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## Implementation Of Road Safety Audit

by

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## **INTRODUCTION**

For a number of years, authorities have focussed on reactive strategies such as 'blackspot' programs to increase safety. Road safety audit (RSA) is a concerted attempt to encourage the safety aspects of projects to be reviewed during the design process. Since its introduction in the UK in the 1980s, Road Safety Audit has been used in an increasing number of countries as organisations recognise the impact it can have on the number and severity of accidents.

This paper aims to examine the level of implementation of road safety audit in local government authorities in New Zealand and the state of Victoria in Australia. The paper sets the scene by providing a brief overview of the development of RSA in the two localities before mentioning some of the important issues currently being faced. The objectives, methodology and results of road safety audit implementation studies recently undertaken are then discussed.

### **Australia**

Development of RSA in Australia began in 1990 after a Road Hazards Conference in NSW where representatives from the UK outlined their existing RSA program. AustRoads began weighing up the benefits and costs of RSA in 1992. They came to the conclusion that RSA had the potential to provide real safety benefits for Australian road users (Jordan, 1994). Consequently, the initial guidelines for RSA were released by AustRoads in 1994 (AustRoads, 1994) and RSA is now in place in each state road authority. The AustRoads Guidelines have provided the basis for road authorities in many other countries but at present, local government in Victoria is under no obligation to implement RSA on their projects.

### **New Zealand**

Safety auditing began in New Zealand in 1990 with a series of Post Construction audits. Training courses were run in 1991 and 1992 by Mike Googe from UK and Phil Jordan from Australia. A Policy and Procedures Manual was developed by Transit New Zealand in 1993 and audits became mandatory for 20% of state highway projects per year in that year.

The pilot safety audits were run to develop awareness of safety audit among Local Authorities. However, RSA in New Zealand Local government is not yet mandatory. In 1995, a number of pilot audits of existing roads have been undertaken and draft procedure was developed in 1996.

## **SOME IMPORTANT ISSUES IN RSA**

There are many issues of importance to RSA due to both its infancy and rapid rate of growth internationally. Issues that are of significance under one socioeconomic environment or national culture can be less important under another. Issues of importance currently, include when and at what stages RSA should be implemented, the accreditation and experience of those carrying out audits, the level of formality of audits, the closing of the audit loop and the benefits and costs of RSA. A detailed discussion of these issues can be found in Daly et al (1998).

This section examines some of the issues commonly encountered, with an emphasis on those directly relevant to local government in Australia and New Zealand.

## **RESPONSIBILITY OF LOCAL GOVERNMENT**

Local government in Australia and New Zealand has significant responsibility for road safety. A large part of the public road network comes under the jurisdiction of local government and potential savings generated by road safety audits are high.

### **Victoria**

Victorian local government consists of 79 individual municipal councils. It is the third level of government in Australia and is directed by the Local Government Act 1989. This includes specific responsibilities for bridges, footpaths, bicycle paths, traffic control, road signs, lighting and drainage of roads as well as transport and parking in general.

Local Government collects around four percent of the national taxation dollar (MAV 1996). Victorian local governments spend approximately \$3.2 billion per year and raise their revenue from a range of sources including (MAV 1996):

- property rates (approx 45%)
- government grants (approx 20%)
- user charges (approx 17%)
- loans and other sources (approx 18%)

Local government in Australia is responsible for nearly 631,000 kilometres of the public road network (AustRoads 1994a), which is around 79% of the national total. The length of road in the jurisdiction of Victorian local government is around 138,300 kilometres which is 86% of the Victorian public road network by length and 17% of the national total by length (AustRoads 1994a). Of this length of road, approximately 17% is classified local government urban and 73% local government rural.

### **New Zealand**

In New Zealand there are 74 Territorial Local Authorities (TLAs) and they are all presently responsible for the construction and maintenance of roading in their areas. They obtain funding for this purpose from Transfund New Zealand, the government road-funding agency and from property taxes (rates) on landowners. There is a State Highway system, which is managed by Transit New Zealand. It is fully funded by Transfund.

The Local Authorities are responsible for 81,500km of roads and the State Highway network is 10,500km in length. The entire State Highway network is sealed but about 30% of local roads are not sealed, largely in rural areas.

## **CASE STUDY - IMPLEMENTATION OF ROAD SAFETY AUDIT BY LOCAL GOVERNMENT.**

Recent formal examination of RSA implementation in local government has only been undertaken in New Zealand (Transfund, 1997). Assessment in other countries has so far been restricted to experiences of those working in or with local authorities and speculation.

