road accidents, lane lengths and vehicle travel distances used by WDM

Site Category	Wet Road Accidents (1)			Lane Length km		Travel/Annum (2)	
	Single	Dual	Total	Single	Dual	Single	Dual
1	29	124	153	14.6	6.0	0.13	0.25
2a	240	154	394	936.9	51.9	2.78	1.76
2b	246	36	282	858.5	13.6	2.30	0.46
2c	114	18	132	357.2	4.5	0.56	2.43
3	86	20	106	75.6	3.6	.40	0.11
4	569	1	570	3723.3	2.1	14.23	0.05
5	0	256	256	18.3	186.4	0.35	5.75
6	217	35	252	342.4	2.5	0.56	0.07
Totals	**1501**	**644**	**2145**	**6328.8**	**270.6**	**21.31**	**8.66**

1. *Over a 4 year period 2003 – 2006*
2. *Refers to estimated total vehicle travel (Vehicle km x10^8/year) and is used in the calculation of wet road accident rates. It includes travel on both wet and dry pavements. Consequently the Wet Road Accident Rate is not a measure of actual accident rates on wet roads.*

The approach adopted by WDM included:

- The breakdown of the road network into the six (6) of the site categories referred to previously (Figure 1). Site Category 7 was excluded from the analysis.
- Three (3) subcategories within Category 2 for both single and dual carriageways as follows:
  - Cat 2(a) Grades >5% but <10% and radii > 250m
  - Cat 2(b) Grades <5% and radii < 250m
  - Cat 2(c) Grades >5 but <10% and radii <250m.
- Ten SFC bands. Each band covered a 0.05 step (eg 0.30 to 0.34). The bands ranged from an SFC of <0.30 to >0.70.

In total 16 categories and sub-categories and 160 data bins were created. Each 100m section of the road network was allocated to the appropriate bin based on its SFC together with:

- the number of wet road accidents

- the annual vehicle travel in the particular lane expressed in terms of vehicle kms per annum. The travel was estimated from the Average Annual Daily Traffic, AADT.

The data within each bin was used to calculate the average annual accident rate expressed as Wet Road Accidents per 10^8vehkm. Graphs showing the relationship between SFC and the wet road accident rate were produced for each category as illustrated in Figure 2.

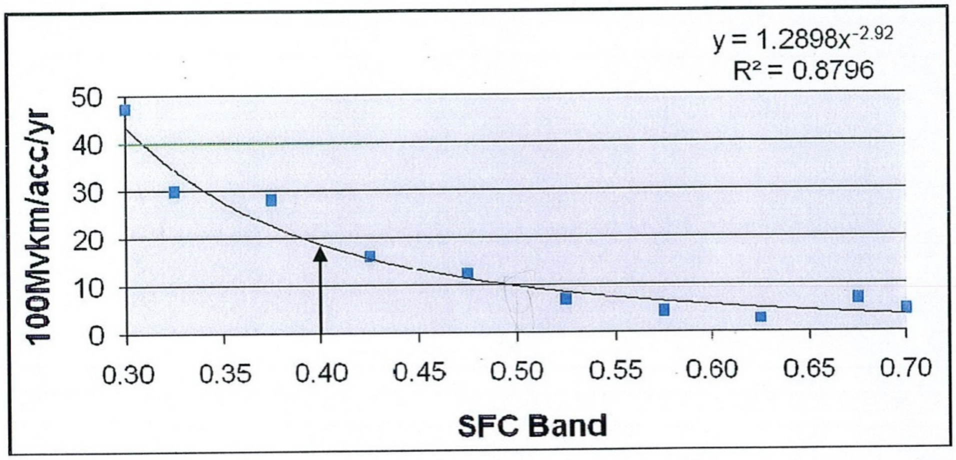

Figure 2 : Accident Rate versus SFC for Category 4 roads(WDM)

In their report WDM stated that "*the aim of a skid resistance policy is to provide a uniform risk of wet road skidding accidents across the network". WDM adopted a background rate of 18.7 wet road accidents/10^8veh km. This background rate was then used to derive the ILs for the other site categories. The basis for this background rate was not explained beyond that it corresponded to the estimated accident rate for Site Category 4, at the then existing IL of 0.40 (Figure2).

Figure 3 plots the wet road accident rate on a log-scale against SFC for Site Categories 2, 4, 5 and 6. It can be seen from the figure that at an accident rate of 20 (18.7), the corresponding SFCs are approximately:

- Category 2 (single and dual) about 0.5 to 0.55
- Category 4 and 5 about 0.40
- Category 6 (single) about 0.7.

