

Introduction

The Rooding Controlling Authorities Forum (RCA Forum) is a closed, non-political incorporated society representing New Zealand road asset managers. The membership consists of 73 territorial authorities, the New Zealand Transport Agency (NZTA), the Department of Conservation (DoC) and Local Government New Zealand (LGNZ). The RCA Forum meets three times a year for reporting by working-groups, assessment of new common issues, directing further work or giving advice or direction to the membership on aspects of the management of the New Zealand road asset.

From its inception, the purpose of the RCA Forum has been to share resources and information between members. In early 1996, discussions between territorial authorities and Transit New Zealand (Transit) established that many individual authorities and Transit regions were working in isolation when it came to management of their networks. This included, in many cases, ‘re-inventing the wheel” on a wide scale. There was a recognised need to combine efforts in policy, consultancy, construction, operation and asset management to achieve better use of the limited resources available. In July 1996 the RCA Forum was established by the then 74 territorial authorities, Transit, DoC and the Waitangi Trust Board.

Establishment of the Stormwater Group

A number of common issues confronted the roading sector. One such issue was stormwater and road run-off. Road run-off was fast becoming a concern for those that look after the environment and there was a responsibility for road asset managers to act. The national road costing exercise undertaken by the Ministry of Transport (MOT) in the mid-1990’s indicated that stormwater costs were something that would need to be addressed by network operators.

The RCA Forum established a stormwater sub-group within months of its inception and in early 1998 this became the Stormwater Working Group. Its purpose was to investigate the needs of the member authorities in dealing with stormwater and road run-off, and to provide links to best practice in managing, and treating, road run-off.

The main task of the Stormwater Group has been to provide advice and direction to road asset managers and establish a knowledge base for practitioners. While this work has been roading orientated, much of it fits into an essential part of the management of the total stormwater that finds its way into the roading corridor, from whatever source.

This question of source remains one of the major concerns of road network managers, for it leads inevitably to the matter of who is going to pay for the management and, where necessary, treatment of stormwater from the road corridor. Estimates of the proportion of contaminated stormwater actually originating in the roadway have ranged from only 40% of all contaminated stormwater to as high as 60% and attempts to quantify these proportions more exactly have been bedevilled by the sheer complexity of the task.

The Stormwater Group drew its membership initially from territorial authority and Transit road asset managers, especially those who had worked closely in roading design involving stormwater and project management associated with stormwater. This was later expanded to include the major funder of roading and roading related research, Land Transport New Zealand, as well as representatives of regional councils, MoT and the Ministry for the Environment (MfE), as well as planners and stormwater managers. From 1 August 2008 Transit NZ and Land Transport NZ were merged into the NZTA.

Activities and achievements

The immediate focus of the working group was on identifying the issues confronting road asset managers. Two surveys highlighted widely varying regional council requirements and a lack of applicable local data. To address this, during 2001 the group established liaisons with the stormwater sub-group of the New Zealand Water and Waste Association (NZWWA) and with the New Zealand Water Environment Research Foundation (NZWERF) to co-ordinate responses to common issues.

This liaison produced the joint RCA Forum, NZWWA, MoT facilitated Roding and Stormwater Technical Workshop in May 2002. This was the first such workshop ever held with a roading focus and brought together roading asset managers, roading designers, consultants, planners, scientists, researchers and those working on environmental stormwater in territorial authorities and Transit. An attendance of over a hundred practitioners was able to exchange thoughts, put forward research work and predict future needs for the roading sector. This workshop established the priorities for the working group over the next half-decade.

The first priority was to provide asset managers with good direction in the approaches they may need to take in addressing their stormwater problems. The 'Integrated Stormwater Management Guidelines for the New Zealand Roding Network' were being developed by Montgomery Watson Harza (MWH) with Transfund NZ research funding. The Stormwater Group became the reference group for this project, and the Guidelines were published in 2004 as Transfund Research Report 260.

