

---

# State highway environmental plan: improving environmental sustainability and public health in New Zealand

---

Our environmental plan sets out our strategic environmental and social vision to enable us to set specifications and standards for our contractors undertaking roading works. The plan is also available to help and guide other land transport operators.

Published: June 2008



## ENVIRONMENTAL POLICY

[Return to Table of contents](#) →

### Transit New Zealand is committed to:

- being socially and environmentally responsible; and
- improving the contribution of state highways to the environmental and social well being of New Zealand by:

#### Protecting and enhancing the environment where appropriate

Managing the state highway network provides opportunities to protect and enhance the natural and physical environment. Transit manages these opportunities, where appropriate, for the benefit of current and future generations. Transit has a role in improving quality of life, particularly in urban areas, and aims to do this in partnership with others.

#### Avoiding adverse effects to the extent reasonable in the circumstances

Constructing and operating state highways can impose adverse effects on communities and the environment. Transit avoids these effects to the extent reasonable in the circumstances. Adverse environmental effects that cannot be reasonably avoided are mitigated by low-impact and, preferably, multi-purpose measures; statutory compliance is a minimum requirement. Working in partnership with others to encourage multi-modal travel and reduce demand for private motor vehicle travel helps reduce adverse effects.

#### Using and managing resources efficiently

Materials and energy are key components of Transit's business and these resources are used in a manner that recognises supply limitations and lifecycle costs. Particular emphasis is given to reusing and recycling resources. Transit recognises the multiple benefits of using energy efficiently and aims to ensure state highways contribute to improving the energy efficiency of the transport sector and help reduce New Zealand's greenhouse gas emissions.

#### Considering environmental issues early

Environmental management is most effective when environmental constraints and opportunities are considered early in network planning, design and maintenance. Transit recognises it is also cost effective to consider environmental issues early, alongside other key objectives such as safety, economic development and integrated planning.

#### Contributing to sustainable outcomes by working with others

Many elements of a sustainable land transport system are beyond Transit's direct control. In these situations Transit aims to influence sustainable outcomes by working with central government, local government, communities, Māori and transport providers.

#### Continually improving environmental performance

Achieving sound social and environmental outcomes is an integral part of Transit's business. While compliance with legal obligations is inherent in Transit's business, learning from experience, including that of consultants and contractors, is necessary for continual improvement. Transit encourages new ways of improving environmental sustainability and public health.

Signed in the presence of the Transit New Zealand Board, 3 November 2004.



**David Stubbs**

Chairperson



**Rick van Barneveld**

Chief Executive

## FOREWORD

[Return to Table of contents](#) →

One of the National State Highway's five strategic goals is to: *"improve the contribution of state highways to the environmental and social well being of New Zealand, including energy efficiency and public health"*.

Large civil engineering projects are a major contribution to the economic well being of a region and country as a whole. However, they are unintentionally disruptive and damaging to the environment and social cohesion of local communities. Transit is dedicated to avoiding whenever possible, enhancing if practicable, mitigating where required and remedying if feasible adverse environmental and social effects from state highway construction and operation. Transit considers environmental and social issues early in the planning phases and promotes good urban design to have the least impact possible. This Environmental Plan specifies how employees and suppliers achieve environmental and social objectives.

Since publishing version 1 of the Environmental Plan (2004) new environmental initiatives appeared in the planning, design, build, maintenance and operation of state highways, including:

- signatory to the NZ Urban Design Protocol, appointment of urban design champions and an *Urban Design Professional Services Guide*;
- *Guidelines for Highway Landscaping* revisions included low-growth vegetation;
- *Memorandum of Understanding* with Department of Conservation and revised *Guidelines for State Highways* within or adjacent to National Parks, Reserves and Conservation Areas;
- contract template providing improved clarity and direction for consultants and contractors on environmental and social responsibilities; and
- allocation of over \$2 million per annum to noise improvements, landscaping, stormwater treatment and recycling on existing state highways.

As a work in progress this will always be evolving in response to stakeholders and as our environmental knowledge improves. Over time the Environmental Plan will be converted to a web-based version that will be continuously updated and dynamically linked to references and sources of up-to-date information. Feedback is welcome at any time and I encourage you to contact us.

I commend this Environmental Plan and look forward to working with Transit's partners and stakeholders to achieve results on the ground.



**Rick van Barneveld**

Chief Executive  
May 2008

## TABLE OF CONTENTS

Environmental Policy	1
Foreword	2

### PART 1 INTRODUCTION 4

1.1 Sustainable management	6
1.2 National State Highway Strategy	7
1.3 How to use this Environmental Plan	11

### PART 2 IMPACTS

Click to access 

2.1 Noise	Objectives 14	Effects 14	Transit's role 15	Performance indicator 15	Examples of current practice 16	Implementation plan 17
2.2 Air quality	Objectives 24	Effects 24	Transit's role 24	Performance indicator 25	Examples of current practice 25	Implementation plan 27
2.3 Water resources	Objectives 33	Effects 33	Transit's role 33	Performance indicator 34	Examples of current practice 34	Implementation plan 36
2.4 Erosion and sediment control	Objectives 39	Effects 39	Transit's role 40	Performance indicator 40	Examples of current practice 40	Implementation plan 42
2.5 Social responsibility	Objectives 45	Effects 45	Transit's role 46	Performance indicator 46	Examples of current practice 47	Implementation plan 48
2.6 Culture and heritage	Objectives 52	Effects 52	Transit's role 52	Performance indicator 52	Examples of current practice 53	Implementation plan 54
2.7 Ecological resources	Objectives 56	Effects 56	Transit's role 56	Performance indicator 56	Examples of current practice 57	Implementation plan 58
2.8 Spill response and contamination	Objectives 61	Effects 61	Transit's role 61	Performance indicator 61	Examples of current practice 62	Implementation plan 63
2.9 Resource efficiency	Objectives 65	Effects 65	Transit's role 65	Performance indicator 65	Examples of current practice 66	Implementation plan 67
2.10 Climate change	Objectives 70	Effects 70	Transit's role 71	Performance indicator 71	Examples of current practice 72	Implementation plan 73
2.11 Visual quality	Objectives 76	Effects 76	Transit's role 76	Performance indicator 76	Examples of current practice 77	Implementation plan 78
2.12 Vibration	Objectives 82	Effects 82	Transit's role 82	Performance indicator 83	Examples of current practice 83	Implementation plan 84

### PART 3 APPENDICES

3.1 Implementation plan – General methods for all impacts	89
3.2 Glossary	92

# 1 INTRODUCTION

[Return to Table of contents](#) →

## AUDIENCE

The Environmental Plan guides staff, consultants and contractors who plan, design, build, maintain and operate the state highway network as well as making a commitment to local authorities, affected communities and interest groups.

## PURPOSE

The Environmental Plan implements Transit’s Environmental Policy embedding into our business the National State Highway Strategy goal to “*improve the contribution of state highways to the environmental and social well being of New Zealand and prioritise and address environmental and social issues*” by developing approaches and implementation plans for each category of environmental and social impact.

## CONTEXT

The Land Transport Management Act 2003 (LTMA), New Zealand Transport Strategy (NZTS) and Resource Management Act 1991 (RMA) are the Plan’s primary enabling legislation. These mandate sustainable management with the expectation that Transit “exhibits a sense of social and environmental responsibility” in meeting the statutory objective of operating a state highway network that contributes to an integrated, safe, responsive and sustainable land transport system.

New Zealand Transport Strategy	Land Transport Management Act 2003
<p><b>Vision:</b></p> <p>“by 2010 New Zealand will have an affordable, integrated, safe, responsive and sustainable transport system”</p> <p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• assist economic development;</li> <li>• assist safety and personal security;</li> <li>• improve access and mobility;</li> <li>• protect and promote public health; and</li> <li>• environmental sustainability.</li> </ul> <p><b>Environmental expectations that the transport sector will:</b></p> <ul style="list-style-type: none"> <li>• reduce negative impacts on land, air, water, communities and ecosystems; and</li> <li>• make more efficient use of its resources, reduce its use of non-renewable resources, and shift over time from non-renewable to renewable resources.</li> </ul>	<p>Transit’s objective, contained in section 77, is:</p> <ol style="list-style-type: none"> <li>(1) The objective of Transit is to operate the State highway system in a way that contributes to an integrated, safe, responsive, and sustainable land transport system.</li> <li>(2) In meeting its objective, Transit must exhibit a sense of social and environmental responsibility, which includes: <ol style="list-style-type: none"> <li>a) avoiding, to the extent reasonable in the circumstances, adverse effects on the environment;</li> <li>b) taking into account the views of affected communities;</li> <li>c) giving early and full consideration to land transport options and alternatives in a manner that contributes to paragraphs (a) and (b); and</li> <li>d) providing early and full opportunities for specified persons and organisations to contribute to the development of its land transport programmes.</li> </ol> </li> </ol>

# 1 INTRODUCTION

[Return to Table of contents](#) →

Recently a discussion paper, *Updating the New Zealand Transport Strategy*, was released (comments closed February 2008). The final Update will:

- provide direction for the transport sector until 2040 in the context of the Government's sustainability agenda and other government strategies in the areas of energy and energy efficiency;
- translate that direction into high-level targets for the transport sector and intermediate targets for sub-sectors (air, sea, road, vehicle fleet, rail, freight, public transport, walking and cycling) to help achieve the high-level targets;
- provide clearer guidelines for decisions about funding allocations; and
- contain an action plan, including accountabilities for actions, reflecting how we intend to reach the transport targets.

Compliance with targets has substantial implications for information management, which are signalled in the Plan. To the extent known the targets are included as performance measures.

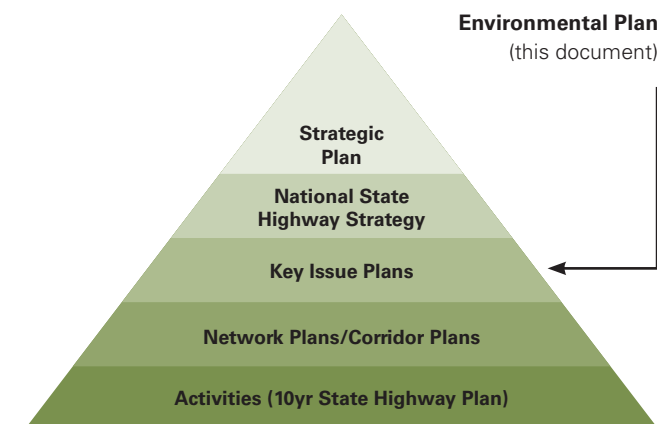
Further, the RMA promotes the sustainable management of natural and physical resources. As such, the state highway system is a physical resource that needs to be sustainably managed by Transit. The RMA has a particular focus on ensuring that the adverse environmental effects of activities are avoided, remedied or mitigated. The LTMA requires Transit to avoid, to the extent reasonable in the circumstances, adverse effects on the environment.

Other legislation	Other policy
<ul style="list-style-type: none"> <li>• Conservation Act 1987</li> <li>• Energy Efficiency &amp; Conservation Act 2000</li> <li>• Historic Places Act 1993</li> <li>• Local Government Act 2003</li> <li>• Transit New Zealand Act 1989</li> <li>• Public Works Act 1981</li> </ul>	<ul style="list-style-type: none"> <li>• Urban Design Protocol</li> <li>• Biodiversity Strategy</li> <li>• Energy Strategy</li> <li>• Health and Disabilities Strategy</li> <li>• Waste Strategy</li> <li>• New Zealand's climate change position</li> <li>• Crime Prevention through Environmental Design</li> </ul>

## INTERNAL RESPONSE

Transit's National State Highway Strategy 2007 (NSHS) provides the link between the NZTS and relevant legislation, government funding allocated to state highways, detailed programme of works, specific plans and policies. The NSHS includes a view of the state highway network in 30 years, taking account of the need for an affordable, integrated, safe, responsive and sustainable approach to moving people and goods.

The Environmental Plan implements the Strategic Plan and NSHS by ensuring the way we plan, build, operate and maintain state highways is environmentally and socially responsible.



## OTHER RELATED DOCUMENTS

A Travel Demand Management Manual describes initiatives that modify travel decisions so as to reduce negative impacts of road transport. The Planning Policy Manual provides direction toward integration of land use and transport planning.

## 1.1 SUSTAINABLE MANAGEMENT

[Return to Table of contents](#) →

Sustainable management balances economic, environmental and social responsibilities. Achieving practicable balance is value-for-money.