The Transit New Zealand Safety Audit Policy and Procedures were released in 1993. The AustRoads Guidelines for RSA were first published in 1994. They were aimed primarily at encouraging local government to undertake RSA. In Australia the assumption was made that the state road authorities had higher resource levels and were better able to develop their own procedures.

This section of the paper summarises some of the main findings of two recent independent local studies undertaken by the Department of Civil Engineering at Monash University (Morgan and Daly, 1998) and Tony Francis and Associates Ltd. (TransFund 1997) into the implementation of RSA in local government. It builds on an earlier paper by Daly et al. (1998), using an expanded data set.

### **Survey instrument**

#### **Victoria**

A mail-out, mail-back self-completion questionnaire was sent to 50 local government authorities in Victoria in early April 1998. The survey was accompanied by a covering letter on Monash letterhead, which amongst other things, made it clear to respondents that confidentiality would be assured and individual responses would not be identified. A stamp-addressed envelope was also included for return of the survey.

The survey was distributed with four main objectives in mind. These were:

- To determine the degree of RSA implementation in local government throughout Victoria.
- To determine the effectiveness of RSA implementation in local government throughout Victoria.
- To ascertain reasons for any lagging or ineffective implementation of RSA in local government throughout Victoria.
- To provide sufficient information to allow the provision of recommendations which will encourage the effective implementation of RSA in local government throughout Victoria.

The survey was 3 pages long and contained a combination of open ended questions (requiring the respondent to answer in their own words) and structured questions (pre-specifying a set of response alternatives). Open-ended questions were provided to allow some additional feedback which would not have been possible with structured questions alone. It was made clear in the survey that if a respondent's local government was not implementing RSA, they were only required to answer certain questions.

The final number of surveys returned was 41, which equates to 82% response rate. Although the response rate for the survey was excellent and those returned were almost always fully completed, the given sample size per response category was sometimes relatively small due to the distribution of answers.

### **New Zealand**

In May 1996 a postal questionnaire was sent to all 74 Territorial Local Authorities and all of them eventually responded to it. The questionnaire was accompanied by a covering letter from Ian Appleton, Safety Audit Manager of Transit New Zealand. A direct response to Tony Francis and Associates Ltd. was requested.

The survey aimed to establish which Territorial Local Authorities undertook safety audit as part of their road design process, and what would encourage greater use of the safety audit process.

For those TLA's which undertake safety audit, questions were asked on the proportion of projects which were audited, who conducts the audits, how projects were selected to be safety audited, whether the Transit New Zealand Policy and Procedures Manual was followed and why all projects couldn't be audited.

For the TLA's that did not undertake safety audits, the reasons why they didn't and what would persuade them to under audits, was sought.

Most of the questions in the questionnaire were open-ended, seeking their comments.

### **Results**

The remainder of this section discusses some aspects of the analysis of the survey responses. As the surveys were designed to test slightly different hypotheses the questions asked did not have the same wording and in some cases sought a different emphasis. This section makes comparisons between the two response sets where appropriate and reports other findings of interest in each locality. Further information is available in Daly et al (1998) and Transfund (1997).

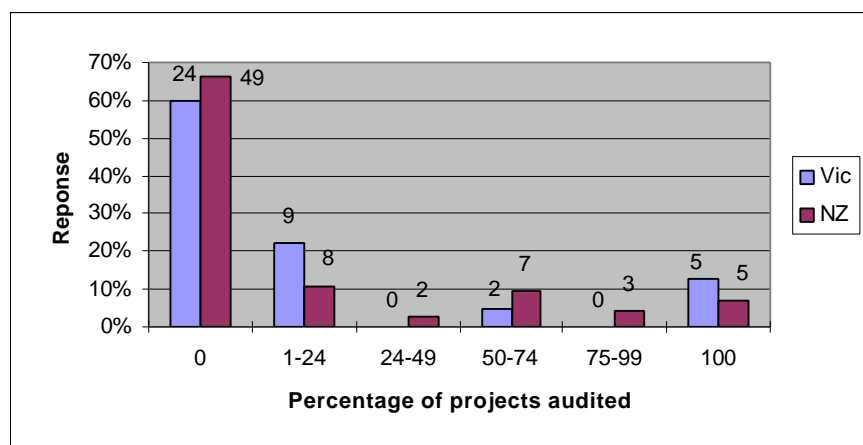
It was found that where multiple options were provided for an answer (ie. multiple choice), some respondents chose more than one response. This was also experienced in the New Zealand sample. All the responses chosen by a respondent for a particular question were included in the grouped data and any additional comments for each question noted. This should be taken into account when reading the following analysis of results. A clear distinction should be made between the number of respondents who answered a question, and the number of responses for that question (ie. the number of responses may be greater than the number of respondents for a question).