WDM recommended the adoption of the following ILs:

- Category 1 – 0.55
- Category 2(a), 2(b), 2(c) – 0.50
- Category 4 and 5 – 0.40
- Category 6 – 0.6.

These ILs have been adopted in DIER's "*Skid Resistance Management Plan 2009*".

A common feature of the plots is that the accident rates for the second highest and highest SFC bands do not follow the falling trend with increasing SFC. The cause has not been established.

The report did not take the analysis of data any further than outlined above, nor did it contain a record of the data (e.g. number of accidents, lane lengths, traffic) on which the plots and recommendations were based. DIER has provided this information which has been compiled in Appendix A and used in the following analysis. The points plotted in the figures do not always have the same reliability. Some are based on 1 or 2 accidents and others on 50 and more accidents.

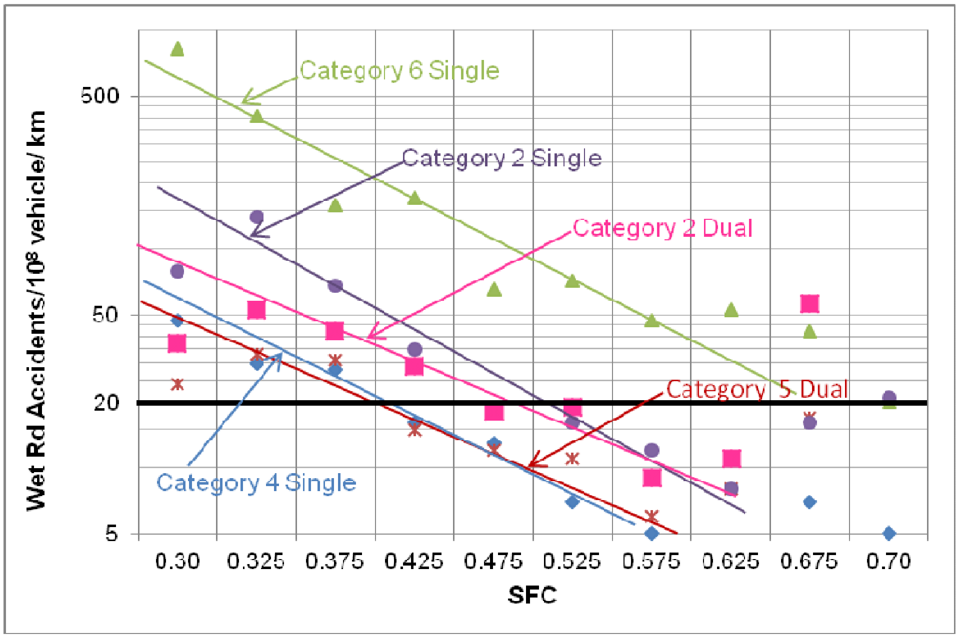

Figure 3: Wet Road Accident Rates Versus SFC for Site Categories 2,4,5&6

Note: *The SFC has been plotted at 0.275 and 0.725 for the lowest (<0.30) and highest SFC(>0.70) bands. For the intermediate bands the midpoints (0.325, 0.375 etc) of the bands have been plotted. The lines shown above are trend lines and have been drawn by eye. The trend lines do not include the accident rates for the two highest SFC bands.*

FURTHER ANALYSIS OF THE WDM DATA

The author's concern with the adoption of a background accident rate of 18.7wet road accidents per 10^8 vehicle km lay with:

1. The value appeared to be arbitrary and had not been justified by benefit-cost or other considerations.
2. The plots of SFC versus accident rate indicated that accident rates lower than 18.7 might be achievable in Categories 4 and 5. In Figure 2 an accident rate of 10 is indicated at an SFC of 0.50. The question arises as to "*Why an accident rate of 18.7 was preferred to a lower and apparently safer rate of say 10 or 5 wet road accidents per 10^8 vehicle km?"*

A statistical correlation between two properties, here between SFC and the wet road accident rate, is not necessarily reliable evidence that one property effectively regulates the other. In order to test the nature and strength of the observed correlations a closer look was made of the data for categories 2, 4, 5 and 6. These are the manoeuvre free site categories. Their larger data sets make them more amenable to analysis.

In considering the following, it is likely that 90% plus of the single carriageways will have a sprayed seal surface and in consequence will generally have significant texture. A significant proportion of the dual carriageways will be surfaced with asphalt (i.e. low texture depths).