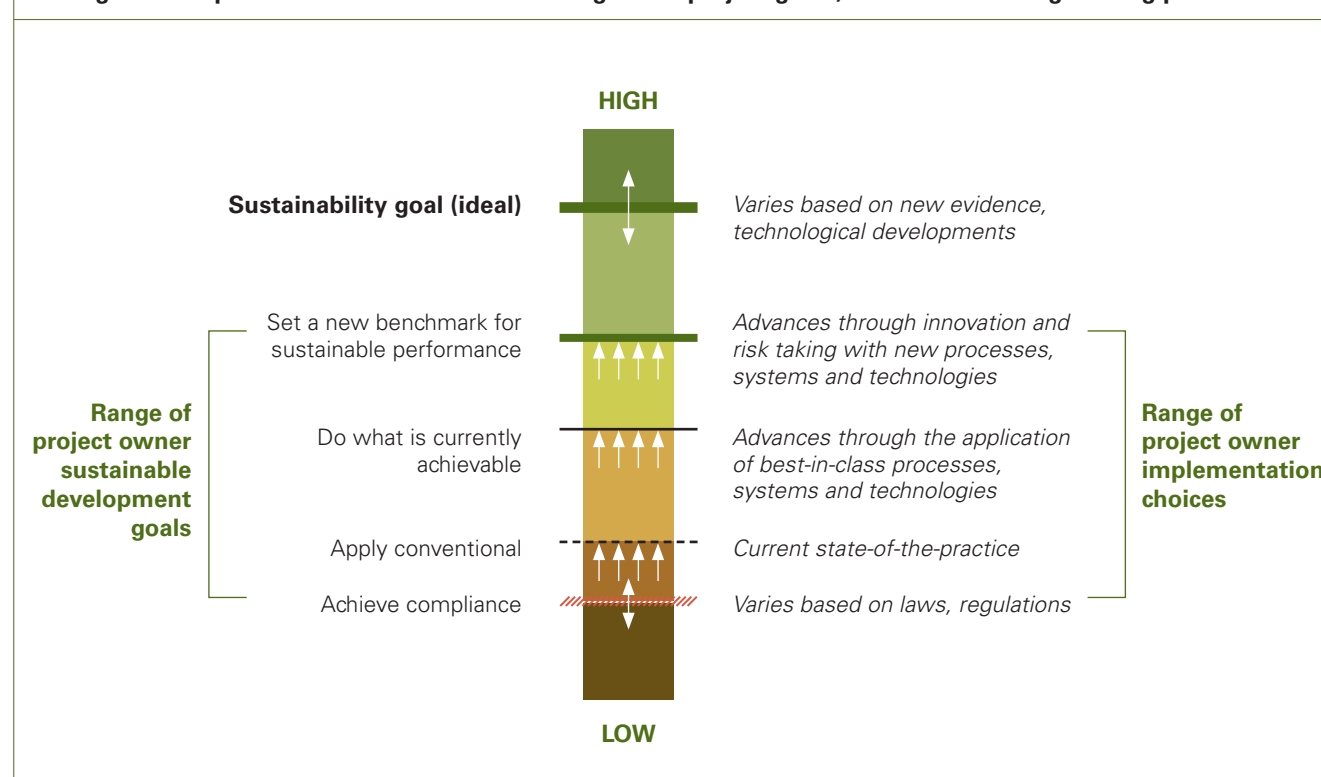
*Environmental challenges facing the transport sector are numerous. Many of them bring into question the sustainability of the current transport system.*

- New Zealand has the second highest car ownership rate in the world. Over 3.2 million vehicles were registered in 2006. Vehicles here use 37% more fuel than in the EU. The average car is nearly 12 years old and the average age increases every year; busses and trucks are even older.
- Old cars are less safe, polluting air at higher rates than newer cars.
- Domestic transport contributes 45% of New Zealand's total carbon dioxide emissions, and road transport accounts for 89% of this figure.
- Domestic transport accounts for 40% of New Zealand's total energy use.
- Second hand cars are New Zealand's top import commodity. Together with new cars and parts, this costs \$5.5 billion/year.
- Transport infrastructure currently covers around 25-30% of land within most cities.

*(Sources: Land Transport NZ, New Zealand Transport Strategy, Land Transport Safety Authority and Ministry of Economic Development, Parliamentary Commissioner for the Environment)*

Other challenges, for which there is little data, include noise, air, water pollution and aesthetic form of transport corridors and structures.

**Fig 1: Conceptual model of sustainable management project goals, indicators and engineering practices**



Above is an example of how Transit can shift from a minimalist approach, such as legal compliance, through the progressive application of new technologies, processes and the setting of benchmarks. A sustainable transport system finds appropriate balances between economic prosperity, environmental quality and social equity, while at the same time improving transport's overall performance in terms of safety, integration, access and mobility.

As a result of this Transit has set itself environmental performance indicators toward sustainable management. These can be found in this Environmental Plan as well as Transit's Statement of Intent. As we progress towards sustainable management we expect to review and revise these indicators.

## 1.2 NATIONAL STATE HIGHWAY STRATEGY (NSHS)

[Return to Table of contents](#) →

The NSHS makes a commitment to: improving the contribution of state highways to the environmental and social well being of New Zealand and prioritising then addressing environmental and social issues.

Implementation of these aims will be through mechanisms to value environmental and social effects in decision-making processes and development of criteria related to the sensitivity of different environments.

We will work with others to:

1. develop mechanisms to value environmental and social effects in decision-making processes, and develop criteria related to the sensitivity of different environments;
2. prioritise mitigation of the environmental effects of existing state highways, especially noise, water quality and air pollution; the sensitivity of the surrounding area will determine the priority of our funding;
3. ensure we operate in an energy efficient manner and plan, design, operate and maintain state highways to conserve energy;
4. promote good urban design and assess the impacts of projects on communities and in doing so consider environmental and social issues early in the planning and design process; and
5. use best practice and policies that balance social needs with all other competing needs and focus on avoiding negative impacts on communities.

### 1.2.1 VALUATION OF ENVIRONMENTAL AND SOCIAL EFFECTS

Value-for-money-based environmental and social decision-making, or more simply valuation, is the greatest obstacle to transparency and equity when mitigating adverse effects. Valuation techniques, which aim to price environmental and social goods and services as if they were traded in the market place, seldom influence decision-makers due to a lack of confidence in their accuracy and reliability.

Other techniques are available. In New Zealand, Australia, the United States and Europe policy-makers allocate health care funds based on Quality-Adjusted Life Years (QALY), an aggregate measure of benefits that makes no attempt to monetise valuations. Commensurate environmental and social metrics are in common use, for example:

- New Zealand developed a conservation metric called Conservation Output Protection Years (COPY) to assess benefits of threatened species programmes;
- Australia's BushTender programme protects and funds biodiversity based on a Biodiversity Benefits Index (BBI); and
- the United States Conservation Reserve Program has successfully used an Environmental Benefits Index (EBI) since 1985 to balance the use of conservation lands with agriculture in the United States.

Transit is a member of the Permanent International Association of Road Congresses (PIARC) and the International Roading Federation, which has the expertise

and resources to make a significant contribution toward developing measures capable of maximising improvement subject to budget constraint, or minimise cost subject to meeting a preset level of service; commonly referred to as value-for-money.

Improved contractual procedures (State Highway Professional Services Contract Proforma Manual, SM030) give clarity and certainty to consultants who identify environmental issues during planning, design, construction, operation and maintenance of state highways. The Social and Environmental Minimum Standard, z/19 identifies legal and other requirements, requires a Social and Environmental Screen at the scoping stage and a Social and Environmental Assessment for the preferred option. A Professional Services Guide (PSG 13) provides detailed instructions and examples of how to identify potential social and environmental adverse effects. A Professional Services Form (PSF 14) records this information including estimated mitigation costs thus ensuring adverse effects are avoided or mitigated throughout the project lifecycle.

Following identification of environmental and social issues, they are ranked in terms of significance. Ranking criteria are determined by the RMA requirements having effect in regional and district plan objectives, policies and rules. Some of the more general criteria are summarised as issue-specific objectives in this Environmental Plan. Additionally, national criteria from the Department of Conservation, Historic Places Trust and Ministry for the Environment are assessed.



## 1.2 NATIONAL STATE HIGHWAY STRATEGY (NSHS)

[Return to Table of contents](#) →

### 1.2.2 PRIORITISE MITIGATION

Risk assessment procedures are found in the Risk Management Process Manual. The methodology is based on a joint Australia/New Zealand Standard (AS/NZS 4360:2004). As a result, sensitive receiving environment criteria are weighted for consequence and likelihood resulting in an overall risk score. Issues of significant risk are required to identify treatment actions, responsibility, timing, resources, reporting, cost and consequential risk reduction. An example of common criteria and generic prioritisation is illustrated in the matrix on page 9, "Prioritisation Based on Environmental and Social Sensitivity".

### 1.2.3 FINANCIAL IMPLICATIONS

A Ministerial Advisory Group (MAG) report in 2006 found a significant cause of cost overruns was the lack of foresight and predictability when planning for environmental and social mitigation. Project managers and their consultants seek certainty and clarity in the plan and design phases. The cost of environmental and social mitigation is not as easy to calculate as other aspects of construction, however guidance can be given based on the collective

experiences of roading authorities from many countries. Austroads evaluated international approaches to costing environmental externalities, finding independent approaches produced consistent, comprehensive and usable data. A five-country subset was used to calibrate and estimate uncertainty of EU models for Austroad conditions. A summary of the data based on 2001 NZ\$ can be found in the following table reproduced from *Valuing Environmental and Other Externalities*, Austroads publication AP-R229, appendix F (2003).

Environmental and Social Costs							
VEHICLE	NZ\$/1,000 passenger km			NZ\$/1,000 vkt		NZ\$/1,000 tonne km	
	car	motorcycle	bus	car	bus	LDV	HDV
<b>IMPACT</b>							
air pollution	20	6	23	22	286	106	23
noise	5	11	1	7	18	24	3
climate change	50	32	32	64	376	159	17
nature and landscape	7	4	3	10	33	53	4
upstream/downstream costs	24	14	13	31	159	148	17
urban separation costs	4	2	1	5	17	23	2
<b>average</b>	110	69	73	139	889	513	66
<b>range</b>	79-141	50-86	41-105	104-174	not est.	360-669	40-94

## 1.2 NATIONAL STATE HIGHWAY STRATEGY (NSHS)

[Return to Table of contents](#) →

Example of Mitigation Prioritisation Based on Environmental and Social Sensitivity							
ENVIRONMENTAL SENSITIVITY	HIGH	air quality > NES, GHG emissions increase	wetland, estuary, lake, stream	national park, designated tree, sensitive geology or landform	adverse effect less than minor only with significant level of mitigation		MITIGATION PRIORITY
	MODERATE	air quality > 0.5 NES, GHG emissions unchanged	harbour	scenic reserve, native bush	adverse effect less than minor only with moderate level of mitigation		
	LOW	air quality < 0.1 NES, GHG emissions decrease	exposed coastal shoreline	rural agricultural, commercial land use, secondary growth, exotic forest	adverse effect unlikely, low level mitigation required		
AIR			WATER	LAND	no known cultural or heritage issues, confined and narrow views	area within 1 km of probable traditional use, heritage status concerns unresolved, open vista	known cultural or heritage significance, outstanding view
				industrial/commercial land use, no public access	contact or passive recreation	public drinking water supply, high recreation, natural character or cultural value	
				isolated residence > 100 from road	multiple residences < 50 m	adjacent school, hospital, long term care facility	
				LOW	MODERATE	HIGH	SOCIAL SENSITIVITY

**NOTE** Use information from the Social and Environmental Minimum Standard z/19, to inform this analysis. For moderate and high sensitivity conduct risk assessment in accordance with Risk Management Process Manual.

## 1.2 NATIONAL STATE HIGHWAY STRATEGY (NSHS)

[Return to Table of contents](#) 

### 1.2.4 ENERGY EFFICIENCY AND CONSERVATION

Planning, design, construction and maintenance of state highways involves the use of finite resources like electricity, fossil fuels, new aggregate materials and water or hydrocarbon binders.

Road building and maintenance activity resource use affect the environment and society by:

- production and transport of road building materials (such as rock, gravel, concrete and bitumen);
- disposal of waste material generated during excavation, repair and resurfacing works;
- use of fuel by construction and maintenance vehicles;
- use of paint for road markings;
- production and use of plastic and metal materials in signs, safety devices and markers;
- use of electricity with street lighting, traffic signals, ramp signals and variable message signage; and
- vehicles emit particles and carbon dioxide that affect local air quality and global climate conditions.

Having direct control over use and disposal of road building materials in constructing and maintaining the network means this is an important place to focus efforts. The major contribution to improving the energy efficiency of the land transport sector as a whole is managing demand for travel and getting best use of the existing state highway network.

### 1.2.5 URBAN DESIGN AND COMMUNITY IMPACTS

Urban design involves both placement and design of buildings, roads, open spaces, towns and cities, to create a desirable place in which to live, work and play. At the large scale it is concerned with urban and rural structure, the pattern of buildings, open space and movement networks. At the small scale, it is also concerned with urban and rural form and function and how roads, open spaces and building systems interact and function.

### 1.2.6 BALANCING COMPETING NEEDS

The identification of most suitable and best value-for-money mitigation is accomplished in partnership with local authorities. Regional councils with sufficient resources have developed technical publications based on best practicable options (BPOs) for activities known to result in adverse effects if not properly managed. For example:

- Auckland Regional Council's Erosion and Sediment Control, Technical Report 90;
- Environmental Waikato's Erosion and Sediment Control: Guidelines for Soil Disturbing Activities, Technical Report 2002/01; and
- Greater Wellington's Erosion and Sediment Control Guidelines, WRC/RP-G-02/36.

Where guidance is not available, Transit works with others to develop nationally applicable guidelines, specifications and standards such as:

- Guidelines for Highway Landscaping, S/P/M 020;
- Specification for Base Course Aggregate TNZ/M4: 2006 allowing the use of recycled material in pavement;
- Standards for Storm Water Management for Road Infrastructure (currently under development); and
- New Zealand Noise Standard (currently under development).

## 1.3 HOW TO USE THIS ENVIRONMENTAL PLAN

[Return to Table of contents](#) →

The Environmental Plan is divided into sections by environmental and social impacts such as noise, water, air, culture and heritage. Each impact first states the objectives, then adverse effects are discussed and Transit's role explained, followed by examples of current practices. Next is an Implementation Plan divided into activities such as plan, design, build, maintain and operate as well as national office initiatives. Each Implementation Plan activity has a 'toolkit' with references to sources of policy, guidelines, specifications and standards. Best practices are evolving works in response to understanding of environmental effects, societal expectations and practice informing policy development, a cycle of continuous improvement.

### ENVIRONMENTAL EFFECTS

This Plan specifies how Transit staff and suppliers are expected to address key social and environmental impacts:

- Noise
- Air quality
- Water resources
- Erosion and sediment control
- Social responsibility
- Culture and heritage
- Ecological resources
- Spill response and contamination
- Resource efficiency
- Climate change
- Visual quality
- Vibration

### ENVIRONMENTAL ISSUES STRUCTURE

In each section, the Plan sets out the following information:

#### Objectives

Objectives are overall goals that describe long-term environmental performance consistent with the Environmental Policy. Wherever possible they are measurable, either quantifiably, for example noise level measurements; or qualifiedly, like the opinion of key stakeholders in regard to Transit's performance. Transit's social and environmental objectives are reflected in Transit's Statement of Intent, our Triple Bottom Line approach to performance reporting.