These guidelines provided a much-needed reference on a range of issues relating to the management of stormwater run-off from all sources, not just roads. The research project had comprehensively documented up-to-date information on the:

- Legal framework within which stormwater management takes place
- Management framework (including agency responsibilities and management tools)
- Gaining of resource consents for stormwater management activities
- Environmental effects of stormwater and mitigation measures
- Best practice engineering methods, including life-cycle costings

During 2004 the NZWERF also carried out considerable research work in conjunction with the NZWWA and in October 2004 the “Onsite Stormwater Management Guidelines” were published. While this document is not specifically aligned to roading, these guidelines advised caution on ensuring the appropriate use of control devices and on the need to fully assess all situations. Useful information was included for devices and their design, contamination recognition, ongoing device maintenance and life-cycle costing.

The Integrated Stormwater Management Guidelines were followed in 2005 by further Transfund NZ funded research reports on the ‘Development of a Benefit Evaluation Technique Applicable to Treatment of Road Run-off’ (published as Transfund NZ Research Report 264) and the ‘Reduction of Road Runoff Contaminants: Laboratory Experiments and Monitoring of Treatment Walls’ (published as Land Transport NZ Research Report 282).

The first of these projects investigated the potential to define a cost-benefit ratio based on the reduction of contaminants provided by a treatment device. The second project was undertaken by Landcare Research for the Stormwater Group and involved testing a variety of alternatives to the standard sand filter medium for use as a primary treatment response.

In February 2005 the MoT released eight papers covering research and analysis of road contaminants and road run-off, prepared in conjunction with their consultants and Waitakere City Council. The research encompassed studies dating back to 1973 and included detailed analysis to attempt to align deposition of contaminants on the road with traffic conditions, atmospheric conditions and road surface conditions, using a traffic model based on Waitakere City. This research confirmed the levels of contaminants in road run-off that can be attributed to the road and road use as 40-60% of the total loads for the prominent contaminants: copper, zinc, lead and polycyclic aromatic hydrocarbons.

During 2005 another workshop was held on contaminated sediments and a paper on the ‘Management of stormwater contaminants from roads and who pays’ was presented to the conference of the Association of Local Government Engineers (INGENIUM). By late 2005 there was a feeling that real progress had been made on this issue and a survey was sent to RCA Forum members, to be completed by both the road asset managers and the stormwater asset managers, in order to identify what further work might be required.

The analysis of the survey responses revealed continued confusion, uncertainty and lack of communication between road and stormwater asset managers. Efforts to confront the issues raised by the survey have determined the priorities of the Stormwater Group from mid-2006.

In February 2007 a series of six workshops was organised by the Stormwater Group throughout New Zealand, from Gore to the North Shore, to present up-to-date information and examples of best practice directly to practitioners. Presentations included a review of the regulatory environment and a summary of the latest research on controlling contaminants from roads. One presentation, by MWH, 'Identifying sensitive receiving environments at risk from road run-off', was published in 2007 as Land Transport NZ Research Report 315 and led to the further development of a 'Stormwater Risk Assessment Guide for Road Engineers'.

The Stormwater Group organised a second series of national workshops in regional centres in March 2008, with the support of NZWWA and with a focus specifically on the techniques, tools and devices for managing stormwater and road run-off. Bio-retention, low impact urban design, treatment media, combinations of treatment approaches and consideration of the impact of climate change on stormwater management were all compassed by these workshops.

In 2009 the Stormwater Group organised a special session on road run-off within the NZWWA (now Water NZ) organised Stormwater 09 Conference. This session presented an overview of contaminants, sources of contaminants, toxicity, treatment devices and treatment efficiency, as well as preliminary findings from NIWA research on vehicle emissions in road run-off and contaminant accumulation within sediments.

The draft NZTA Stormwater Treatment Standard for State Highway Infrastructure was introduced in this session, too. This Standard developed from a set of "Stormwater Management Guidelines" for use on State Highways begun by Transit in response to issues raised through the Stormwater Group concerning maintenance of control structures, disposal of contaminated materials and the need for worked examples and coverage of environmental issues.

Current research activities

The Stormwater Group has supported and steered numerous research projects over the past decade. These have included projects to evaluate road run-off and the efficacy of common treatment devices. The published reports from many of these projects remain available as NZTA research reports.

In 2009 the Stormwater Group joined the steering group for a NIWA project, funded by NZTA and Auckland Regional Council (ARC), to evaluate innovative stormwater treatment devices for efficiency in removing contaminants in road run-off. The project runs for two years, commencing in this financial year. As the project involves the study of the performance in the field of several proprietary treatment devices, gaining the agreement of the representatives of

the device manufacturers and distributors was essential and required careful negotiation before the project protocols could be finalised and sent for external peer review.