Influence of Traffic Intensity, AADT

The AADT is the aggregate of daily traffic using all lanes of the roadway. Table 2 records the average AADT of the site categories and subcategories within each SFC band. Figure 4 plots this data for the single carriageways of categories 2, 4 and 6.

Table 2: Relationship between AADT and SFC for Site Categories 2,4,5 and 6

	Site Category (AADT)							
SFC Band	**2(a)s**	**2(b)s**	**2(c)s**	**4**	**6**	**5**	**2 (single) (a, b &c)**	**2(dual) (a,b&c)**
<0.3	2493	2867	1420	2592	719	12526	2394	18630
0.325	2274	2708	1710	2685	1382	14602	2371	26070
0.325	2481	2678	1587	3068	1385	16186	2396	22360
0.425	2430	2150	1431	2794	1148	18610	2158	22330
0.475	2164	1733	1077	2457	1159	17734	1827	19900
0.575	1989	1329	821	2340	933	17510	1538	17120
0.575	1267	1345	649	2006	836	15400	1196	16460
0.625	844	1030	488	1442	561	15637	8448	21830
0.675	749	706	553	1142	408	17146	697	18930
>0.70	673	635	535	832	419	19941	571	24960

Note: The average AADT has been calculated from the vehicle travel distances and lane lengths recorded in Appendix A

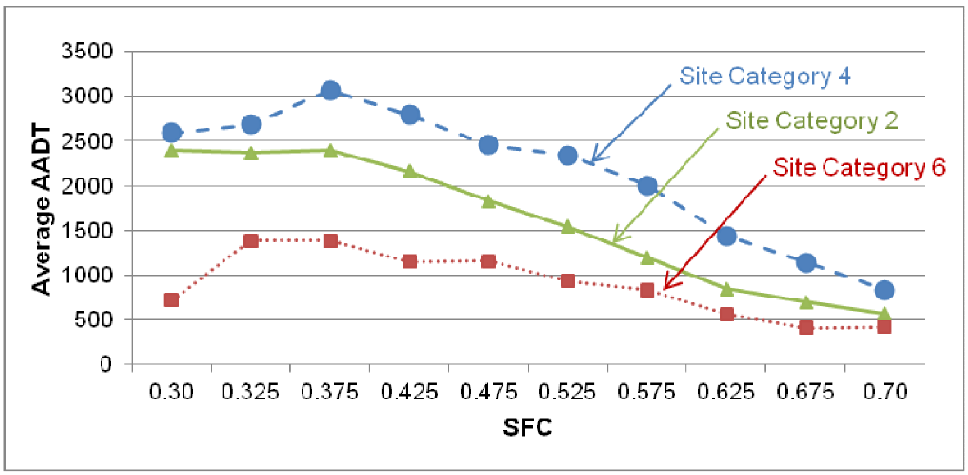

Figure 4: Relationship between SFC and AADT for single manoeuvre free carriageways

SFC and AADT appear to be strongly correlated in the higher SFC ranges for the single carriageways but not for the more heavily trafficked dual carriageways (Table 2). Common features within the categories and subcategories of the single carriageways are:

- The high SFCs occur at low average AADTs.
- At a particular AADT, the SFC falls with an increase in the friction demand. Here it is assumed that a vehicle negotiating a Category 6 site will require more friction than that required of a Category 2 site. The friction demand in the Category 4 sites will be lower again.
- The marked dependence of SFC on AADT is not observable in at SFCs below about 0.45.

The data suggests that the lower accident rates recorded at the high SFCs (Figs 2 and 3) may not be achievable under higher traffic intensities, at least not without an increase in the polishing resistance of aggregate used in the surfacing. With respect to this matter, the polished aggregate friction (PAFV – roughly equal to PSV) of aggregate used in sprayed seals for the period of analysis is likely to have been in the range of 0.42 to 0.52.

It is possible that the low traffic levels have contributed to the low accident rates, but the size of this contribution has not been established.

CONTRIBUTORS TO AND CAUSES OF WET ROAD ACCIDENTS

Figures 2 and 3 do not provide a reliable measure of the likely size of the contribution that low SFCs make to wet road accident rates. It is argued in the following, along lines used by Roe, Webster and West, that if SFC was not significant in accident occurrence, then it could be expected that the distribution of accidents across the SFC range would largely coincide with the distribution of travel distances across the same range and that the proportion of accidents would roughly equal the proportion of travel.

Figure 5 includes plots of the proportional distribution of both travel distance and wet road accidents across the ten SFC bands for Site Category 2(b) single and Category 2 (combined a,b,c), dual.