#### Effects

The source of the adverse effects and the nature of the impact are briefly described.

#### Transit's role

Transit's influence on the effect, and the role of other stakeholders.

#### Current practice

Recently completed mitigation, partnerships or innovative solutions are showcased in this section. Case studies show how context-specific responses to environmental sensitivity and community concerns resulted in sustainable outcomes.

### Performance indicators

Performance indicators assess progression towards objectives. They work best when they are simple, understandable to most people, verifiable and relevant to Transit's activities. Information collection requires a commitment of resources to preserve, manage and track over time. Successful organisations start small, work with what they know and build indicators over time thus gaining experience in evaluating performance. Therefore, not every objective has an indicator at this time. Indicators have been developed for priority areas where information exists to answer them. No single measurement can explain how well we are doing in environmental and social areas.

### Implementation plan

Transit functions are broken down into sequential activities: plan, design, build, maintain and operate. The specific environmental and social responsibilities for each activity are stated. Alongside each activity and responsibility you will find a toolkit of appropriate standards, guidelines and references.

## 1.3 HOW TO USE THIS ENVIRONMENTAL PLAN | Guide to Implementation Plan Tables - Example

Return to Table of contents →

<b>Transit Activities</b> National Office Initiatives Plan Design Build Maintain and Operate	<b>Methods</b> Currently used methods to avoid or mitigate impact	<b>Return to Table of contents</b>	<b>Toolkit</b> Standards, guidelines, best practices and references
TRANSIT ACTIVITIES	METHODS	TOOLKIT	
<b>National Office Initiatives</b>	<b>Monitor</b> Monitor and implement Memorandum of Understanding, between Transit and Department of Conservation.  <b>Information Management</b> Maintain and update information on ecological sites provided by Department of Conservation in Transit's GIS Spatial Viewer. Incorporate National Priority on Threatened Environment Classification Tool into Transit's Spatial Viewer.  <b>Collaborating and Advocating</b> Collaborate and work in partnership with relevant stakeholders such as the Department of Conservation and local authorities in order to ensure ecological resources are managed effectively.  <b>Designation and Resource Consent Conditions</b> Develop designation and resource consent proforma relating to protection of ecological resources.	Transit DOC MOU Liaison Group   Transit New Zealand Spatial Viewer	
<b>Plan</b>	When planning, Transit expects to: <ul style="list-style-type: none"> <li>• promote biodiversity on the state highway network; and</li> <li>• identify and protect significant ecological resources within state highway corridors.</li> </ul> <b>Route Selection</b> Investigate, consider and select, so far as is practicable, route options for new or improved sections of state highways that avoid significant ecological resources and maintain the ecological function of an area.  <b>Assessment of Effects</b> Assess the effects on significant ecological areas for new or improved sections of state highways.	Transit NZ Spatial Viewer Planning Policy Manual (SP/M/001) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a>  State Highway Control Manual: <ul style="list-style-type: none"> <li>• Guidelines for State Highways within or adjacent to National Parks, Reserves and Conservation Areas  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection33_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection33_FileName.pdf</a></li> <li>• State Highway Biosecurity Policy (SM/012)  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection29_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection29_FileName.pdf</a></li> </ul> Stream Ecological Valuation Auckland Regional Council TP 302 Guidelines for Highway Landscaping (SP/M/020) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a>	

## 1.3 HOW TO USE THIS ENVIRONMENTAL PLAN | General Methods

[Return to Table of contents](#) →

Overview, for detailed information see – (link to SECTION 3.1)



### Contract Management

Ensure Transit's LTMA objectives and Environmental Policy are reflected in all contract documentation and contract management. Ensure consultants and contractors identify environmental effects of relevant activities by completing the Social and Environmental Standard z/19 in SM030 appropriately. As part of contract management reviews, assess how objectives and performance measures are being met.



### Risk Management

Monitor, report and manage risks throughout project lifecycle including operation and maintenance.



### External Experts

Engage suitably qualified external experts to provide advice on environmental effects and mitigation.



### Complaint Management

Manage, investigate and resolve, as appropriate, complaints in accordance with Transit's Guideline for Handling Environmental Complaints.



### Relationship Management

Ensure Memoranda of Understandings are consistent with Policy and Guidance. Consult stakeholders early and provide genuine opportunities for public contributions to Transit decision-making. Ensure consistency with the consultation provisions of the Land Transport Management Act 2003 and Resource Management Act 1991.



### Permitted Activities

Have a clear understanding as to what Transit activities are permitted and what activities require a consent from a local or regional consent authority.



### Designation and Resource Consent Conditions

Ensure compliance with all designation and resource consent conditions.



### Urban Design

Ensure each project meets Urban Design Policy and Transit's commitment to the New Zealand Urban Design Protocol. Ensure concept designs are developed as an integrated engineering / urban design solution. Ensure urban design considerations of all mitigation measures that are identified at the planning and design phase are constructed or improved through innovation during construction. Ensure urban design principles take into account maintenance requirements.

## 2.1 NOISE

[Return to Table of contents](#) →

### OBJECTIVES

- N1** Reduce exposure to high traffic noise levels from the existing state highway network.
- N2** Determine reasonable noise requirements when seeking new or altering existing designations including when designating existing local roads by using RMA procedures.
- N3** Manage construction and maintenance noise to acceptable levels.
- N4** Influence activities adjacent to state highways to discourage noise-sensitive activities establishing in areas adversely affected, or likely to be in the future, by state highway traffic noise.

### EFFECTS



A noise-sensitive residence in close proximity to the Auckland Southern Motorway

Road traffic is a widespread source of environmental noise in New Zealand and can adversely affect community health and well being. The World Health Organisation identified a range of health effects associated with exposure to elevated levels of community noise, such as traffic noise, including:

- noise-induced hearing impairment;
- interference with speech communication;
- disturbance of rest/sleep; and
- physiological, mental health and performance effects.

The NZTS acknowledges noise from motor vehicles affects community health and well being, especially in urban areas. At present there is no national environmental standard relating to traffic noise, although a number of local councils have included approaches to address the issue in their district and city plans.

Noise comes from multiple sources associated with the state highway network. Vehicles using state highways generate traffic noise and construction and maintenance activities create noise over short periods of time.

There are two main sources of traffic noise:

- mechanical noise such as engine and exhaust noise; and
- rolling noise resulting from the interaction between vehicle tyres and the road surface.

Traffic noise may be continuous; for example, noise from a busy urban motorway or arterial road, or may be intermittent, like truck noise from a rural road at night.

The level of traffic noise audible in a particular location will depend on a range of factors, including:

- traffic composition (vehicle noise standards, type and age of vehicles) and conditions (speed and traffic flow);
- road surface (texture and porosity) and grade (degree of incline);
- driver behaviour (acceleration and braking); and
- surrounding topography (built and natural environment as well as environmental sensitivity).

Construction noise is associated with works to build new or upgrade existing state highways whilst maintenance noise is associated with works to maintain the standard of or repair existing state highways. Both the type of equipment and techniques employed to undertake construction and maintenance works can generate noise.

## 2.1 NOISE

[Return to Table of contents](#) 

### TRANSIT'S ROLE

Noise assessments are performed on roads with new or altered state highway designations likely to be affected by traffic noise. In consultation with local authorities, reasonable noise level criteria are generally included in the designation conditions. Design methods to achieve the criteria rely on a number of approaches and will be dependent on local conditions. Methods include physical mitigation measures such as low-noise road surfaces, noise barriers, walls and fences as well as landscaped earth bunds. In addition, road geometric design approaches such as design speed, road grade and intersection layout can be used to influence traffic noise levels.

On the existing state highway network, noise complaints are assessed on a case-by-case basis. If noise levels are above 65dB(A)  $L_{eq,24hrs}$ , a Noise Improvement Programme is available to fund retro-fitting of noise mitigation measures. Funding is limited and prioritised according to a set of criteria that considers sensitivity of receiving activities, number of properties affected, achievable noise reduction, cost of works including cost-sharing contribution from third-parties, legal risk, years of occupation or establishment of sensitive receiver(s) and number of complaints received. The programme is not intended to ensure mitigation of traffic noise to 65dB(A)  $L_{eq,24hrs}$  or less.

Transit's Planning Policy Manual demonstrates how potential reverse-sensitivity noise issues should be managed and places a strong emphasis on working with other stakeholders such as local councils and developers to achieve satisfactory outcomes. Transit seeks to ensure that new noise-sensitive developments establishing in close proximity to the state highway network take into account the existing (and, where possible, projected) traffic noise environment.

Transit also recognises that noise issues associated with construction and maintenance activities on the state highway network can be particularly intrusive and disturbing, especially when undertaken at night. The effective management of such noise is essential in order to avoid unreasonable effects on communities and individuals.

### PERFORMANCE INDICATOR

Cumulative increase in vehicle-kilometre-travelled affecting sensitive receiving environments near state highways in urban and peri-urban areas treated with road surfaces that are quieter than a grade 2 chip seal.



## 2.1 NOISE

[Return to Table of contents](#) →

### EXAMPLES OF CURRENT PRACTICE

#### Mitigating noise effects from new road projects

When determining future levels of traffic noise associated with a new road project there is an inevitable degree of uncertainty. In order to take this into account some of the noise barriers constructed as part of the Greenhithe deviation project in Auckland were designed so they can be increased or 'future-proofed'. The barrier system and foundation specifications are designed so additional panels can be added at a later date if there is a need to increase the degree of noise mitigation provided.



Some of the noise barriers on the Greenhithe deviation project in Auckland have been designed so they can be increased in height at a future date

#### Reducing noise from the existing highway network

Transit's Noise Improvement Programme provides funds to 'retro-fit' sections of the state highway network that are experiencing elevated levels of traffic noise. During 2005/06 Transit used this programme to address traffic noise levels along State Highway 50 in Napier where the highway approaches the port. A replacement low-noise road surface was laid which led to a noticeable reduction in traffic noise levels.



SH50 near Napier port where a replacement low-noise surface reduced traffic noise problems for residents in the area

#### Working with councils and developers to avoid new noise issues

Careful design of new noise-sensitive land uses such as residences and schools near existing and future roads can ensure a reasonable degree of acoustic comfort is achieved from current or future levels of traffic noise. Working in partnership with Christchurch City Council, Transit has sought to ensure that 'reverse sensitivity' is minimised along the proposed route of the Southern Motorway Extension. Developers have been required to construct noise bunds and barriers between the boundary of residences and the motorway alignment.



Noise barrier constructed by a developer next to proposed link road to the Christchurch Southern Motorway

## 2.1 NOISE

Return to Table of contents 

## IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>National Office Initiatives</b></p>	<p><b>Transit Noise Management Guidance</b></p> <p>Provide assistance, support and guidance for use when:</p> <ul style="list-style-type: none"> <li>• undertaking noise assessments for new and upgraded state highways;</li> <li>• determining the best practicable option to avoid, remedy or mitigate exposure to unreasonable levels of traffic noise associated with the state highway network;</li> <li>• seeking designation noise conditions for new or upgraded state highways;</li> <li>• dealing with reverse-sensitivity noise issues near the state highway network;</li> <li>• managing noise associated with construction and maintenance activities on the state highway network; and</li> <li>• handling and managing noise complaints in conjunction with regional offices.</li> </ul> <p><b>Information Management</b></p> <p>Develop a comprehensive network-wide noise information management system to enable relevant information to be stored, analysed and used efficiently ensuring noise issues are managed effectively.</p> <p><b>Existing Network Prioritisation</b></p> <p>Assist with the identification and prioritisation of the existing state highway network which may require enhanced noise management measures due to elevated levels of traffic noise by:</p> <ul style="list-style-type: none"> <li>• reviewing and analysing traffic noise measurements;</li> <li>• where appropriate, measuring and mapping traffic noise levels; and</li> <li>• analysing traffic noise complaint histories.</li> </ul>	<p>Contact Transit Environmental Manager, National Office</p> <p>Planning Policy Manual (SP/M/001) – Reverse Sensitivity Policy and Guidelines</p> <p><a href="http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf</a></p>

## 2.1 NOISE

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>National Office Initiatives</b></p>	<p><b>Collaborate and Advocate</b></p> <p>Work in partnership with key stakeholders such as the Ministry of Transport, Land Transport New Zealand and local authorities in order to enhance noise management on the state highway network including:</p> <ul style="list-style-type: none"> <li>• advocate for national measures to reduce traffic noise at source through, for example, improved vehicle noise emission standards;</li> <li>• support Ministry of Transport to develop a national Land Transport Noise Management Framework;</li> <li>• contribute to preparation of a New Zealand Standard for the measurement and assessment of noise from new or upgraded state highways and local roads; and</li> <li>• facilitate appropriate noise management research initiatives.</li> </ul> <p><b>Audit</b></p> <p>Review content and quality of work undertaken on behalf of Transit by consultants and contractors involved in noise management activities.</p>	
<p><b>Plan</b></p>	<p><b>Route Selection</b></p> <p>Investigate and select, where practicable, route options for new or upgraded sections of state highways that avoid exposing sensitive receivers to unreasonable levels of traffic noise.</p> <p><b>Assessment of Effects</b></p> <p>Assess the noise effects of new or upgraded sections of state highways in accordance with Transit's Guidelines for the Management of Road Traffic Noise.</p>	<p>State Highway Professional Services Contract Proforma Manual (SM030)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>MfE (2006) – A Guide to Preparing a Basic Assessment of Environmental Effects</p> <p><a href="http://www.mfe.govt.nz/publications/rma/aee-guide-aug06/aee-guide-aug06.pdf">http://www.mfe.govt.nz/publications/rma/aee-guide-aug06/aee-guide-aug06.pdf</a></p>