#### **Proportion of Projects (new and existing) Audited**

This question requested an answer from all respondents asking whether they have road safety audits done in their municipality. The NZ survey referred only to road

improvements. The Victorian survey included existing roads as well as new projects. Figure 1 shows the proportion of projects audited in the two studies.

Around 60% of Victorian municipalities responding to this survey do not use RSA's and around 40% do at least one audit per project. This is very similar to the levels of safety auditing in New Zealand (Transfund, 1997), where 66% of local authorities were reported as not doing safety audits and 34% (25 responses) auditing projects in at least one stage. The majority (24 responses) of Victorian municipalities who answered are not implementing RSA. Sixteen respondents said there was some degree of RSA implementation, with 13 of these auditing 10% or more of their projects.



**Figure 1 : Proportion of projects audited**

Of those municipalities in Victoria who do undertake safety audits, there is a significantly lower level of implementation than in New Zealand. Municipalities auditing 50% or more of projects comprise 44% of the sample (compared to 60%, 15 responses in New Zealand) and those auditing less than 50% comprise 56% of the sample (40%, 10 responses in NZ). Those purporting to audit 100% of projects comprise 31% of the Victorian sample (5 from 16) and 20% of the New Zealand sample (5 from 25). It should again be stressed that as we are dealing with modest samples, small changes to responses appear to be large percentage changes.

However the Victorian figures may be slightly worse than they seem as some confusion appears to exist about what a road safety audit actually is. One respondent, who stated that 100% of projects are audited, commented that their RSA is “more of a check with safety just one aspect covered”.

In New Zealand, a similar problem of understanding what constitutes a safety audit and what is a ‘design check’ also exists. Subsequent questioning of some Territorial Local Authorities showed that their staff confused a ‘in office’ check of the design, by another engineer with the safety audit process.

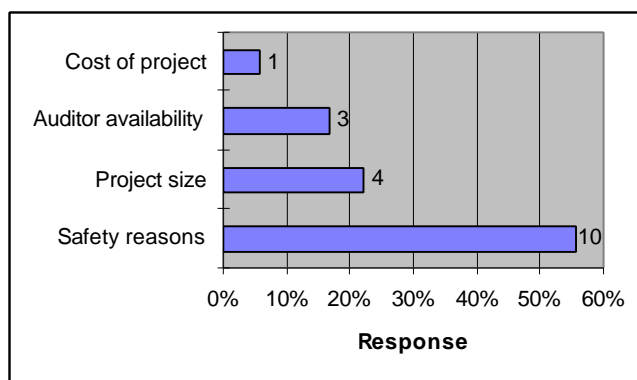
Some respondents provided additional information related to this question. One stated that that their municipality doesn't have official RSA's but generally use good design principles learned from attending RSA workshops. Another municipality had taken RSA very seriously, awarding a 3 year contract to a consultant to audit all new projects at more than one stage and on 20 existing sites per year.

### How projects are selected for safety audit

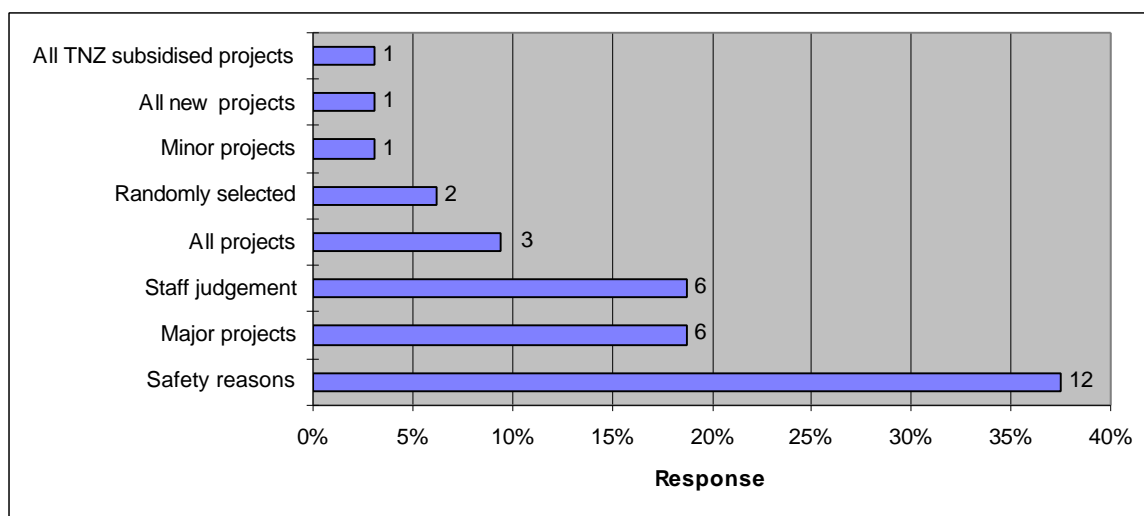
In Victoria, this question asked the respondents to select from a list the factor they considered most important when determining which projects are audited. In New Zealand, the 25 TLA's who undertake safety audit were asked how are projects selected' and 32 responses were received, some respondents giving more than one reason. The results are shown in Figures 2 and 3.