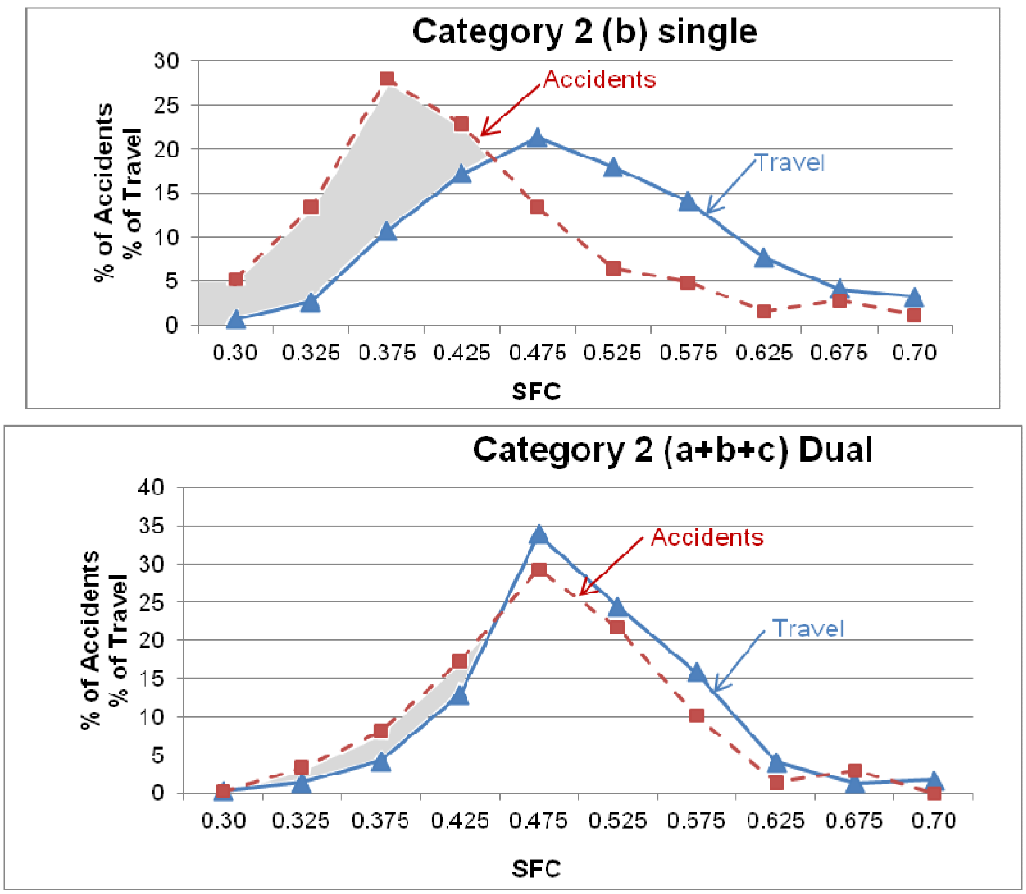

Figure 5: Distribution of Wet Road Accidents and Travel Distances across the SFC range, for Site Category 2

It can be seen that the plots of accident and travel distances are not coincident. In the upper plot of Figure 5 , a significant proportion of accidents about 34% (shaded area), falls outside the travel distance plot. Table 3 includes estimates of the proportion of wet road accidents that falls outside the travel distance distribution. These, it is argued, cannot be attributed confidently to driver behaviour. The most likely contributor is a low SFC. Table 3 also includes estimates of the Chi (X^2) square function derived from the comparison of the distributions of travel and accident occurrence. The significance level refers to the hypothesis that the two distributions are equal. A low significance level suggests that the distribution of accidents is significantly different to the distribution of travel.

Table 3: Proportion of Accidents not within the Travel Distance Distribution

Site Category	Area %	X^2	Significance Level
2(a) single	17	59.8	<<.001
2(b) single	34	125.1	<<.001
2(c) single	36	73.5	<<.001
2 (combined) single	27	95.7	<<.001
2 (combined) dual	10	10.2	0.50
4 single	23	44.2	<0.001
5 dual	15	23.6	<0.01
6 single	29	78	<<0.001

Note: The accuracy of the area estimates are likely to be in the order of ± 3 to 5%.

The above estimates indicate that in 15 to 35% of wet road accidents on single carriageways low SFCs provide a better explanation of high accident rates than driver behaviour.