## 2.1 NOISE

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Plan</b></p>	<p><b>Designation Conditions</b></p> <p>Determine reasonable noise requirements when seeking new or altering existing designations, including the designation of existing local roads, by using RMA processes. Conditions should refer to noise criteria that deliver a reasonable noise level and implement the best practicable option.</p> <p><b>Local Planning Processes</b></p> <p>Influence proposed policy statements and plan provisions to improve consistency with accepted noise management practice in relation to planning, construction, use and maintenance of the state highway network.</p> <p><b>Reverse Sensitivity</b></p> <p>Avoid potential future noise effects from the state highway network by implementing Transit's Reverse Sensitivity Policy and Guidelines. Encourage local authorities and developers to provide, within developments:</p> <ul style="list-style-type: none"> <li>• separation areas/buffer zones between state highways and noise-sensitive locations;</li> <li>• noise mitigation including noise barriers, noise bunds as well as building design, construction, site and orientation; and</li> <li>• no complaint instruments on land titles where appropriate.</li> </ul>	<p>Planning Policy Manual (SP/M/001) – Appendix 6: Transit New Zealand's Guidelines for the Management of Road Traffic Noise  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection417_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection417_FileName.pdf</a></p> <p>UK Department of Transport, Welsh Office – Calculation of Road Traffic Noise  <a href="http://www.tsoshop.co.uk/bookstore.asp?FO=1159966&amp;Action=Book&amp;ProductID=0115508473&amp;From=SearchResults">http://www.tsoshop.co.uk/bookstore.asp?FO=1159966&amp;Action=Book&amp;ProductID=0115508473&amp;From=SearchResults</a></p> <p>Transit Research Report No. 28 (1994) – Traffic Noise from Uninterrupted Traffic Flows (copies available from Transit Environmental Manager, National Office)</p> <p>New Zealand Standard NZS 6801-2008 Acoustic – measurement of environmental sound.  <a href="http://www.standards.co.nz/web-shop?action=viewSearchProduct&amp;mod=catalog&amp;pid=6801:2008(NZS)">http://www.standards.co.nz/web-shop?action=viewSearchProduct&amp;mod=catalog&amp;pid=6801:2008(NZS)</a></p> <p>Planning Policy Manual (SP/M/001)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>

## 2.1 NOISE

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Design</b></p>	<p><b>Design Approach</b></p> <p>In situations where elevated levels of traffic noise cannot be avoided, design new or upgraded state highways in order to remedy and/or mitigate adverse effects by considering design measures such as:</p> <ul style="list-style-type: none"> <li>• low-noise road surface treatments;</li> <li>• noise barriers, walls, fences and earth bunds that will achieve a noticeable reduction in noise levels, are in accordance with Transit’s urban design and highway landscaping approaches, do not create adverse environmental effects themselves or excessive maintenance obligations and balance mitigation benefits with whole-of-life costs;</li> <li>• minimising the effect of road gradient and vehicle movements at intersection on traffic noise generation;</li> <li>• taking into account the effect of vehicle speed and fleet composition on traffic noise generation; and</li> <li>• utilising features such as cuttings, retaining walls and solid safety barriers to act as noise barriers.</li> </ul> <p><b>Durability of Mitigation Measures</b></p> <p>Ensure all physical noise mitigation measures are designed to have a life expectancy of at least 20 years and take into account maintenance requirements.</p> <p><b>Design Plans</b></p> <p>Ensure that the design solutions to mitigate and manage noise effects associated with a new or upgraded state highway project are fully detailed in the appropriate design documentation, for example Noise Management Plan.</p>	<p>State Highway Geometric Design Manual (Draft) (SHGDM)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit</a></p> <p>NZ Supplement to Pavement Design – A Guide to the Structural Design of Road Pavements (Austrroads, 2004)  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection147_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection147_FileName.pdf</a></p> <p>Land Transport NZ Research Report 292 (Opus) 2007 – Road Traffic Noise: Determining the Influence of NZ Road Surfaces on Noise Levels and Community Annoyance  <a href="http://www.ltsa.govt.nz/research/reports/292.pdf">http://www.ltsa.govt.nz/research/reports/292.pdf</a></p> <p>NSW RTA 2001 – Environmental Noise Management Manual  <a href="http://www.rta.nsw.gov.au/environment/noise/noise_management_manual.html">http://www.rta.nsw.gov.au/environment/noise/noise_management_manual.html</a></p> <p>NSW RTA 2006 – Noise Wall Design Guideline  <a href="http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/noise_wall_guidelines.html">http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/noise_wall_guidelines.html</a></p> <p>MfE New Zealand Urban Design Protocol  <a href="http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf">http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf</a></p> <p>Urban Design Implementation Principles  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection307_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection307_FileName.pdf</a></p> <p>Guidelines for Highway Landscaping (SP/M/020)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p>

## 2.1 NOISE

Return to Table of contents →

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Build</b></p>	<p><b>Property Acquisition and Disposal</b></p> <p>When disposing of property, implement Transit’s Reverse Sensitivity Policy and Guidelines in order to facilitate compatible land use opportunities and controls in close proximity to state highways and to avoid creating new or exacerbating existing (and where possible projected) traffic noise issues.</p> <p><b>Construction Noise</b></p> <p>Manage and minimise potentially unreasonable noise effects during construction, so far as is practicable, in accordance with NZS 6803:1999 ‘Acoustics – Construction Noise’.</p> <p>Ensure all Construction Management Plans, or equivalent, include a noise management component. This should detail consultant and contractor obligations during the construction phase in relation to:</p> <ul style="list-style-type: none"> <li>• monitoring and reporting requirements including results of risk assessments and noise measurements;</li> <li>• identifying appropriate noise mitigation measures to be implemented; and</li> <li>• procedures for maintaining contact with stakeholders and managing noise complaints.</li> </ul> <p>If it is necessary and justified to undertake construction works at night ensure that any applicable night-time noise limits are both reasonable and practicable (depending upon local conditions, these may need to vary from NZS 6803:1999).</p>	<p>Planning Policy Manual (SP/M/001) – Reverse Sensitivity Policy and Guidelines  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf</a></p> <p>New Zealand Standard NZS 6803:1999 ‘Acoustics – Construction Noise’  <a href="http://www.standards.co.nz/web-shop/?action=viewSearchProduct&amp;mod=catalog&amp;pid=6803:1999(NZS)">http://www.standards.co.nz/web-shop/?action=viewSearchProduct&amp;mod=catalog&amp;pid=6803:1999(NZS)</a></p> <p>State Highway Construction Contract Proforma Manual (SM031)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit</a></p> <p>Transit’s Public Engagement Policy (copies available from Transit Environmental Manager, National Office)</p> <p>Risk Management Process Manual (AC/Man/1)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit</a></p> <p>Freeflow (Grafton Gully to Central Motorway Junction Alliance) – Night Works: Noise Mitigation Best Practice Solutions (copies available from Transit Environmental Manager, National Office)</p>
<p><b>Maintain and Operate</b></p>	<p><b>Asset Management</b></p> <p>Ensure the RAMM system and all appropriate documentation, including Asset Owner’s Manuals, include details of all relevant noise mitigation measures and maintenance requirements.</p> <p>Maintain all noise mitigation measures such as low-noise road surfaces and noise barriers correctly to ensure they continue to provide the designed level of mitigation.</p>	<p>State Highway Professional Services Contract Proforma Manual (SM030)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p>

## 2.1 NOISE

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Maintain and Operate</b></p>	<p><b>Maintenance Activities</b></p> <p>Manage and minimise unreasonable noise effects associated with maintenance activities in accordance with NZS 6803:1999 'Acoustics – Construction Noise'.</p> <p>If it is necessary and justified to undertake maintenance works at night ensure that any applicable night-time noise limits are both reasonable and practicable (depending upon local conditions, these may need to vary from NZS 6803:1999).</p> <p><b>Heavy Vehicle Noise</b></p> <p>Seek to reduce the impact of heavy vehicle noise where practicable by:</p> <ul style="list-style-type: none"> <li>• re-routing heavy vehicles away from noise-sensitive locations; and</li> <li>• installing standard 'No Engine Braking' signs as appropriate and in consultation with relevant stakeholders.</li> </ul> <p><b>Annual Plan and Statement of Intent</b></p> <p>When preparing maintenance Annual Plans for the routine re-surfacing of state highways, demonstrate due consideration to Transit's Statement of Intent to <i>"annually increase the cumulative lane kilometres, in sensitive receiving environments near state highways in urban and peri-urban areas, that are treated with road surfaces that are quieter than a 'grade 2' chip seal"</i>.</p> <p><b>Noise Improvement Programme</b></p> <p>In accordance with Transit's Annual Plan Instructions Manual, implement the noise improvement programme as detailed below:</p> <p>Where traffic noise levels coming from the state highway network are above 65dB(A) <math>L_{eq,24hrs}</math>, at any noise-sensitive location, consider applying for 'strategic plan initiative' funding in order to retro-fit noise mitigation measures.</p>	<p>State Highway Maintenance Contract Proforma Manual (SM032)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p> <p>New Zealand Standard NZS 6803:1999 'Acoustics – Construction Noise'</p> <p><a href="http://www.standards.co.nz/web-shop/?action=viewSearchProduct&amp;mod=catalog&amp;pid=6803:1999(NZS)">http://www.standards.co.nz/web-shop/?action=viewSearchProduct&amp;mod=catalog&amp;pid=6803:1999(NZS)</a></p> <p>Freeflow (Grafton Gully to Central Motorway Junction Alliance) – Night Works: Noise Mitigation Best Practice Solutions (copies available from Transit Environmental Manager, National Office)</p> <p>Statement of Intent 2007/08 – 2009/10</p> <p><a href="http://www.transit.govt.nz/content_files/news/SOI-2007-2008.pdf">http://www.transit.govt.nz/content_files/news/SOI-2007-2008.pdf</a></p> <p>Annual Plan Instructions Manual (SM018) – Appendix 25 Maintenance Within Capital Funding (copies available from Transit Operations and Programming Manager, National Office)</p> <p>Transit's Guideline for Handling Environmental Complaints (copies available from Transit Environmental Manager, National Office)</p>

**2.1 NOISE**

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Maintain and Operate</b></p>	<p>The programme is not intended to mitigate existing traffic noise to 65dB(A) <math>L_{eq,24hrs}</math> or less. This noise level is instead used as part of the process to identify potentially suitable retro-fit sites and to allocate limited funding according to a weighted set of criteria that includes:</p> <ul style="list-style-type: none"> <li>• the measured traffic noise level at relevant noise-sensitive locations;</li> <li>• the sensitivity of receiving activities;</li> <li>• number of properties benefiting from potential mitigation;</li> <li>• achievable noise level reduction from potential mitigation;</li> <li>• cost to mitigate and whether those benefiting will contribute to the cost (offers equal to or greater than 50% of the total cost of the mitigation will receive higher relative priority);</li> <li>• legal risk;</li> <li>• years of occupation or establishment of sensitive receiver(s); and</li> <li>• the number of complaints received.</li> </ul> <p>Noise improvement programme mitigation measures will only be implemented within or at the edge of the state highway corridor and will only include the following:</p> <ul style="list-style-type: none"> <li>• low-noise road surfaces;</li> <li>• noise barriers, up to a maximum height of 3 m that are landscaped where practicable; and</li> <li>• landscaped noise bunds.</li> </ul> <p><b>Complaint Management</b></p> <p>Ensure that all noise complaints are managed, investigated and resolved in accordance with Transit’s Guideline for Handling Environmental Complaints.</p>	



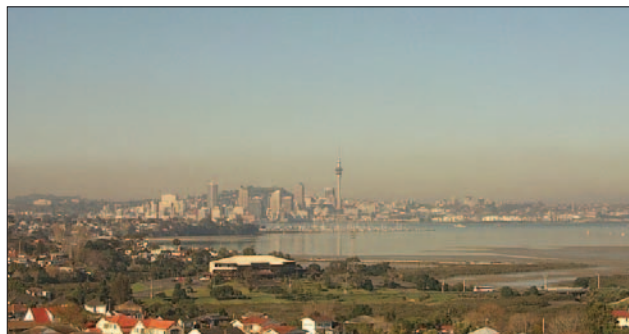
## 2.2 AIR QUALITY

[Return to Table of contents](#) 

### OBJECTIVES

- A1** Understand the contribution of vehicle traffic to air quality.
- A2** Ensure new state highway projects do not directly cause national environmental standards for ambient air quality to be exceeded.
- A3** Contribute to reducing emissions where the state highway network is a significant source of exceedances of national ambient air quality standards.

### EFFECTS



Air pollution in Auckland (Source: Auckland Regional Council)

Motor vehicle exhaust contains an array of air pollutants such as fine particulates (PM<sub>10</sub>), nitrogen dioxide, carbon monoxide, carbon dioxide and volatile organic compounds.

PM<sub>10</sub> and nitrogen dioxide contribute to harmful effects on human health ranging from breathing problems caused by lung irritations, to premature death of the seriously ill as a result of increased risk of lung and heart disease. Carbon monoxide at lower levels of exposure causes mild effects that are often mistaken for the flu. These symptoms include headaches, dizziness, disorientation, nausea and fatigue. High concentrations can be fatal. Carbon dioxide is a significant greenhouse gas (see section on Climate Change). Volatile organic compounds are known human carcinogens.

Vehicle exhaust emissions contribute to smog that reduces atmospheric visibility similar to that shown in the photograph. In addition to vehicle emissions, state highway construction and maintenance activities impact on air quality, e.g. dust, odour and spray drift. While individual vehicles may not be particularly important, collectively they represent a major source of air pollution. The Government has indicated in the NZTS and Energy Strategy that reducing the air quality effects of motor vehicle emissions is a high priority.

### TRANSIT'S ROLE

Ensuring compliance with the National Environmental Standard (NES) for air quality and managing local air quality in general is the responsibility of regional councils. When Transit seeks a new or altered designation in order to build a new or alter an existing state highway, it must take into account any air quality effects and the requirements of the NES.

Given the complex nature of managing the effects of emissions from motor vehicles, Transit is committed to inter-agency initiatives to tackle these effects by collaborating with relevant stakeholders and contributing to forums such as the National Air Quality Working Group. In addition, Transit has commissioned an air quality monitoring network to investigate relative levels of motor vehicle-related air pollution around the state highway network and to focus limited resources more effectively.