It can be seen in both samples that the perceived safety implications of a particular project are a key factor in determining which projects to audit. The NZ study found that 38% of reasons given by the 25 local authorities which undertake RSA's suggest that it is undertaken when there is a safety problem ("projects with a crash history, or for safety reasons"). This compares to 56% in the Victorian study.

In the Victorian study, the relatively low response for project size, cost of project and auditor availability should be noted. One respondent observed that often VicRoads request a RSA on externally funded projects, in which case there is little choice but to conduct a RSA.



**Figure 2 : How projects are selected for audit (Victoria)**



**Figure 3 : How projects are selected for audit (New Zealand)**



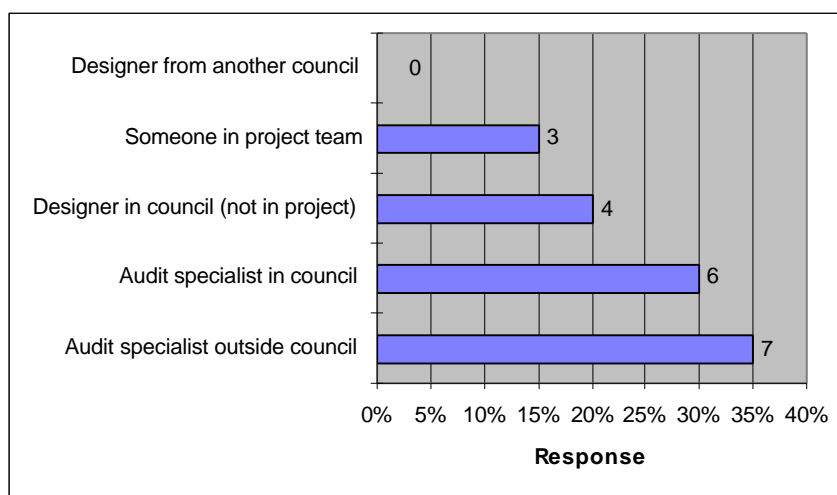
The importance of “perceived safety implications” has both positive and negative implications. It is good that local government recognises that safety audit has the potential to increase safety (as this is perhaps the main reason they are doing it) and this is to be encouraged. However, it is necessary that a balance between design audits and existing road audits is made. The survey reveals that the majority of respondents are carrying out design audits.

The potential for unsafe design to slip through the audit selection process would ideally be minimised. Twenty four percent of audits in the NZ study (6 out of 25 TLA’s) were selected by staff judgement. It is unclear what proportion of the Victorian responses fall into this category. The ability of the designer/selector to assess the potentially safety and decide whether a project needs to be audited is limited if they do not have audit experience. Preconceived notions of ‘safety’ and ‘unsafety’ based on prior experience may be flawed. It is preferable for all projects to be submitted to at least one road safety audit during the design phase.