While the estimated contribution of low SFCs to accident rates was about 10% for Category 2 (dual) carriageways, the Chi (X^2) analysis indicates that it is not a reliable assumption to attribute this to SFC. It is suspected that other factors (e.g. texture depth) may be significant for Category 2 duals. The same might apply to Category 5, but to a lesser extent.

Variation in Accident Rates within Categories

An examination of Figure 6 will show that the wet road accident rate of Subcategory 2(c) (grades>5% and radii<250m) is 2 to 3 times that of Subcategory 2(a) (grades > 5% and radius >250m). The span in SFC between subcategories 2(a) and 2(c) is 4 SFC bands at WDM's benchmark rate of 18.7,

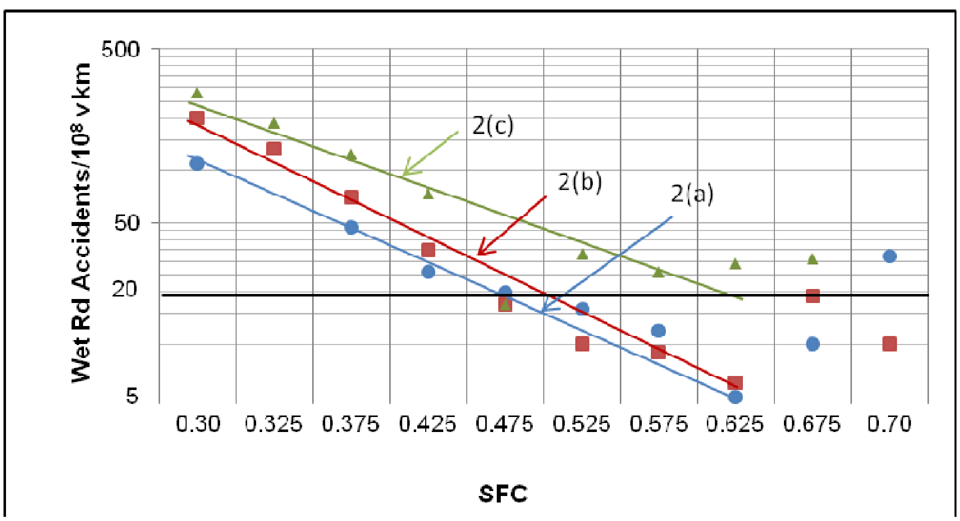

Figure 6: Wet Road Accident Rates Versus SFC for Site Categories 2, a, b & c combined for single carriageways.

These large spans in accident rates and SFC within Category 2 are derived from average values. If individual sites were taken into account, the spans within the site category are likely to be larger. The geometric conditions within Site Category 2, for instance, can vary from a straight section of roadway with a 5% grade to a winding road with a gradient approaching 10% and radii just over 100m. The former is likely to have a much lower friction demand than the latter. An equivalent diversity in geometry and complexity can be expected in the other site categories.

Unless this diversity in conditions within categories is recognised in the determination of ILs, road users will be exposed in places to unnecessarily high risks. In DIER's "*Skid Resistance Management Plan*" guidelines are provided for the adjustment up and down by one band width.

PERSONAL RISK VERSUS PUBLIC SAFETY

The ILs derived by WDM were based on a policy that there should be "*a uniform risk of wet road skidding accidents across the network"*. This approach leads to the assignment of the lowest ILs to the highest class of roads. Two significant questions arise:

- *"Does it make sense to allow the surfacing of heavily trafficked dual carriageways to deteriorate to an SFC level below what would be acceptable for a lowly trafficked Category 2 road, simply in order to satisfy an abstract concept of equal risk to all road users?*
- *Can exposing the road users to risks greater than the lowest reasonably practical risk without their knowledge be morally justified, and if so, who should have the authority to do this?*

A different set of ILs might arise from a policy that aimed at maximising public safety by minimising the number of wet road accidents within the network. The policy would aim to direct expenditure on those sections of road that have the highest accident rates per lane km. Such a policy could be based on a benchmark, "*accidents per lane kilometre per year*." The values of " Wet road accidents /100 lane km/year", calculated from Appendix A are included in Table 4.

Table 4: SFC versus Wet Road Accidents/Lane km/Year

Wet Road Accidents /100 Lane km / Year						
	Category 2		Category 4	Category 5	Category 6	
SFC Band	Single	Dual*	Single	Dual*	Single	Dual*
<0.30	81	63	23	28	154	
0.325	61	125	15	43	143	
0.375	29	85	16	45	57	540
0.425	14	58	8.4	25	50	286
0.475	6.1	34	5.6	19	20	63
0.525	4.3	30	3.0	17	17	42
0.575	2.7	21	1.7	8	10	
0.625	1.2	15	0.8	11	7.6	
0.675	2.0	95	1.4	26	3.9	
>0.70	2.2	-	0.7	5	1.9	

Note: The wet road accident rates/lanekm/year for the dual carriageways have been based on the assumption that they have four (4) lanes. The rates for the duals were calculated on the same basis as the single carriageways. The rate was then divided by two.