## 2.2 AIR QUALITY

[Return to Table of contents](#) →

In order to minimise other sources of air pollution, for example construction dust and spray drift of chemicals used for vegetation control, Transit requires that its consultants and contractors employ good management practices.

### PERFORMANCE INDICATOR

Annual assessment of vehicle emissions from the state highway network gathered from selected sites using diffusion tubes to measure nitrogen dioxide (NO<sub>2</sub>) as a surrogate measure. The objective is to monitor a decreasing trend in emissions of NO<sub>2</sub>.

### EXAMPLES OF CURRENT PRACTICE

#### Working in partnership

Transit is collaborating with the Hawke's Bay Regional Council to support a fine particulate (PM<sub>10</sub>) monitoring study in the vicinity of the Meeanee Road intersection upgrade project. Monitoring began in 2005 with the aim of assessing particulate levels before, during and after the roading project. During the construction phase of the project, measured levels of PM<sub>10</sub> have been compared with records documenting the nature and duration of activities, such as earthworks, on the site.

#### Managing dust during construction

The means used to control dust levels during the build phase of a roading project is a key component of any construction management plan. As part of the approach to manage dust levels around the Wellington inner city bypass project, wheel wash facilities were installed to clean all vehicles leaving the project site. This was part of a package of measures that helped the contractors working for Transit to ensure good community relationships were established and maintained during the construction of the bypass.



Air quality monitoring station near Meeanee Road intersection upgrade project in Napier



Wheel wash facility used to control dust from the Wellington inner city bypass project

## 2.2 AIR QUALITY

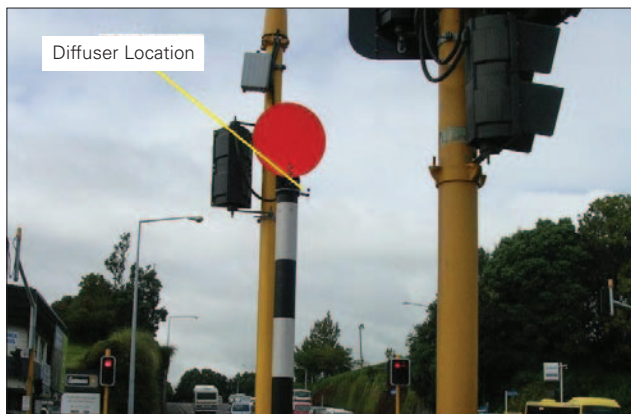
[Return to Table of contents](#) →

### Assessing air quality effects of new projects

Since the introduction of the National Environmental Standards for Air Quality, there has been an increasing focus on understanding the contribution of vehicle emissions to overall air pollution levels in areas believed to be at risk of breaching the standards. This is particularly the case where new projects are proposed in urban areas that experience high levels of congestion and traffic flows. For example, in order to assess the likely effects of the Victoria Park tunnel project in Auckland, a sophisticated monitoring station was set up in a nearby residential area during 2005 and 2006.

### Air quality on the state highway network

To obtain information about air quality on the state highway network, over 80 nitrogen dioxide diffusion tubes are deployed across the network and exchanged on a monthly basis. Data from these tubes allows air quality associated with vehicle emissions to be established and tracked over time. Measurements are made near a variety of potentially sensitive locations near state highways throughout New Zealand. These include residences and schools in major urban centres as well as rural centres.



Air quality monitoring site in Tauranga

## 2.2 AIR QUALITY

Return to Table of contents →

## IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>National Office Initiatives</b></p>	<p><b>Transit Air Quality Management Guidance</b></p> <p>Provide assistance, support and guidance to regional offices for use when:</p> <ul style="list-style-type: none"> <li>• undertaking air quality assessments for new and upgraded state highways;</li> <li>• determining best practicable option to avoid, remedy or mitigate exposure to elevated levels of air pollution associated with the state highway network;</li> <li>• seeking designation air quality management and monitoring conditions for new or upgraded state highways;</li> <li>• dealing with reverse-sensitivity air quality issues near the state highway network;</li> <li>• managing air pollution emissions, including dust, associated with construction and maintenance activities on the state highway network; and</li> <li>• handling and managing air pollution complaints.</li> </ul> <p><b>Information Management</b></p> <p>Develop a comprehensive network-wide air quality information management system to enable relevant information to be stored, analysed and used efficiently ensuring air quality issues are managed effectively.</p> <p><b>Existing Network Prioritisation</b></p> <p>Assist with the identification and prioritisation of the existing state highway network where vehicles may be contributing to poor air quality. In areas of the network where vehicles may be the principal emission source causing exceedances of the national environmental standards for ambient air quality:</p> <ul style="list-style-type: none"> <li>• measure and analyse relative levels of nitrogen dioxide around the state highway network; and</li> <li>• estimate emissions and modelling concentrations of fine particulates (PM<sub>10</sub>), nitrogen oxides and carbon monoxide on the state highway.</li> </ul>	<p>Contact Transit Environmental Manager, National Office</p> <p>MfE Users Guide to National Environmental Standards (NES) for Air Quality  <a href="http://www.mfe.govt.nz/publications/rma/user-guide-draft-oct05/index.html">http://www.mfe.govt.nz/publications/rma/user-guide-draft-oct05/index.html</a></p> <p>MfE Ambient Air Quality Guidelines  <a href="http://www.mfe.govt.nz/publications/air/ambient-air-quality-may02/index.html">http://www.mfe.govt.nz/publications/air/ambient-air-quality-may02/index.html</a></p> <p>Planning Policy Manual (SP/M/001) – Reverse Sensitivity Policy and Guidelines  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf</a></p> <p>MfE Good Practice Guide for Air Quality Monitoring and Data Management  <a href="http://www.mfe.govt.nz/publications/air/air-quality-good-practice-guide-dec00.html">http://www.mfe.govt.nz/publications/air/air-quality-good-practice-guide-dec00.html</a></p> <p>“NO<sub>2</sub> Diffusion Tubes for LAQM: Guidance Note for Local Authorities”  <a href="http://www.airquality.co.uk/archive/reports/cat13/0604061218_Diffusion_Tube_GN_approved.pdf">http://www.airquality.co.uk/archive/reports/cat13/0604061218_Diffusion_Tube_GN_approved.pdf</a></p> <p>MfE Good Practice Guide for Preparing Emissions Inventories  <a href="http://www.mfe.govt.nz/publications/air/emissions-good-practice-guide-01.html">http://www.mfe.govt.nz/publications/air/emissions-good-practice-guide-01.html</a></p> <p>MfE Good Practice Guide for Atmospheric Dispersion Modelling  <a href="http://www.mfe.govt.nz/publications/air/atmospheric-dispersion-modelling-jun04/index.html">http://www.mfe.govt.nz/publications/air/atmospheric-dispersion-modelling-jun04/index.html</a></p>

## 2.2 AIR QUALITY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Collaborate and Advocate</b></p> <p>Collaborate and work in partnership with relevant stakeholders such as the Ministry of Transport, Land Transport New Zealand and local authorities in order to enhance air quality management around the state highway network including:</p> <ul style="list-style-type: none"> <li>• advocating for national measures to reduce vehicle emissions, for example, through improved vehicle emission and fuel standards; and</li> <li>• supporting and facilitating appropriate air quality management research initiatives.</li> </ul> <p><b>Audit</b></p> <p>Review the content and quality of work undertaken on behalf of Transit by consultants and contractors involved in air quality management activities.</p>	
<b>Plan</b>	<p><b>Route Selection</b></p> <p>Investigate, consider and prioritise route options for new or upgraded sections of state highways that avoid increasing the exposure of sensitive receivers to poor air quality.</p> <p><b>Assessment of Effects</b></p> <p>Assess the effects on local air quality of new or improved sections of state highways in accordance with appropriate New Zealand and overseas guidance.</p> <p><b>Designation Conditions</b></p> <p>When seeking new or altering existing designations, including the designation of existing local roads, use RMA processes to ensure conditions take into account local air quality circumstances and are also nationally consistent.</p> <p><b>Local Planning Processes</b></p> <p>Influence proposed policy statements and plan provisions to improve consistency with accepted air quality management practice in relation to planning, construction, use and maintenance of the state highway network.</p>	<p>Contact Transit Environmental Manager, National Office</p> <p>MfE (2006) – A Guide to Preparing a Basic Assessment of Environmental Effects  <a href="http://www.mfe.govt.nz/publications/rma/aee-guide-aug06/aee-guide-aug06.pdf">http://www.mfe.govt.nz/publications/rma/aee-guide-aug06/aee-guide-aug06.pdf</a></p> <p>MfE Draft Good Practice Guide on Assessing Discharges to Air from Land Transport  <a href="http://www.mfe.govt.nz/publications/air/assessing-discharges-land-transport-jun06/index.html">http://www.mfe.govt.nz/publications/air/assessing-discharges-land-transport-jun06/index.html</a></p> <p>MfE Good Practice Guide for Air Quality Monitoring and Data Management  <a href="http://www.mfe.govt.nz/publications/air/air-quality-good-practice-guide-dec00.html">http://www.mfe.govt.nz/publications/air/air-quality-good-practice-guide-dec00.html</a></p> <p>MfE Good Practice Guide for Preparing Emissions Inventories  <a href="http://www.mfe.govt.nz/publications/air/emissions-good-practice-guide-01.html">http://www.mfe.govt.nz/publications/air/emissions-good-practice-guide-01.html</a></p>

## 2.2 AIR QUALITY

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Plan</b></p>	<p><b>Regional Air Quality</b></p> <p>Seek to ensure that proposed regional air quality targets are consistent with national environmental standards and MfE guidelines.</p> <p>Advocate for regional measures to improve poor air quality where vehicles may be the principal emission source causing exceedances of the national environmental standards for ambient air quality.</p> <p>Collaborate with local authorities and other relevant partners on measures that can support regional air quality management action plans including:</p> <ul style="list-style-type: none"> <li>• travel demand management approaches;</li> <li>• integration of land use and transport planning; and</li> <li>• route/corridor management strategies.</li> </ul> <p><b>Reverse Sensitivity</b></p> <p>Avoid potential future adverse effects associated with vehicle emissions from the state highway network by implementing Transit's Reverse Sensitivity Policy and Guidelines. For example, encourage local authorities and developers to:</p> <ul style="list-style-type: none"> <li>• provide separation areas/buffer zones between state highways and air pollution sensitive locations; and</li> <li>• ensure applications for air discharge permits do not have a discernible adverse effect on air quality in areas where state highways are located and national environmental standards for ambient air quality may be exceeded.</li> </ul>	<p>MfE Good Practice Guide for Atmospheric Dispersion Modelling  <a href="http://www.mfe.govt.nz/publications/air/atmospheric-dispersion-modelling-jun04/index.html">http://www.mfe.govt.nz/publications/air/atmospheric-dispersion-modelling-jun04/index.html</a></p> <p>Standards Australia AS3580 family of Air Monitoring Standards  <a href="http://www.saiglobal.com/shop/Script/Result.asp?SearchType=simple&amp;Sort=AS&amp;Status=all&amp;Gst=1&amp;Max=15&amp;Db=AS&amp;DegnKeyword=as+3580&amp;Search=+Go+">http://www.saiglobal.com/shop/Script/Result.asp?SearchType=simple&amp;Sort=AS&amp;Status=all&amp;Gst=1&amp;Max=15&amp;Db=AS&amp;DegnKeyword=as+3580&amp;Search=+Go+</a></p> <p>MfE Users Guide to National Environmental Standards (NES) for Air Quality  <a href="http://www.mfe.govt.nz/publications/rma/user-guide-draft-oct05/index.html">http://www.mfe.govt.nz/publications/rma/user-guide-draft-oct05/index.html</a></p> <p>MfE Ambient Air Quality Guidelines  <a href="http://www.mfe.govt.nz/publications/air/ambient-air-quality-may02/index.html">http://www.mfe.govt.nz/publications/air/ambient-air-quality-may02/index.html</a></p> <p>Travel Demand Management Manual (TDM)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=67&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=67&amp;action=edit</a></p> <p>Planning Policy Manual (SP/M/001)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>

## 2.2 AIR QUALITY

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Design</b></p>	<p><b>Design Approach</b></p> <p>In situations where vehicles are likely to be a significant source of emissions and cause of poor air quality, design new or upgraded state highways in order to remedy and/or mitigate adverse effects. Consider design measures to reduce vehicle emissions and avoid exposure to poor air quality, for example, by:</p> <ul style="list-style-type: none"> <li>• easing congestion and improving traffic flow;</li> <li>• improving vehicle performance through use of road surface treatments and smoothing techniques;</li> <li>• minimising the effect of road gradient and vehicle movements at intersections;</li> <li>• taking into account effect of vehicle speed and fleet composition and balancing this effect with function and purpose of the state highway;</li> <li>• utilising Intelligent Transport Systems (ITS), such as new or improved traffic signalling, better traffic information systems and signage;</li> <li>• providing high occupancy vehicle lanes, bus lanes and cycle lanes;</li> <li>• ensuring alignment of vehicle lanes is optimised within state highway designation to minimise exposure to vehicle-related air pollution at adjoining sensitive locations; and</li> <li>• ensuring that vehicle emissions from road tunnels are appropriately controlled, dispersed and diluted.</li> </ul> <p>Ensure air quality management design solution complies with urban design and highway landscaping approaches do not create adverse environmental effects themselves or inappropriate maintenance obligations and balance mitigation benefits with whole-of-life costs.</p> <p><b>Durability of Mitigation Measures</b></p> <p>Ensure physical air pollution mitigation measures are designed with a life expectancy of at least 20 years and take into account maintenance requirements.</p>	<p>State Highway Geometric Design Manual (Draft) (SHGDM)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit</a></p> <p>NZ Supplement to Pavement Design – A Guide to the Structural Design of Road Pavements (Austroads, 2004)  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection147_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection147_FileName.pdf</a></p> <p>MfE New Zealand Urban Design Protocol  <a href="http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf">http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf</a></p> <p>Urban Design Implementation Principles  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection307_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection307_FileName.pdf</a></p> <p>Guidelines for Highway Landscaping (SP/M/020)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p>