A list of potential devices and sites has been prepared and each potential site has been assessed for its suitability:

Site 1 – a Stormwater360 ‘StormFilter’ at Esmonde Rd, North Shore.

Site 2 – a Hynds ‘UpFlo’ at Westfield Albany shopping centre.

Site 3 – a Humes ‘Filternator’ either in a trial installation at SH17 Silverdale, north of Auckland, or at an alternative site in central Auckland that would be better for NIWA in terms of location relative to NIWA office.

Sampling was scheduled to begin at each site over the course of July 2010.

Development of guidance for planners

Members of the Stormwater Group participated in the reference group established in 2007 to help the MoT and MfE determine whether national direction was needed for management of stormwater runoff from roads. In particular the group was asked to consider whether a national policy statement or national environmental standard was appropriate.

The reference group comprised members from MoT, MfE, the Ministry of Economic Development, Transit, Land Transport NZ, DoC, LGNZ, the RCA Forum, and the Automobile Association.

This group concluded that national direction was needed, but not in the form of a national environmental standard or national policy statement under the Resource Management Act. The composition of components which generate contaminants from transport, such as copper from brake linings and zinc from tyres, cannot be managed under the Resource Management Act and, as such, a national environmental standard or national policy statement was an inappropriate tool.

Considering runoff from roads in isolation, without reference to wider stormwater and water management issues was viewed as unhelpful, and unlikely to achieve improvements. One key concern was the lack of readily available information for planners and engineers to help inform good practice and to provide guidance. The group’s view was that a code of practice or guidelines could meet this need.

The MoT and MfE undertook to oversee jointly the development of suitable guidance material as recommended by the reference group. The terms of reference for this were developed and approved in 2008, consultants were engaged and, in November 2009, a draft guidance note was presented to the project’s technical reference group and to the Stormwater Group. This draft has progressed no further and it is now agreed that the document is insufficiently robust and practical to provide guidance or to inform good practice.

The Stormwater Group is now assessing whether it can produce a guidance document drawn from current research and recognised best practice to fill this gap.

Concerns over current practice

The Stormwater Group believes such an investment is in the interests of its members, because current policy is, in many cases, imposing on roading projects costs that are not able to be justified by our current knowledge and which result in an ineffective investment of resources to achieve an improvement in stormwater quality.

It is increasingly common for resource consents for roading projects to have conditions added requiring specifically designed stormwater treatment if the expected daily traffic on the road will exceed 5,000 vehicles. Extensive research here and overseas has demonstrated that the threshold for any measurable effect from traffic is many multiples of this figure.

More concerning, however, is the persistence of the focus on the transport use of the road as the principal source of contaminants in road run-off. Almost since the outset of research on stormwater, vehicle numbers on a road have been assumed to provide an analogue for the potential contaminant load. In fact, no research has yet confirmed this and numerous reports suggest that the assumption is fallacious.

The following table demonstrates the extent to which daily traffic numbers cannot be used as an analogue for the potential contaminant load in road run-off. These are catchpit samples. The results show the named heavy metal contaminant in grams per cubic metre and, analysed with the toxicity characteristic leaching procedure, in milligrams per kilogram of dry weight.

Table 1. Comparison of catchpit samples and daily traffic at four Napier sites.

	Site 1	Site 2	Site 3	Site 4
Total Cu (g/m ³)	<0.011	<0.011	<0.011	0.40
Total Pb (g/m ³)	0.047	0.051	0.022	0.70
Total Zn (g/m ³)	2.6	3.3	4.2	31
TCLP Cu (mg/kg)	88	92	48	330
TCLP Pb (mg/kg)	64	190	110	720
TCLP Zn (mg/kg)	380	1,300	1,200	2,600
PAH	560	1,600	150	3,600
Daily traffic	25,000	7,000	1,000	1,500
location	SH2/SH50	Maadi Rd	Alamein Cr	Dunlop Rd