Figure 7 plots the tabulated data. It can be seen that the accident rate/lane kilometre/year for Category 5 dual carriageways is higher than that for Category 2 single and 3 to 4 times the rate for a Category 4 single carriageway.

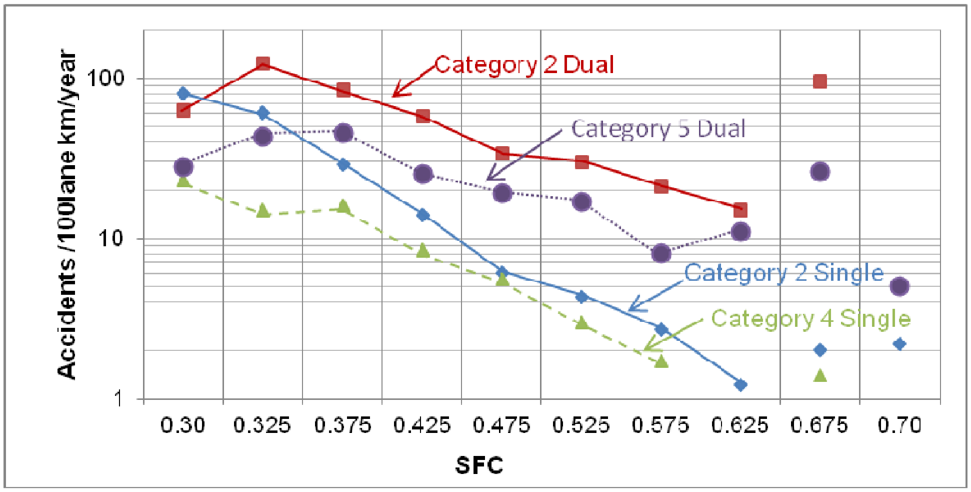

Figure 7: Wet road accidents /100 lane km/yr versus SFC

The appropriate bench mark rate for accidents/ lane km/yr would have to be calculated on a benefit/cost basis because of the different costs of the surfacing appropriate to the particular site category. Whatever the benchmark, the accidents/ lane km/year approach is likely to result in higher ILs for heavily trafficked roads such as the dual carriageways.

It is not argued that one or other of the two policies, equal risk or minimising accidents, should have primacy over the other. It is considered that both approaches should be part of a mix of considerations in the establishment of ILs. The ALARP principle must also be satisfied.

DIER's "*Skid Resistance Management Plan*" provides for an increase in the IL by one band width for high traffic flows. This should increase the ILs of most dual carriageways by a further 0.05.

SUMMARY OF ANALYSIS OF WDM DATA SET

The further analysis of the WDM data has indicated that:

- A significant proportion of wet road accidents, between 15 to 35% for single carriageways and about 15% on Category 5 dual carriageways cannot be directly attributed to driver behaviour or vehicle defect. A better explanation lies with low SFCs.
- While accident rates for Category 2 dual roads decrease with increasing SFCs, it is not possible to show that this reduction in accident rates is related to higher SFCs.
- The generally lower wet road accident rates observed at high SFCs in single carriageways may not be achievable under heavier traffic spectrums without an increase in the polishing resistance of surfacing aggregates.

It has been shown that a policy focused on accidents/lane km/year and public benefit would result in a different set of ILs to a set based on the existing policy of equal risk to all road users per unit of travel. It is argued that ILs should be based on a balance between individual risk and public benefit always tempered by ALARP considerations.

OWNERSHIP OF SKID RESISTANCE POLICY AND ILS

The ownership of the ILs must lie with the community. It is the community who, as road users, will pay for the consequences of inappropriately low ILs and, as tax payers, bear the cost of road improvements. Effective ownership will not eventuate without understanding. Understanding will not develop while the silence about road surfaces in accident frequency and prevention prevails.

ILs are not value free. They will be fashioned around the values, perceived threats and opportunities of those involved in setting them. A road authority is likely to be in fear of a situation where the ILs are beyond its capacity, financial or technical, to provide. ILs, however, determined without public understanding and ownership may fail to generate public support for the funds necessary to maintain the network in an appropriate state.