## 2.2 AIR QUALITY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Design</b>	<p><b>Design Plans</b></p> <p>Ensure that the design solutions to mitigate and manage adverse air pollution effects associated with a new or upgraded state highway project are fully detailed in the appropriate design documentation, for example Environmental Management Plan.</p>	
<b>Build</b>	<p><b>Property Acquisition and Disposal</b></p> <p>When acquiring property, ensure agreements that include a requirement to manage air quality including monitoring effects are fully considered and aligned with any related commitments such as designation conditions or the content of any Environmental Management Plan.</p> <p>When disposing of property, implement Transit's Reverse Sensitivity Policy and Guidelines in order to facilitate compatible land use opportunities and controls in close proximity to state highways and to avoid creating new or exacerbating existing (and where possible projected) air quality issues.</p> <p><b>Construction Dust and Air Pollution</b></p> <p>Ensure Construction Management Plans, or equivalent, include an air quality management component. These should detail consultant and contractor obligations during the construction phase in relation to:</p> <ul style="list-style-type: none"> <li>• monitoring and reporting requirements including results of risk assessments and any air pollution measurements, for example in relation to dust and/or odour;</li> <li>• identifying appropriate dust and air pollution mitigation measures to be implemented; and</li> <li>• procedures for maintaining contact with stakeholders and managing dust and air pollution complaints.</li> </ul> <p>Utilise methods and equipment to minimise air quality issues when a state highway is being built, for example, by using:</p> <ul style="list-style-type: none"> <li>• bituminous emulsions;</li> <li>• low emission and well maintained construction vehicles and equipment; and</li> <li>• environmentally friendly dust suppressants.</li> </ul>	<p>Planning Policy Manual (SP/M/001) – Reverse Sensitivity Policy and Guidelines  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf</a></p> <p>State Highway Construction Contract Proforma Manual (SM031)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit</a></p> <p>Transit's Public Engagement Policy (copies available from Transit Environmental Manager, National Office)</p> <p>Risk Management Process Manual (AC/Man/1)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit</a></p> <p>MfE Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions  <a href="http://www.mfe.govt.nz/publications/air/dust-guide-sep01.html">http://www.mfe.govt.nz/publications/air/dust-guide-sep01.html</a></p> <p>MfE Good Practice Guide for Assessing and Managing Odour in NZ  <a href="http://www.mfe.govt.nz/publications/air/odour-guidelines-jun03/index.html">http://www.mfe.govt.nz/publications/air/odour-guidelines-jun03/index.html</a></p>



## 2.2 AIR QUALITY

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Maintain and Operate</b></p>	<p><b>Asset Management</b></p> <p>Ensure the RAMM system and all appropriate documentation, including Asset Owner's Manuals, include details of all relevant air quality management/air pollution mitigation measures and their maintenance requirements.</p> <p>Maintain and operate all air quality management/air pollution mitigation measures, such as traffic signalling and road tunnel ventilation systems, correctly to ensure that they continue to provide the designed level of mitigation.</p> <p><b>Spray Drift</b></p> <p>Minimise air pollution effects associated with vegetation control by reducing use of inappropriate chemical sprays.</p> <p><b>Transit Air Quality Monitoring Network and Statement of Intent</b></p> <p>Collaborate with Environmental Manager to support air quality monitoring network measuring relative levels of nitrogen dioxide on the state highway network using nitrogen dioxide diffusion tubes as a surrogate for vehicle emissions.</p> <p>Nitrogen dioxide is a surrogate measurement for other motor vehicle-derived air pollutants such as PM<sub>10</sub>, carbon monoxide and volatile organic compounds.</p> <p>The monitoring network provides data in response to Transit's Statement of Intent which states: <i>"Annual assessment of vehicle emissions from the state highway network gathered from selected sites using diffusion tubes to measure nitrogen dioxide (NO<sub>2</sub>) as a surrogate measure. The objective is to monitor a decreasing trend in emissions of NO<sub>2</sub>."</i></p> <p><b>Complaint Management</b></p> <p>Ensure noise complaints are managed, investigated and resolved in accordance with Transit's Guideline for Handling Environmental Complaints.</p>	<p>State Highway Professional Services Contract Proforma Manual (SM030)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>State Highway Maintenance Contract Proforma Manual (SM032)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p> <p>Specification for Vegetation Control (TNZ C/21)  <a href="http://www.transit.govt.nz/content_files/technical/Specification126_pdfFile.pdf">http://www.transit.govt.nz/content_files/technical/Specification126_pdfFile.pdf</a></p> <p>Guidelines for Highway Landscaping (SP/M/020)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p> <p>"NO<sub>2</sub> Diffusion Tubes for LAQM: Guidance Note for Local Authorities"  <a href="http://www.airquality.co.uk/archive/reports/cat13/0604061218_Diffusion_Tube_GN_approved.pdf">http://www.airquality.co.uk/archive/reports/cat13/0604061218_Diffusion_Tube_GN_approved.pdf</a></p> <p>Transit Statement of Intent 2007/08 – 2009/10  <a href="http://www.transit.govt.nz/content_files/news/SOI-2007-2008.pdf">http://www.transit.govt.nz/content_files/news/SOI-2007-2008.pdf</a></p> <p>Transit's Guideline for Handling Environmental Complaints (copies available from Transit Environmental Manager, National Office)</p>

## 2.3 WATER RESOURCES

[Return to Table of contents](#) →

### OBJECTIVES

- W1** Ensure run-off from state highways complies with RMA requirements.
- W2** Limit the adverse effects of run-off from state highways on sensitive receiving environments.
- W3** Ensure stormwater treatment devices on the network are effective.
- W4** Optimise the value of water management through partnerships with others.

### EFFECTS

Routes selected for state highways and their alignment intercept and potentially affect natural waterways and drainage patterns. Stormwater run-off during state highway construction, especially during major earthworks, requires considerable mitigation to avoid sedimentation of nearby water bodies.

Vehicles on state highways shed waste products from braking (copper), tyres (zinc) and exhaust emissions (products of incomplete combustion). These pollutants mix with rainwater and may enter surface and groundwater via drains and infiltration. In some cases, metal concentrations in estuary sediments are unacceptably high.

The quantity and speed of stormwater run-off from state highways, if not controlled, can cause flushing and disturbance of receiving water bodies, or erosion where stormwater is discharged to land.

A significant number of New Zealand fish move between marine and fresh waters. In-river artificial structures such as culverts, fords, weirs and dams can pose a barrier to fish migration when poorly designed or installed.

### TRANSIT'S ROLE

Through careful planning and design, adverse environmental and social effects of highway stormwater run-off are avoided or minimised. Transit engages stakeholders, such as regional councils, Māori, local communities and the Department of Conservation before and during construction, operation and maintenance.

Historically, regional council plans varied widely in their approaches to managing works affecting surface and groundwater. Current studies under progress seek to find the most efficient and effective approach for consistency and reasonableness across the roading network.

Recently we completed a geographic information system (GIS)-based assessment of the state highway network to identify sensitive receiving environments potentially at risk from road run-off using a source-pathway-receptor approach with traffic intensity as a measure of relative pollution risk.

Further work is underway to measure traffic-derived environmental contaminants in high VKT estuaries.

This data is available on the Spatial Viewer. As a follow-up, site investigations will be conducted to measure actual pollutant loadings in sediment and assess vehicle contribution relative to surrounding land use discharges.

## 2.3 WATER RESOURCES

[Return to Table of contents](#) →

A parallel stream of work examined regional council stormwater discharge technical publications and overseas best practices to develop a Stormwater Treatment Standard for Road Infrastructure, which will improve clarity and certainty for state highway project managers and consultants. The Standard will be subjected to a rigorous fit-for-purpose technical and cost benefit analysis by stakeholders prior to publication.

### PERFORMANCE INDICATOR

Cumulative increase in vehicle-kilometre-travelled where highway run-off is treated by designed solutions, such as both natural and engineered water-filtering systems before being discharged into sensitive water bodies.

### EXAMPLES OF CURRENT PRACTICE

#### Sediment management

Wrap-face walls or reinforced earth walls stabilise slopes, prevent sediments entering nearby waterways and facilitate vegetation growth on slopes. The project uses sediment ponds to protect water quality during construction and exposed slopes are hydro seeded outside of earthworks season.

#### Permanent treatment

One hundred percent of stormwater from the alignment is treated using a range of devices including treatment ponds. Raupo from natural wetlands along a section of ALPURT B2 will be planted in the treatment ponds creating a wetland to provide a more effective water quality treatment process, reuse plant resources, improve visual quality of the corridor and provide additional native habitat.



Greenhithe, SH18, Auckland



Adjacent to the Northern Gateway Motorway, Auckland

## 2.3 WATER RESOURCES

[Return to Table of contents](#) →

### Fish passage and habitat

This project developed a fish passage solution for culverts using sheets of plastic baffles. These sheets enable easy and cost-effective replacement and maintenance of engineered fish passages. The project team also installed fish habitats between sections of the baffles within culverts. Baffles create habitat for invertebrates, which fish eat, as they oxygenate water, anchoring rocks and detritus between pools. Research is currently underway to determine how successful these habitats are, and the initial results are promising.

### Wetland preservation

During stage two of construction of the MacKays Crossing project north of Wellington, an area of wetland in a scenic reserve may be destroyed. Transit has mitigated this potential future loss by excavating and planting at the northern end of the existing wetland to enhance its viability and developing 3.5 hectares of wetlands in Queen Elizabeth II Park as part of the long-term development of the park.



ALPURT B2, Auckland fish passage



MacKays Crossing, Wellington

## 2.3 WATER RESOURCES

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Prioritise</b> Identify water bodies sensitive to highway run-off (<i>in progress</i>).</p> <p><b>Legislative Compliance</b> Develop resource consent proforma relating to highway discharges (<i>in progress</i>).</p> <p><b>Quality Response</b> Develop specifications for constructing and maintaining stormwater quality improvement devices (<i>in progress</i>).</p> <p>Provide advice on the selection of external experts, including identification of approved and/or accredited water effects and mitigation service providers.</p> <p><b>Advocacy</b> Collaborate with Ministry of Transport, Ministry for the Environment, regional councils and research organisations to achieve water quality standards and consistent vehicle component standards and application of scientific knowledge throughout New Zealand.</p>	<p><i>Preliminary assessment of sensitive receiving environments at risk from state highway runoff.</i> Gardiner, Osborne, Reller. NZWWA <a href="http://www.transit.govt.nz/content_files/planning/storm-water-management/20081205-NZWWA-SRE-paper.pdf">http://www.transit.govt.nz/content_files/planning/storm-water-management/20081205-NZWWA-SRE-paper.pdf</a></p> <p>Transit Spatial Viewer</p>
<b>Plan</b>	<p><b>Route Selection</b> Investigate, consider and select, so far as is practicable, route options for new or improved sections of state highways that limit adverse effects on water, including avoiding significant changes to the natural functions of surface and ground waterways and flow paths.</p> <p><b>Designation and Consent Conditions</b> Ensure reasonable conditions and performance standards in regional plans and discharge permits, where 'reasonable' includes consideration of:</p> <ul style="list-style-type: none"> <li>• actual impacts of the proposal on the receiving environment;</li> <li>• the cost effectiveness of treatment mechanisms; and</li> <li>• the relative contribution of the state highway to adverse effects on water resources.</li> </ul>	<p>ARRB Austroads Guidelines for the Collection and Discharge of Stormwater from the Road Infrastructure <a href="http://www.arrb.com.au/index.php?option=com_content&amp;task=view&amp;id=86&amp;Itemid=105">http://www.arrb.com.au/index.php?option=com_content&amp;task=view&amp;id=86&amp;Itemid=105</a></p> <p>Consult relevant regional plan</p>

## 2.3 WATER RESOURCES

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Plan</b>	<p><b>Regional Plans</b></p> <p>Influence proposed policy statements and plans to improve consistency with accepted stormwater management practice in relation to the use and functioning of the state highway network.</p> <p><b>Effects of Adjacent Land Use</b></p> <p>Avoid potential flooding or contamination risk from adjacent land use by encouraging regional councils and developers to provide on-site stormwater treatment facilities within developments.</p>	<p>Planning Policy Manual (SP/M/001)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>
<b>Design</b>	<p><b>Legislative Compliance</b></p> <p>Ensure stormwater management techniques comply with regional plan and discharge consent conditions.</p> <p><b>Mitigation Selection</b></p> <p>Seek expert advice to ensure stormwater quality improvement devices are appropriately sized and designed for site conditions, contaminant loadings, treatment efficiencies and maintenance requirements.</p> <p>Design multi-functional water management techniques (e.g. vegetated swales) that also serve amenity and ecological functions.</p> <p>For new projects, avoid, where reasonable, adverse effects on sensitive water bodies by specifying and achieving project-specific water quality and quantity management objectives.</p> <p><b>Partnership</b></p> <p>Develop joint strategies with local authorities and private landowners/developers to reduce and manage stormwater from sources wider than the state highway corridor, where additional costs are appropriately shared.</p>	<p>Stormwater Treatment Standard for Road Infrastructure <i>(under development)</i></p>

## 2.3 WATER RESOURCES

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Build</b>	<p><b>Legislative Compliance</b></p> <p>Comply with regional plan and discharge permit conditions for worksite erosion and sediment control.</p>	
<b>Maintain and Operate</b>	<p><b>Asset Management</b></p> <p>Ensure the RAMM and the Asset Owner’s Manual include details of all relevant stormwater mitigation measures and their maintenance requirements.</p> <p>Maintain all stormwater mitigation measures, such as sumps, filters, swales and fish passage, correctly to ensure they continue to provide the designed level of mitigation.</p> <p><b>Existing State Highways</b></p> <p>On the existing network, identify sensitive water bodies that are adversely affected by state highway run-off. As appropriate, treat the identified sites, with priority based on the following criteria:</p> <ul style="list-style-type: none"> <li>• effect of run-off from the state highway;</li> <li>• improvement in water quality that can be maintained;</li> <li>• reasonableness of capital and maintenance costs;</li> <li>• legal compliance and legal risk;</li> <li>• area benefiting from treatment; and</li> <li>• opportunities to work with local authorities and adjacent landowners/developers.</li> </ul> <p>Continue to develop stock effluent disposal sites to limit uncontrolled effluent disposal.</p> <p>Ensure contractors have procedures in place to manage accidental spills of hazardous/toxic substances to limit contamination of water bodies.</p>	<p>State Highway Maintenance Contract Proforma Manual (SM032)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p> <p>Annual Plan Instructions Manual (SM018)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=40&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=40&amp;action=edit</a></p>

## 2.4 EROSION AND SEDIMENT CONTROL

[Return to Table of contents](#) →

### OBJECTIVES

- ES1** Ensure construction and maintenance activities avoid, remedy or mitigate effects of soil erosion, sediment run-off and sediment deposition.
- ES2** Identify areas susceptible to erosion and sediment deposition and implement erosion and sediment control measures appropriate to each situation with particular emphasis on high-risk areas.
- ES3** Use bio-engineering and low-impact design practices where practicable.