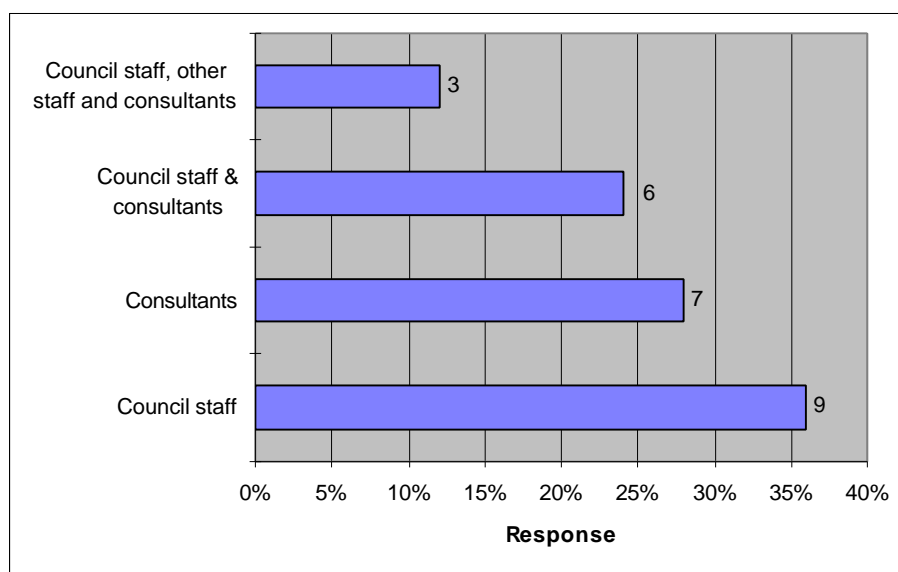
### Who undertakes the Audit?

This question requested respondents to select who performs the audit from a list of possible responses. The results are shown in Figures 4 and 5.

It should be noted that in Victoria some respondents chose more than one response, and therefore different auditors are being used within certain municipalities (eg. specialist(s) within councils for some audits and specialist(s) outside council for other audits).



**Figure 4 : Who is doing the audits (Victoria)?**



**Figure 5 : Who is doing the audits (New Zealand)?**

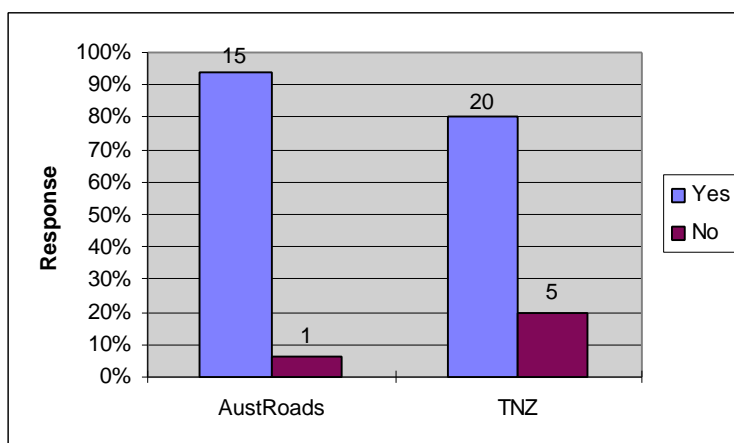
In NZ respondents had three choices, or a combination of them – TLA (or Council) staff, other Council’s staff and consultants.

In Victoria, the use of audit specialists appears to be the favoured option. Of the 65% of audits done by specialists, around half were done by external consultants, with the balance done within the council. In the NZ survey, 64% of the sample reported input from consultants with consultants alone responsible for 25%. Around 36% of NZ municipalities make use of internal resources to perform audits.

A concerning aspect of the Victorian study is the number of respondents using someone within the project design team to perform the audit (3 responses). Although the actual number is low, it points towards an undesirable practice that should be discouraged. The independence of the auditor is a key element in the RSA concept and the use of the project designer to conduct the audit diminishes the independence of the audit considerably.

### **Guidelines used for audits**

Both Victorian and New Zealand local government has access to national road safety audit guidelines. AustRoads and Transit New Zealand procedures are recommended for use in the respective locality. Figure 6 demonstrates that these appear to have been adopted. Ninety four percent of Victorian respondents and 80% of NZ respondents use the recommended guidelines. It is interesting to note that the one local government in the Victorian sample not using the AustRoads guidelines conducts all audits in-house and does not use their one trained auditor to carry out audits.

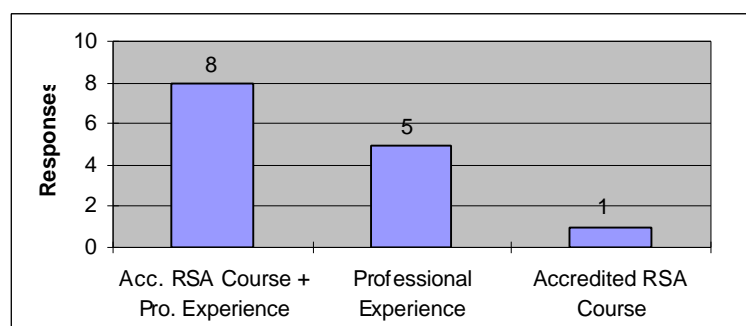


**Figure 6 : Guidelines used for audits**

### Minimum Experience/Accreditation of Auditors

This question in the Victorian study asked those performing audits to specify the minimum level of experience and/or training of those performing RSA's. The results are shown in Figure 7.