The road authority's staff must have ownership of the ILs and support and understand the reasons for them. Not only will staff be required to implement the skid resistance policy, they may be required to defend the policy and its effects in public forums and before coronial hearings and courts of law.

The government must also be persuaded to own the ILs, for without government ownership there will be little chance of establishing an effective long-term skid resistance and road safety strategy. Figure 8 illustrates the form and nature of the desirable relationship between the road authority, the community and the elected government.

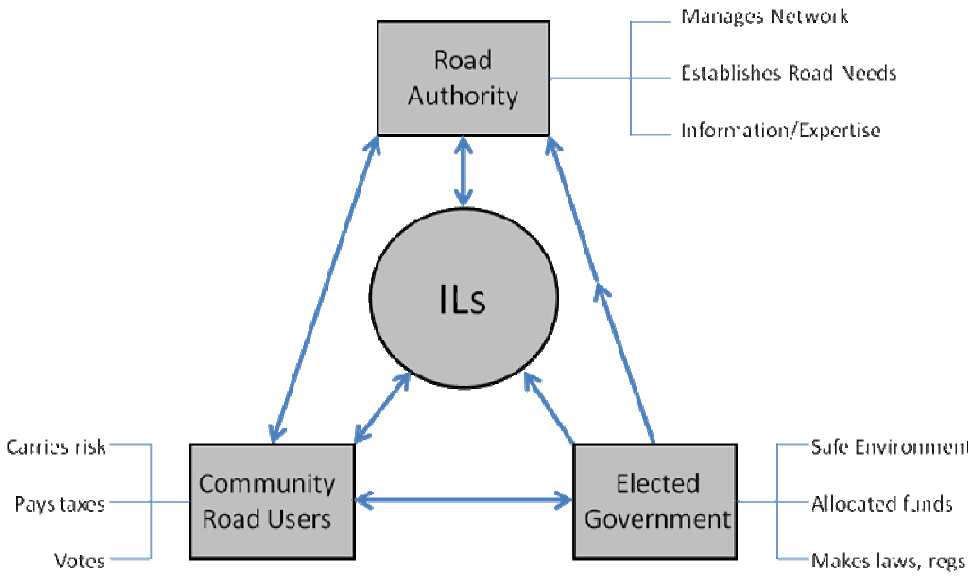

Figure 8: Desirable Relationship between the Road Authority, the Community and the elected Government

There will be many competitors for an increased stake on the public purse, many with well established claims and vocal public support. In this competitive environment, the case for additional funds has to be built on solid grounds. It will need to be shown that increased expenditures on road surfaces are justified on "whole of government grounds" by offsetting costs in other areas, hospitals, rehabilitation, lost time etc,

The current Austroads and Australian Standard's definition of Investigatory Level tells nothing about its purpose. It also excludes texture depth. For wider acceptance of the concept of ILs the definition should make reference to its safety implications. This could be on the lines of the HD28/04 definition "*represents a limit, above which the skid resistance is assumed to the satisfactory"'* or alternatively "at or *below which there are possible skid resistance concerns*".

SILENCE IS NO LONGER AN OPTION

ILs are essentially risk control and management devices. There is a suite of Australian and International Standards concerned with risk management that mandate the involvement of key stakeholders in the development of the risk strategy and risk control devices. This should apply to the determination of ILs for road surfaces.

In introducing the Tasmanian *Right to Information Act* 2009 (No.68) ,the Minister stated that the bill *"mandated the proactive release of information*" and that "*the disclosure would enhance scrutiny of government decisions – making processes and thereby improve accountability and participation"*. The minister drew favourable attention to the routine release of information and specifically mentioned the Health Progress Report and the Schools Improvement Report. The routine release of information on the health of the road surfaces, for example a breakdown of the proportion of the network below the adopted ILs, would be entirely in keeping with the minister's intentions. Similar bills with similar demands on government instrumentalities are likely in other Australian states.

The previous concern that the release of information would not be in the interest of the public, because of potential litigation, is no longer a sustainable position. The bill should be seen as an opportunity to establish a genuine and robust dialogue with the community at large and to place before the community the vital roles that road surfaces play in road safety. Furthermore, as indicated above, there is a requirement under risk management standards for such a dialogue.

In this coming dialogue, road authorities will need to explain the basis for the current ILs and its strategy to improve road surface properties. In Tasmania, the public needs to be made aware of legacies of relatively low polishing resistance aggregates and low textured asphalts and that considerably time and resources may be required to reach a preferred state.