Source: Napier City Council, Environmental Management Office

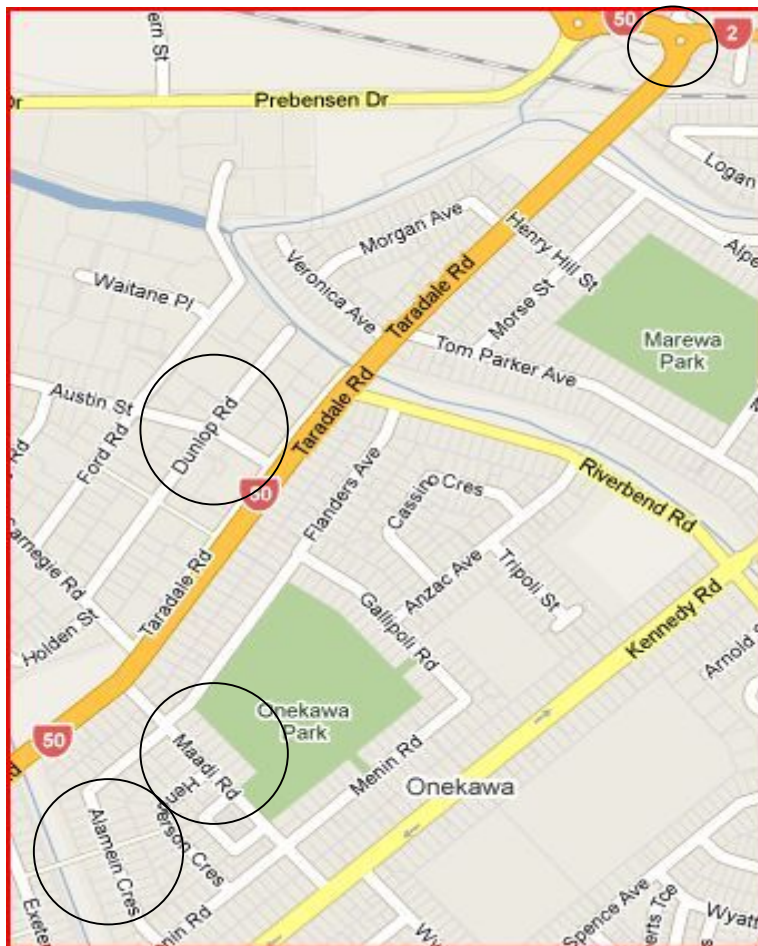


Figure 1. Map of part of Napier City showing the general location of each of the sample sites.

Source: MapData Sciences Pty Ltd, PSMA
www.mapds.com.au

These four sites are all within 2 km of each other immediately southwest of Napier. Site 1 is at the intersection of State Highway 2 with State Highway 50. Site 2 is on a connecting road between SH50 and a parallel arterial road to the east, with a supermarket on one side of the road at the eastern end. Site 3 is on a local distributor road with a wholly suburban character. Site 4 is a local distributor road to the west of State Highway 50 in an intensively commercial and industrial area of land use.

It should be noted that Site 1 is not merely the site with the heaviest traffic volume. It is an intersection that contains a roundabout, so it provides extra factors of brake and tyre wear that would not be present on any straight section of these highways. Every vehicle transiting this site can be expected to have slowed and manoeuvred through the approaches and curves of this intersection. Site 1 represents a relatively congested site as well as one with relatively highly traffic volume.



Figure 2. Satellite view of the intersection of Taradale Road (SH 50) and Hyderabad Road (SH 2) showing the roundabout at Site 1.