Eleven respondents answered this question, with one stating they didn't know what the minimum level of experience and/or accreditation the auditors had.



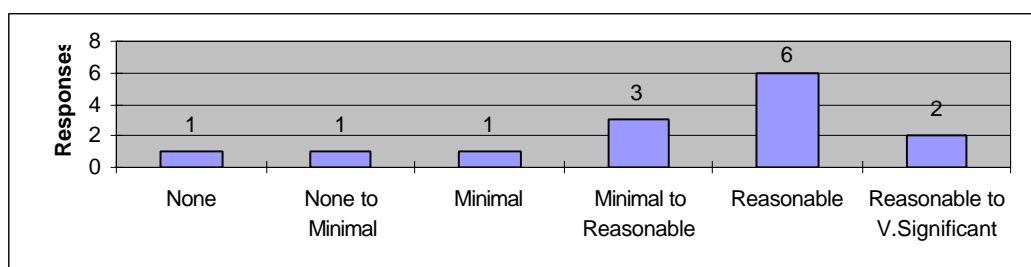
**Figure 7 : Minimum experience/accreditation of auditors**

The majority of respondents reported that attendance at a RSA course and professional experience were the minimum credentials of their auditors. Three respondents stated the minimum as professional experience only, whilst one respondent reported that an accredited RSA course was the minimum credentials for their auditors. It should be noted that this last respondent uses someone from within the project design team to perform their audits.

Victoria is developing an accreditation scheme and runs regular RSA workshops. The miswording of the question (referring to accreditation when none exists) does not seem to have biased response, with respondents assuming the workshops run are accredited. In New Zealand, there is no accreditation scheme for auditors.

### Perceived Impact on Accident Level/Severity

Of the 16 respondents performing audits in the Victorian study, 14 answered this question relating to the perceived impact of RSA on the accident level/severity. It is obvious from the results (Figure 8) that the majority of responses indicated that the perceived impact of RSA on the accident level/severity is positive. Only 2 responses rated the perceived impact as “none” or “none-minimal”, with the other 12 responses rating the perceived impact as “minimal to reasonable” (3 responses), “reasonable” (6 responses) or “reasonable to very significant” (2 responses).



**Figure 8 : Perceived impact of road safety audit on accident level/severity**

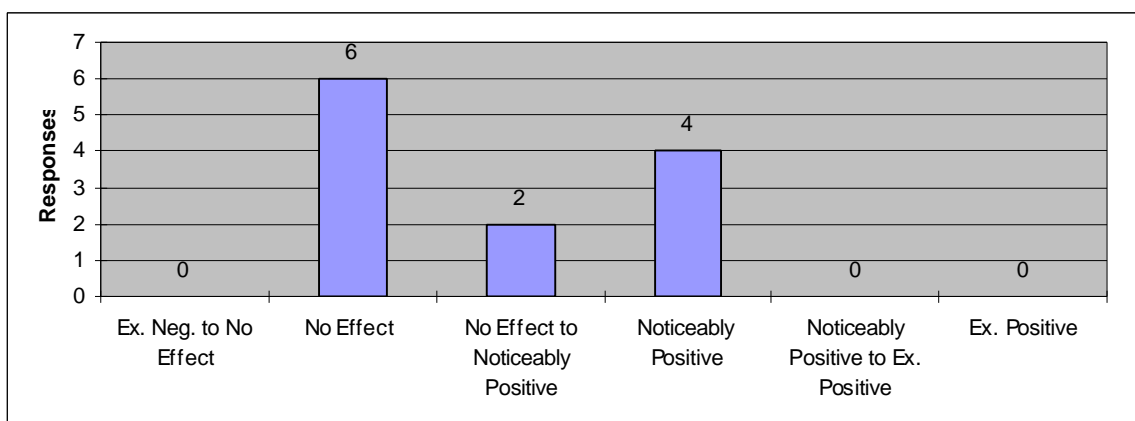
One respondent who rated the perceived impact as “none to minimal” added that at present there were too few audits performed to accurately consider the perceived impact of RSA on the accident level/severity. It is also interesting to note that the municipality that rated the perceived impact of RSA on the accident level/severity as “none” also indicated in other questions that it:

- did not use the AustRoads Guidelines,
- used designers (not specialist auditors) from within the council and
- did not use their one trained auditor for audits.