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BIOGRAPHY:

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Graduated BE (Civil), University of Qld in 1961 and awarded ME in 1966. Prior to becoming Materials and Research Engineer with the then Tasmanian Public Works Department, worked as geotechnical engineer in Qld, Sth Australia and Malaysia. As Materials and Research Engineer represented the state road authority on NAASRA and Austroads technical committees concerned with pavements for over 20 years. Convenor and part author of " *A guide to the visual assessment of pavement condition*" NAASRA 1987. From 1998, Principal Geotechnical Engineer with Pitt and Sherry. The essence of this paper is not technical. It arises from long held beliefs that a healthy society must be safe, fair, open and caring.

Appendix A
WDM's Data for Site Categories 2, 4, 5 & 6

Site Category	Attribute (1)	SFC Band									
		<0.30	0.325	0.375	0.425	0.475	0.525	0.575	0.625	0.675	>0.70
2 (a) Single	Rate	110	132	47	26	20	16	12	5	10	32
	Accidents	4	19	36	48	50	45	19	3	4	12
	Lane Km	2	8.7	41.9	104.9	162.2	191	165	106.4	77.3	77.5
	Traffic	0.0091	0.3610	0.1897	0.4650	0.6407	0.6934	0.3816	0.1640	0.1057	0.0951
2 (b) Single	Rate	200	133	70	35	17	10	9	6	19	10
	Accidents	13	33	69	56	33	16	12	4	7	3
	Lane km	3.1	12.6	51	101.4	155.1	171	132.5	94.5	73.7	63.6
	Traffic	0.016	0.062	0.248	0.397	0.49	0.414	0.325	0.178	0.095	0.074
2 (c) Single	Rate	282	189	125	74	17	33	26	29	31	
	Accidents	5	12	31	30	7	14	7	5	4	
	Lane km	1.7	5.1	21.4	37.6	53.5	70.4	57.4	49	32.5	28.6
	Traffic	0.004	0.016	0.062	0.098	0.105	0.105	0.068	0.044	0.033	0.022
2(a) Dual	Rate	37	17	37	36	17	21	13	8	21	
	Accidents	1	1	12	31	39	40	16	2	2	
	Lane km	0.2	0.4	1.9	5.7	15.9	15.2	9.7	1.7	0.6	0.6
	Traffic	0.007	0.014	0.081	0.214	0.559	0.467	0.309	0.066	0.024	0.02
2 (b) Dual	Rate		79	61	18	13	8	17	7	176	
	Accidents		6	5	3	8	3	5	1	5	
	Lane km	0	0.3	0.6	1.1	4.5	2.8	2.9	0.8	0.3	0.3
	Traffic	0.019	0.021	0.041	0.152	0.09	0.074	0.034	0.007	0.021	
2 (c) Dual	Rate				8	31	13				
	Accidents				2	14	2				
	Lane km	0	0	0	0.9	2.3	1	0.3	0	0	0
	Traffic				0.059	0.113	0.037	0.005			
4 Single	Rate	47	30	28	16	13	7	5	3	7	5
	Accidents	8	19	80	118	158	105	48	13	13	7
	Lane km	8.9	32.2	126.7	355.1	703.8	873	726.3	433	222.8	241.5
	Traffic	0.042	0.016	0.71	1.811	3.157	3.728	2.659	1.141	0.464	0.366
5 Dual	Rate	24	33	31	15	12	11	6	8	17	3
	Accidents	4	9	22	34	69	63	26	15	13	1
	Lane km	1.8	2.6	6.1	16.7	46	47	40.1	17.5	6.3	2.3
	Traffic	0.041	0.069	0.18	0.566	1.487	1.5	1.126	0.499	0.197	0.084
6 Single	Rate	827	402	159	171	66	72	47	53	42	20
	Accidents	7	26	36	57	29	29	16	10	5	2
	Lane km	1.6	6.4	22.4	39.8	51.7	59.4	56.2	46	32.1	26.8
	Traffic	0.002	0.016	0.057	0.083	0.109	0.101	0.086	0.047	0.03	0.025
6 Dual	Rate			434	141	57	28				
	Accidents			13	16	5	1				
	Lane km	0	0	0.3	0.7	1	0.3	0.1	0.1	0	0
	Traffic			0.008	0.028	0.022	0.009	< 0.0001	< 0.0001		

1. Rate refers to Wet Road Accidents/10^8 vehicle kilometres.
   Accidents over 4 year period 2003 – 2006
   Traffic – annual vehicle travel x 10^{-8}km