### EFFECTS

Adverse impacts include soil slips and landslides where significant amounts of sediment enter waterways resulting in deterioration and destruction of flora, fauna, aesthetic features, structures and water quality.

The two main drivers of erosion are water and wind.

**Water:** Water plays a major role in erosion by displacing and transporting soil. In general, there is an increased potential for water erosion where the land slope is greater than 2%.

Water erosion types include:

1. Raindrop erosion: the breaking-up of the soil surface through the direct impact of raindrops. The extent of raindrop erosion is directly related to soil surface cover and the size, velocity and direction of raindrops, and is essentially the start of the erosion process.
2. Sheet erosion: the uniform removal of soil without the development of visible water channels. It is the least apparent of the erosion types.
3. Rill erosion: soil removal through the cutting of many small but conspicuous channels.
4. Gully erosion: the consequence of water cutting down into the soil along the line of flow. Gullies – the result of concentrated flows – develop more quickly in places characterised by furrows and vehicle ruts.
5. Tunnel erosion: occurs in soils with sub-layers with a tendency to transport flowing water more readily than their surface layer.
6. Channel erosion: when the volume and velocity of water in stream systems results in scouring and undercutting of stream banks and beds.

**Wind:** Wind can move sediment grains over long distances when they are air-borne. Sediments also can be blown along expanses of land, such as beaches, mudflats, unvegetated cropland or construction areas. Obstructions can reduce the wind's erosive capacity; hence windblown sediment is often deposited at these locations.

Windborne dust can pose a significant hazard on the state highway network by reducing visibility.



Lime application (Photo taken by G Ridley, Waitakere, Auckland)

The three key factors that influence the erosion process are climate, soil characteristics (soil texture, organic matter, permeability and structure) and topography. These factors need to be considered when implementing risk assessment, mitigation and control measures; with particular attention being paid to:

- vegetation cover removal;
- control measures during earthworks;
- roading project design;
- unstable or exposed soil;



## 2.4 EROSION AND SEDIMENT CONTROL

[Return to Table of contents](#) →

- stockpile location of soil and other debris including haul road location;
- earth damaged by vehicle passage;
- works carried out during rainy seasons and other wet periods;
- works in areas sensitive to erosion (friable soils, high rainfall, coastal environments);
- local environments characterised by high water flows and subject to high rainfall;
- steep slopes;
- long slope lengths; and
- storms featuring heavy or abnormal rainfall, both forecast and not forecast.

Because erosion and sediment deposition has a detrimental effect on the environment and safe sustainable use of the state highway network, control measures should be planned and implemented early in any project that is likely to cause erosion or sediment deposition.

### TRANSIT'S ROLE



Silt fence construction (Photo in Auckland region – compliments ARC)

With careful planning and design, adverse effects of sediment discharges resulting from construction and maintenance activities can be avoided or minimised.

Transit ensures that the above objectives are key in minimising adverse effects of road construction and maintenance. This involves forming partnerships with interested parties – government agencies, consulting and engineering firms, specialist advice and contracting firms. Transit's intention is to lead in the:

- promotion and use of appropriate design methods;
- development and application of practices that minimise risk of erosion and sediment deposition;
- implementation of erosion and sediment control measures;
- identification of risk and problem areas;
- use of best-practice methods unique to each situation to ensure effectiveness;
- early identification of new projects that have a higher risk of erosion;
- identification of and support for new techniques and methodologies including research and implementation as appropriate;
- consultation with council authorities to ascertain problem areas and agree upon solutions; and
- protection of sensitive receiving environments.

### PERFORMANCE INDICATOR

None at this time.

### EXAMPLES OF CURRENT PRACTICE

There are 10 core best-practice principles for erosion and sediment control to be applied in all projects.

1. Minimise disturbance: some areas of a site should not be disturbed and others should have the impacts on them minimised as much as possible. Projects should avoid working on areas that are steep, wet, have fragile soils, vegetation or are conservation areas.
2. Stage construction: to limit erosion, project sites should use only the areas needed for the immediate activity and construction staging where the site has earthworks undertaken in small units over time, followed by progressive re-vegetation.
3. Protect steep slopes: steep slopes should be avoided, but if necessary, divert run-off from slope and ensure that erosion control measures are put in place immediately the activity is finished.
4. Protect watercourses: preserve riparian margins around watercourses – a vegetative barrier should be maintained and appropriate erosion and sediment control measures implemented around water bodies to minimise contamination.
5. Stabilise exposed areas rapidly: it is important to stabilise each area with vegetation or other appropriate measures after they have been disturbed. Mulch is a material that provides instant stabilisation.
6. Install perimeter controls: placed around the project, these prevent clean offsite run-off contamination.
7. Sediment retention measures: when installed, will capture and minimise the impacts of any sediment run-off where present.

## 2.4 EROSION AND SEDIMENT CONTROL

[Return to Table of contents](#) →

8. Get registered: consult with erosion experts or attain qualifications on erosion and sedimentation, allowing savings on project time and money, as well as facilitating early identification of potential problems. An appropriately qualified and trained contractor enhances achievement of the above objectives.
9. Ensure plan evolution: the project plan should evolve as the relevant variables do. Factors such as weather, changes to grade and altered drainage can require changes to planned erosion and sediment control practices.
10. Assess and adjust: monitor, assess and maintain effective control measures by facilitating adaptation to storm events or changes in project plans.

Transit promotes the use of vegetation as an effective erosion and sediment control measure because it is a low-impact bioengineering alternative. The use of vegetation to manage erosion and to achieve slope stabilisation serves these key functions:

- retain sediment, keeping it out of receiving environments;
- provide permanent slope stabilisation and erosion control with its root structures minimising slip risk; and
- create an aesthetically pleasing roadside environment.

Use of vegetation in erosion and sediment control is an efficient use of capital compared to traditional construction-based alternatives, and can also save staff time, maintenance costs mitigating against future road closures and remedial work.

To effectively utilise vegetative options for erosion and sediment control careful planning and consideration is needed as:

- vegetative options should complement the natural biodiversity of the surrounding area, especially when working in or adjacent to Department of Conservation (DOC) land;
- selection of native species endemic to the area is important because of the impact on the natural character, the species native to the area and plants' ability to flourish in the environment; and
- plants should be locally-sourced and chosen after consultation with experts such as tangata whenua and local DOC personnel.



Sediment retention pond (Photo in Auckland region – compliments ARC)



Orewa Interchange construction, ALPURT B2 Northern Motorway Extension

## 2.4 EROSION AND SEDIMENT CONTROL

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Risk Assessment</b></p> <p>Identify areas of high risk on a national basis with respect to future proposed projects based on extent and nature of construction works and the values of the receiving environments.</p> <p><b>Specifications</b></p> <p>Develop specifications for implementation and maintenance of erosion and sediment control measures, including details of resource consent proforma relating to earthworks activities.</p> <p><b>Education/Advocacy</b></p> <p>Undertake educational initiatives with Transit-employed contractors and consultants to upskill at all levels.</p> <p>Collaborate and form partnerships with the various external providers, research organisations and councils to promote good practice and to further explore technical options and advancements.</p>	<p>Soil Conservation Technical Handbook  <a href="http://www.nzarm.org.nz/SoilConserv%20Pt%20A.pdf">http://www.nzarm.org.nz/SoilConserv%20Pt%20A.pdf</a></p> <p>Goldman, Steven J, Jackson, K and Bursztynsky, T:            Erosion and Sediment Control Handbook, 1986</p> <p>Fundamentals of Urban Runoff Management: Technical and Institutional Issues  <a href="http://www.nzarm.org.nz/SoilConserv%20Pt%20A.pdf">http://www.nzarm.org.nz/SoilConserv%20Pt%20A.pdf</a></p>
<b>Plan</b>	<p><b>Local Authorities' Erosion and Sediment Control Guidelines</b></p> <p>Detailing each local authority's erosion and sediment control guidelines and extracting key elements from international experience.</p> <p><b>Collaborative Regional Planning</b></p> <p>Work with councils to develop regional and district plans that meet the needs of Transit to ensure that consideration is given to practical and achievable requirements for erosion and sediment control for all projects including maintenance works.</p>	<p>Erosion and Sediment Control Guideline 2007 for Canterbury  <a href="http://www.ecan.govt.nz/NR/rdonlyres/30C25E34-6844-4498-84B9-AE31BD133EAC/0/FullErosionandSedimentControlGuideline.pdf">http://www.ecan.govt.nz/NR/rdonlyres/30C25E34-6844-4498-84B9-AE31BD133EAC/0/FullErosionandSedimentControlGuideline.pdf</a></p> <p>Erosion and Sediment Control for the Auckland Regional Council (TP90)  <a href="http://www.arc.govt.nz/albany/fms/main/Documents/Plans/Technical%20publications/51-100/TP90%20Erosion%20and%20sediment%20control%20guidelines%20for%20land%20disturbing%20activities%20in%20the%20Auckland%20Region%20Part%20A%201-4%20-%201999.pdf">http://www.arc.govt.nz/albany/fms/main/Documents/Plans/Technical%20publications/51-100/TP90%20Erosion%20and%20sediment%20control%20guidelines%20for%20land%20disturbing%20activities%20in%20the%20Auckland%20Region%20Part%20A%201-4%20-%201999.pdf</a></p> <p>Erosion and Sediment Control Guidelines for the Wellington Region  <a href="http://www.gw.govt.nz/council-reports/pdfs%5Creportdocs%5C2002_514_2_Attach.pdf">http://www.gw.govt.nz/council-reports/pdfs%5Creportdocs%5C2002_514_2_Attach.pdf</a></p>

## 2.4 EROSION AND SEDIMENT CONTROL

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Plan</b></p>	<p><b>Consent Conditions</b></p> <p>Ensure that resource consent conditions are appropriate and have considered:</p> <ul style="list-style-type: none"> <li>• potential effects;</li> <li>• cost effectiveness; and</li> <li>• practicality and achievability.</li> </ul>	<p>Earthworks- Erosion and Sediment Control for Environment Waikato  <a href="http://www.ew.govt.nz/Environmental-information/Land-and-soil/Erosion/Earthworks---Erosion-and-Sediment-Control/">http://www.ew.govt.nz/Environmental-information/Land-and-soil/Erosion/Earthworks---Erosion-and-Sediment-Control/</a></p> <p>Preparing the Erosion and Sedimentation Control Plan  <a href="http://www.dlr.enr.state.nc.us/images/Sediment_design_manual_June2006/ChapterFour_20060614.PDF">http://www.dlr.enr.state.nc.us/images/Sediment_design_manual_June2006/ChapterFour_20060614.PDF</a></p> <p>Preparing the Erosion and Sedimentation Control Plan – North Carolina Department of Environment and Natural Resources  <a href="#">a useful guideline on how to plan erosion and sediment control measures</a></p>
<p><b>Design</b></p>	<p><b>Control Selection</b></p> <p>Seek expert advice and research available literature as necessary to design and advise on appropriate selection of control measures.</p> <p>Follow the 10 basic principles and place emphasis on the prevention of sediment-generation in the first instance. The less sediment we generate the less we have to capture before it leaves our site.</p> <p><b>Ongoing Advancements</b></p> <p>Collaborate and form partnerships with the councils and private landowners to continually enhance the erosion and sediment control measures while looking for innovative ways of implementation and maintenance.</p> <p><b>Risk Assessment</b></p> <p>Develop a risk matrix for each specific project to allow clear interpretation of the areas where the highest risk exists and how this can be managed to minimise the risk.</p>	<p>Erosion and Sediment Control Using New Zealand Native Plants  <a href="http://icm.landcareresearch.co.nz/knowledgebase/publications/public/NZIHT_Chris_Phillips_natives.pdf">http://icm.landcareresearch.co.nz/knowledgebase/publications/public/NZIHT_Chris_Phillips_natives.pdf</a></p> <p>West Virginia Department of Transportation Division of Highways: Erosion and Sediment Control Manual  <a href="http://www.wvdot.com/engineering/files/EROSION/Erosion2003.pdf">http://www.wvdot.com/engineering/files/EROSION/Erosion2003.pdf</a></p>

## 2.4 EROSION AND SEDIMENT CONTROL

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Build</b>	<p><b>Key Contacts</b> Develop a list of key suppliers and key contacts for your region. Develop partnerships with these parties to secure availability as required.</p> <p><b>Consent Compliance</b> Comply with all resource consent conditions and continue to work with all authorities to understand and ensure compliance.</p> <p><b>Incident Reporting and Checklists</b> Develop incident reporting and checklists for the various projects to assist with achieving compliance and appropriate objectives and outcomes. Check against the objectives for erosion and sediment control and adjust as necessary.</p> <p><b>Collaboration</b> Ongoing partnership building with councils and key stakeholders.</p>	<p>Tennessee Erosion and Sediment Control Handbook <a href="http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/eschandbook.pdf">http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/eschandbook.pdf</a></p> <p>Advice and Guidance on Range of Consenting and Compliance Issues <a href="http://www.qualityplanning.org.nz">http://www.qualityplanning.org.nz</a></p>
<b>Maintain and Operate</b>	<p>Only on completion of the construction activity can the erosion and/or sediment control measure be removed. They are short-term measures only and are not designed for long-term placement. Utilise rapid stabilisation techniques to allow for removal of the control measures and to eliminate future sedimentation issues.</p>	

## 2.5 SOCIAL RESPONSIBILITY

[Return to Table of contents](#) →

### OBJECTIVE

**SR1** Enhance and contribute to community cohesion.

### EFFECTS



Severance effect

State highways are the main streets of many towns. While only part of the state highway network runs through towns and cities, over 85% of New Zealanders live in these urban communities. The state highway system is an essential part of New Zealand's transport system that provides access to social, educational, employment and recreational opportunities and, in this way, contributes to the well being of communities.