Therefore it may not be seen as such a surprise that this municipality perceived no impact on the accident level/severity.

### Perceived Impact on Whole-of-Life Project Costs

This question in the Victorian study sought the perceived impact of RSA on the whole-of-life costs of projects. The question was answered by 12 of the 16 respondents performing audits. The important point to note about the results (Figure 9) is that none of the 12 responses indicate a negative perceived impact on the whole-of-life costs of projects. The perceived impact responses ranged from “no effect” (6 responses) to “no effect to noticeably positive” (2 responses) to “noticeably positive” (4 responses). No responses rated the perceived impact above “noticeably positive.”

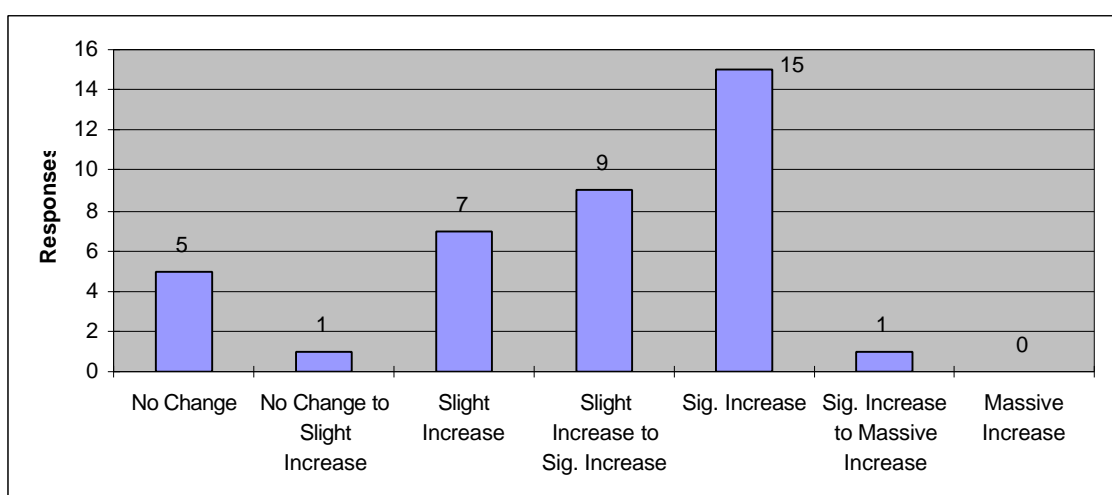


**Figure 9 : Perceived impact of road safety audit on whole-of-life costs**

### Effect of Road Safety Audit on Safety Awareness of Designers

This question in the Victorian study asked for the perceived effect of RSA on the safety awareness of designers. It requested an answer from all respondents, as it was believed that even if some local governments were not implementing RSA, designers' knowledge of the RSA concept may have changed their awareness of safety in design.

Of the 41 respondents, 38 supplied an answer to this question. The results are shown in Figure 10. Only 16% of responses said RSA had had no effect on the safety awareness of designers. The other 84% of responses rated the effect of RSA on the safety awareness of designers as positive.



**Figure 10 : Perceived effect of road safety audit on safety awareness of designers**

It is interesting to note that of the 24 respondents not implementing RSA (as discussed earlier), 19 of them said the perceived effect of RSA on the safety awareness of designers was positive. The other 5 not implementing RSA observed no change in awareness.

Therefore, all those respondents currently not implementing RSA perceived a non-negative impact on the safety awareness of designers.

### **Additional Comments**

An open-ended question at the end of the survey form invited all respondents to make additional comments concerning RSA. Comments received in this question, which have not been included in the analysis of previous questions are given below.

#### *Victorian sample*

- A significant number of respondents who are not implementing RSA stated that a major reason for not implementing RSA was the perception that the benefits were not able to be quantified. It was felt that the difficulty in measuring the benefits made it hard to justify the additional costs of a RSA. Resource constraints were also identified as a factor with many respondents reporting limited resources made it difficult to commit to a program of RSA's.
- The cost of RSA was a concern to some municipalities, with 6 respondents (2 implementing RSA) providing additional information which criticised the perceived high cost of RSA implementation, especially given the limited resources and funding levels.
- Three respondents (1 implementing RSA) observed that the additional time and resulting delays produced by the RSA process were a disadvantage, especially with projects having tight time constraints.
- One respondent not implementing RSA felt that rural local government has not been involved in the RSA program and another felt that audits were being promoted by those with a vested interest.
- A number of respondents criticised the high cost of RSA training courses (which limited the number of staff able to attend) and felt that the AustRoads guidelines were not detailed enough.