Source: DigitalGlobe, GeoEye

Conclusion

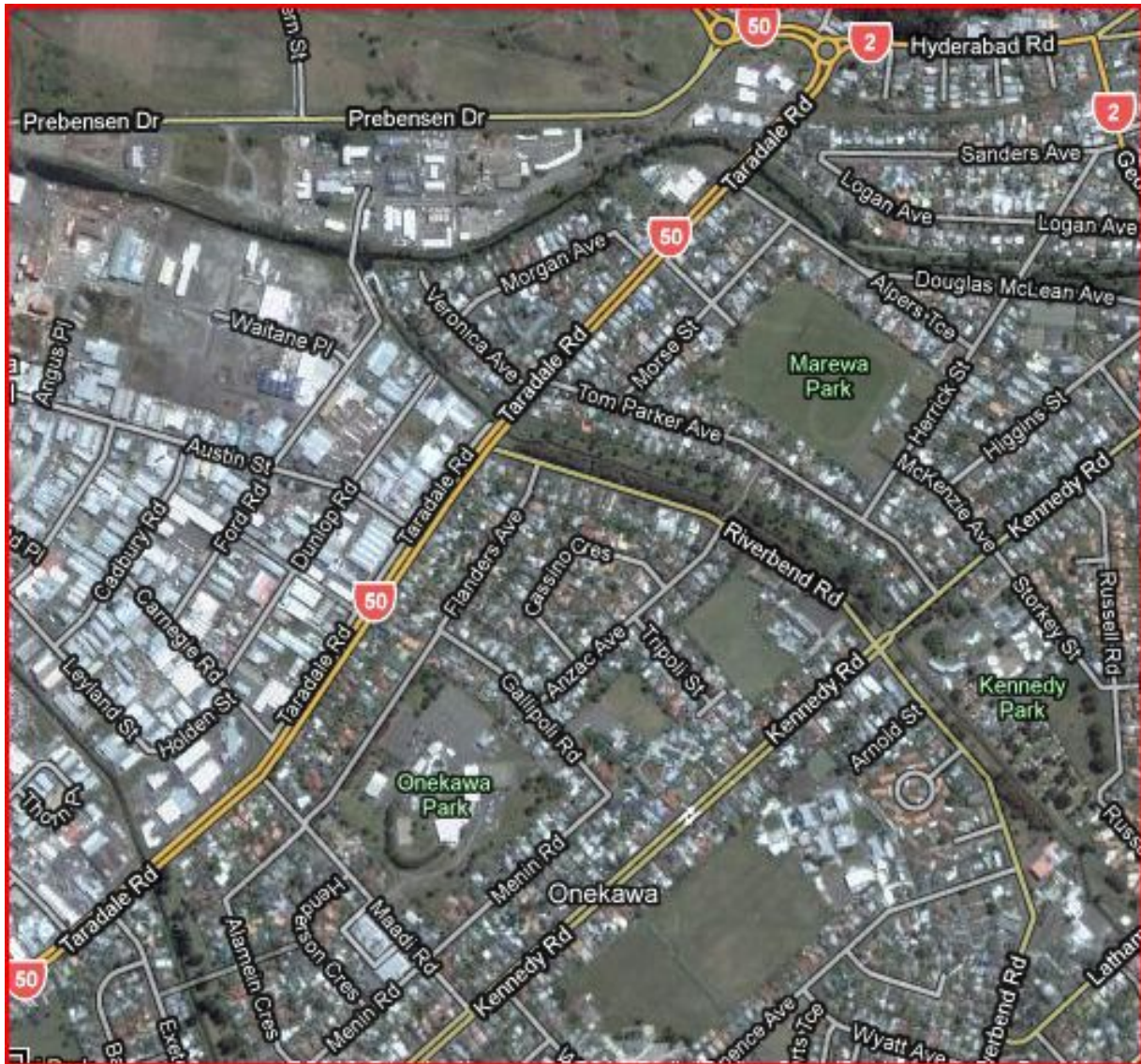
The levels of contamination of road run-off and stormwater cannot be explained by reference to vehicle emissions alone. The variance in traffic volumes cannot be related in any meaningful way to the variance in measured contaminant load. Reliance on traffic figures to provide an analogue for the quality of the stormwater will lead to ineffective treatment decisions.

Policies based on unsound assumptions or outdated research on road run-off, no matter how well-intentioned, risk failing to address significant sources of contamination in stormwater entering local environments, while adding unnecessary costs to community roading projects. For this reason the RCA Forum Stormwater Group welcomes an opportunity to open a dialogue with regional councils that can allow the development of guidelines to ensure a consistent treatment of stormwater and road run-off by all regions based on the best available knowledge to achieve the most beneficial and effective outcomes.

Finally (perhaps provocatively), if a more predictive analogue for probable contaminant load were sought, it might prove to be as simple as the relative albescence of any aerial image of the area, as appears evident in Figure 3 (below).

Wayne Newman, Convener, RCA Forum Stormwater Group, 22 July 2010

Figure 3. Overview of the sample sites highlighting the proximity and relative extent of areas of roof for each site.



Source: Google – Imagery: DigitalGlobe, GeoEye; Google – Map Data: MapData Sciences Pty Ltd