These comments provide some interesting insight into RSA implementation in Victorian local government. However, there was one point that was difficult to illustrate by isolated analysis of each question. By reading each of the survey forms returned, there were numerous situations in which an answer to one question was inconsistent with an answer to another question or to an additional comment made (ie. there was an apparent contradiction). This may indicate a misunderstanding amongst many municipalities of what exactly the RSA concept is and what implementation involves. In particular, it seems that some municipalities believe that a casual safety check is the same as a RSA.

#### *New Zealand sample*

In the NZ survey, those TLA's or Councils who undertook safety audits commented:

- One Council suggested that it was "important for staff to gain an appreciation of safety issues to incorporate them into designs". Another suggested that safety audits are a "valuable tool", but they should be done by staff which are outside the authority being audited.
- The relationship between Safety Audits and cost of the recommendations was mentioned. "The process highlights the real differences between text book answers and practical solutions where compromises due to budget and local factors must be taken into account."

- One Council suggested that Transit New Zealand should be more pro-active arranging more seminars and training.
- Another suggested that safety auditing will only be undertaken fully if it is made mandatory or more emphasis is placed on it. Justifications of the benefits would be needed to make this happen.

Among the TLA's that did not do safety auditing, only 22 of the 49 TLA's had additional comments:

- The number of positive and negative comments was the same. The negative comments varied, but the largest number referred to the need for funding to do safety audits. Other comments referred to the need for staff to do it, and several suggested that perhaps safety auditing is unnecessary, or only appropriate for larger Councils.
- There were also a number of neutral comments, on issues associated with safety auditing.

## **CONCLUSIONS AND RECOMMENDATIONS**

The state of RSA implementation in local government throughout Victoria and New Zealand was investigated two independent surveys.

From these studies, it is apparent that the majority of responding municipalities are not making full use of the RSA process. Most municipalities appear to lack a full understanding of the RSA process. Further research must be undertaken to clarify the issues that these surveys have raised, especially addressing the reasons for non-implementation.

It is also apparent that there is a scarcity of information in relation to the quantification of the benefits of RSA, and that this is proving to be a major impediment to the implementation of RSA by local government. It is concluded that the perceived impact on the accident level/severity, whole-of-life costs and safety awareness of designers is positive. However it is recognised that local government is unlikely to be convinced of the full benefits of RSA until more 'concrete' information is available to demonstrate the cost effectiveness of RSA. Therefore, further research into quantifying the benefits of RSA is strongly recommended.

The lack of effective marketing of RSA is seen as a major contributor to the slow adoption of RSA in many municipalities. The production and subsequent distribution of a set of RSA Guidelines has not brought about the necessary awareness and knowledge of the RSA process in local government. The AustRoads and Transit New Zealand guidelines have been in circulation for a number of years and this paper provides further evidence that Local Government is yet to be convinced about RSA. It is believed that RSA needs to be more effectively marketed (especially if there is a culture of resistance to change) with the use of a small team of experienced auditors conducting pilot audits and training workshops with practical examples.

Municipalities manage a significant part of the road network and have a vital role to play in road safety. It is disappointing to see the limited progress in the implementation of RSA in local government over the four years to date. Will it require legislation, tied funding arrangements or a significant legal liability issue to force them to adopt a full and comprehensive RSA process? Local government must get more serious about confronting the issues that are preventing greater implementation of road safety audit and proactively determine how they can meet the challenges in conjunction with state/federal agencies.

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**ABSTRACT:** Road Safety Audit is an important tool in the design and management of safe road networks. Australia and New Zealand pioneered the use of road safety audit in South East Asia and have been refining it since the early 1990's. Road safety audit is mandatory in State Road Authorities in Australia and on 20% of State Highway projects in New Zealand. Local government is strongly encouraged to adopt and implement road safety audit procedures in both countries, however it is not compulsory. The degree and effectiveness of road safety audit implementation at this level has not been formally researched until recently. This paper reports the results of a Transfund New Zealand survey of the uptake of safety audit by local authorities in NZ and the Monash University survey of the implementation of road safety audit in Victorian local government. The structural aspects of local government are outlined and the important issues faced by both regions highlighted. The survey methodology is outlined and similarities/differences in the two studies are discussed. The paper makes a number of recommendations that may assist local government to improve effective implementation of road safety audit.

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