However, state highways can also have adverse effects on the cohesion of local communities. The construction, realignment or increase in numbers of vehicles on state highways can physically or perceptually sever parts of a community from services (such as schools and hospitals) and facilities (such as parks and shopping centres).

The ability of pedestrians and cyclists to move freely and without risk of accidents is affected by traffic and roads. The greater the number of vehicles the more delays and



Barrier effect

discomfort are experienced by people walking. This is called the 'barrier effect' and is proportional to vehicle kilometre travelled (VKT). New or widened highways impose a 'severance' effect on communities. Together, the barrier and severance effects can reduce community cohesion.

This loss of community cohesion is not intentional but is unavoidable when fast-moving, and/or large vehicles share space with vulnerable road users. Consequently, pedestrians may change routes and take longer to reach their destinations. The increased travel time of pedestrians caused by increased traffic volumes and new roads is currently not formally assessed.

Loss of connectivity promotes increased motorised travel. Numerous studies indicate people would like to walk and bicycle for recreation and transport, but are constrained by heavy road traffic; for example, the proportion of British children walking to school decreased from 80%

## 2.5 SOCIAL RESPONSIBILITY

[Return to Table of contents](#) →

in 1971 to 9% in 1990 partly because of fears of traffic risks. Furthermore, disadvantaged populations bear a disproportionate share of these risks because they are often heavily dependent on non-motorised transport.

Community cohesion is also adversely affected as a result of designations for new or improved transport routes. Once a transportation corridor is 'designated' the residents are placed in a state of uncertainty because the road may not be built for many years. Any improvements made are not compensated once a designation is in place, consequently is it not uncommon for buildings and land to deteriorate.

### TRANSIT'S ROLE

Balancing the needs of local communities with national transport requirements can be a difficult and contentious undertaking. Social impact assessments are one of the methods planners use to improve the decision-making process.

Social impact assessments for major roading projects make good sense for several reasons:

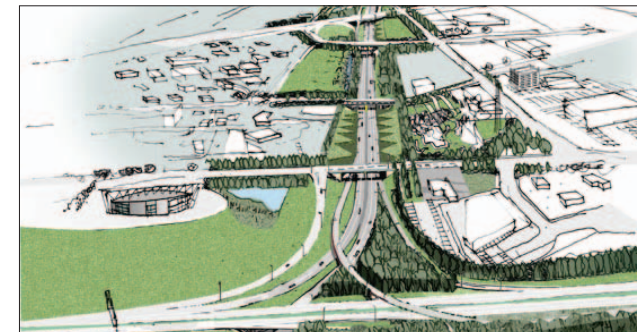
- identify and make explicit community cost and benefits;
- consider social cost alongside technical, safety and economic issues;
- reduce costs from unforeseen environmental damages;
- efficient project design and performance by good urban design; and
- ameliorate public opposition.



Severed communities, Auckland

Roads may also play a useful role in separating incompatible land uses; for example, separating residential areas from wetlands or industry, or restricting land use development to one side of a bypass.

Transport and land use planning decisions affect community cohesion by influencing the location of activities and the quality of the places where people naturally interact, such as footpaths, local parks and public transport, and thus the ease with which neighbours meet and build positive relationships.



Urban design concept

There are many ways to support community cohesion and thereby achieve other strategic planning objectives by improving land use accessibility, affordability and transport diversity. For example, transit-orientated development and good urban design maximise the quality of public space and walk ability, reduce traffic speeds and volumes, encourage mixed use buildings and support neighbourhood events and activities such as street fairs and cultural events. In addition, community cohesion can provide indirect benefits, including increased safety, increased property values and economic productivity, and support strategic objectives like urban redevelopment, reduced travel and improved public health.

### PERFORMANCE INDICATOR

None at this time.

## 2.5 SOCIAL RESPONSIBILITY

[Return to Table of contents](#) →

### EXAMPLES OF CURRENT PRACTICE

#### Community connections

The Northern Gateway Motorway Albany to Puhoi Realignment B2 will allow State Highway 1 traffic to bypass the town of Orewa, easing congestion through the town. This will support the Orewa community's efforts to re-establish a strong connection between town and beach, a focal point of the town's identity long threatened by traffic congestion.



Left is the Hibiscus Coast Highway running between Orewa town and the main beach and right is the ALPURT B2 – Northern motorway extension that directs traffic around the outskirts of Orewa

#### Pedestrian and cycling

Meeting non-road-user expectations depends on several factors including:

- surrounding land use, both existing and planned;
- state highway category;
- safety records;
- whether the highway is existing or proposed;
- numbers and needs of pedestrians and cyclists;
- available and prioritised funds; and
- approach taken by local authority.



Keith Hay Park cycle/walkway SH20 Mount Roskill Extension Auckland

#### Community identity

Transit recognises highways are part of communities and supports celebrations of rural community activities and sporting events on and around state highways. Events such as Whangamomona Independence Day on State Highway 43 (inland Taranaki), Lake Taupo Cycle Challenge and Taihape gumboot festival are such events.



State highway temporarily closed for community celebrations  
Source: Taranaki Daily News



## 2.5 SOCIAL RESPONSIBILITY

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Collaborate and Advocate</b></p> <p>Collaborate and work in partnership with relevant stakeholders such as the Ministry of Transport, Land Transport New Zealand and local authorities in order to mitigate social impacts around the state highway network.</p> <p>Support and facilitate appropriate public health and well being research initiatives.</p> <p><b>Existing Network Prioritisation</b></p> <p>Identify and prioritise for investigation areas of the existing state highway network that may be sensitive to severance by:</p> <ul style="list-style-type: none"> <li>• reviewing and analysing the potential for social impacts;</li> <li>• where appropriate, conducting public health and well being assessments; and</li> <li>• analysing complaint histories.</li> </ul> <p><b>Information Management</b></p> <p>Develop a comprehensive network-wide severance/barrier sensitivity information management system to enable relevant information to be stored, analysed and used efficiently ensuring that Transit manages social responsibility issues in an effective manner.</p> <p><b>Monitor and Audit</b></p> <p>Review the content and quality of work undertaken on behalf of Transit by consultants and contractors involved in social impact mitigation.</p>	

## 2.5 SOCIAL RESPONSIBILITY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Plan</b></p>	<p><b>Consultation and Public Engagement</b></p> <p>Minimise community severance caused by new and existing state highways by:</p> <ul style="list-style-type: none"> <li>• considering community cohesion in strategic studies;</li> <li>• providing local accessibility where appropriate across the state highway where it travels through a community;</li> <li>• engaging early in network planning with local authorities and other transport partners;</li> <li>• engaging early with local authorities in land use and resource planning processes; and</li> <li>• engaging early with affected communities on state highway projects and activities to ensure consideration of concerns and needs of affected persons, prevent isolated development, meet urban design principles and support community cohesion.</li> </ul> <p><b>Route Selection</b></p> <p>Investigate, consider and select, so far as is practicable, route options for new or improved sections of state highways that avoid severance of sensitive receivers.</p> <p><b>Assessment of Effects</b></p> <p>Assess the social impacts of new or improved sections of state highways by using the Social and Environmental Assessment tools.</p> <p><b>Designation Conditions</b></p> <p>Ensure that new state highway designation conditions relating to severance and barrier effects have taken into account social impacts.</p>	<p>Planning Policy Manual (SP/M/001)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p> <p>Urban Design Implementation Policy</p> <p>Transit Urban Design (PSG/12)</p> <p>Roads Traffic Authority Beyond the Pavement Urban Design Guidance Notes, Practice note 12 – Local accessibility and connectivity</p> <p>National Guidelines for Crime Prevention through Environmental Design in NZ  <a href="http://www.justice.govt.nz/pubs/reports/2005/cpted-part-1/index.html">http://www.justice.govt.nz/pubs/reports/2005/cpted-part-1/index.html</a></p> <p>Transit Public Engagement Manual</p> <p>Social and Environmental Management Minimum Standard z/19  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection391_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection391_FileName.pdf</a></p> <p>Travel Demand Management Manual (TDM)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=67&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=67&amp;action=edit</a></p> <p>Roads Traffic Authority: Beyond the Pavement – RTA Urban and Regional Design Practice Notes 13  <a href="http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn13.pdf">http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn13.pdf</a></p> <p>Planning Policy Manual (SP/M/001)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>

## 2.5 SOCIAL RESPONSIBILITY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Plan</b>	<p><b>Urban Design</b></p> <p>Consider urban design principles to facilitate community cohesion, including:</p> <ul style="list-style-type: none"> <li>• early consideration of urban design initiatives to ensure any enhancement of social cohesion is cost-effective in the medium to long term;</li> <li>• recognising the needs of motorists, cyclists, pedestrians and public transport;</li> <li>• adopting engineering solutions that are context-sensitive; and</li> <li>• considering cost sharing of urban design initiatives with relevant local stakeholders.</li> </ul> <p><b>Reverse Sensitivity</b></p> <p>Avoid potential future social impacts from the state highway network by implementing Transit's Planning Policy Manual Reverse Sensitivity Policy and Guidelines. Encourage local councils and developers to provide, within developments, separation areas/buffer zones between state highways and sensitive locations.</p>	
<b>Design</b>	<p><b>Design Contract</b></p> <p>Ensure any requirements to mitigate and manage social impacts associated with a project are detailed in the appropriate design contract documentation, including:</p> <ul style="list-style-type: none"> <li>• ongoing engagement with affected communities to ensure needs and concerns of affected persons are reflected in decision-making process; and</li> <li>• ensuring people are adequately informed about state highway activities.</li> </ul>	Transit Public Engagement Manual
<b>Build</b>	<p>Minimise the disruption to communities that state highway construction and maintenance activities may have by:</p> <ul style="list-style-type: none"> <li>• appropriate timing/sequencing of construction and maintenance activities; and</li> <li>• maintaining access where practicable, to existing travel options, including cycling and pedestrian and public transport facilities such as bus stops.</li> </ul>	

## 2.5 SOCIAL RESPONSIBILITY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Maintain and Operate</b></p>	<p><b>Asset Management</b></p> <p>Engage with local authorities to identify the needs of affected communities and how those needs might be accommodated.</p> <p>Develop and implement Memoranda of Understanding with local authorities to clarify roles and responsibilities.</p> <p>Manage and minimise any potentially unreasonable social impacts associated with maintenance activities.</p> <p>Ensure RAMM and the Asset Owner’s Manual include details of all relevant social impact mitigation measures and their maintenance requirements.</p>	

## 2.6 CULTURE AND HERITAGE

[Return to Table of contents](#) →

### OBJECTIVES

- H1** Proactively limit the disturbance of significant cultural and heritage features along state highways.
- H2** For historic buildings we own, show a respect for them and maintain their integrity.

### EFFECTS



Historic house on Tonks Ave, Wellington inner city bypass

The state highway network closely mimics traditional travel paths that connected historical settlements. It is therefore inevitable that state highway activities have the potential to damage or disturb places of cultural, archaeological or historic importance. This includes places of significance to Māori such as pa, marae and wahi tapū.

Once a state highway is operational there may be adverse effects on heritage structures and archaeological sites such as vibration caused by vehicles.

The use of designation processes to set aside land for state highway construction and improvement in urban areas can influence heritage areas where redevelopment does not occur due to an impending project. This can lead to conflicting objectives and expectations about the future of these heritage structures or areas.

There is strong legislative support for the protection of culture and heritage values. For example, the Historic Places Act 1993 makes it unlawful for any person to destroy, damage or modify the whole or any part of an archaeological site without the prior authority of the New Zealand Historic Places Trust.

A number of important cultural and heritage provisions are also included in the RMA, including recognition of the following as matters of national importance:

- the relationship of Māori and their culture and traditions with their ancestral lands, water sites, wahi tapū and other taonga; and
- the protection of historic heritage<sup>1</sup> from inappropriate subdivision, use and development.

### TRANSIT'S ROLE

The management of cultural and heritage issues involves a number of different stakeholders. Transit recognises that developing strong relationships and good processes is crucial to ensuring positive outcomes for all parties. Transit has established informal and formal relationships with key parties at both a national and regional level, including iwi and hapū, the Department of Conservation and the New Zealand Historic Places Trust (NZHPT).

These relationships are critical in terms of assisting Transit to meet consent conditions and NZHPT authority requirements, as well as building capacity within Transit to understand the cultural and heritage needs of our stakeholders.

Transit has recently developed Guidelines for Managing Stakeholder Relationships and Consultation with Māori, which set out Transit's expectations and methods for consulting and recording consultation outcomes with Māori. Transit, in conjunction with NZHPT, has also developed generic protocols for the accidental discovery of archaeological sites, koiwi and taonga for use in construction and maintenance projects. Some regions have worked with local iwi and NZHPT offices to develop region-specific accidental discovery protocols.

### PERFORMANCE INDICATOR

Avoid loss of cultural, archaeological or spiritually important sites.

<sup>1</sup> The New Zealand Historic Places Trust defines historic heritage as natural and physical resources that contribute to understanding and appreciating New Zealand's history and cultures. Places may be significant because they have aesthetic, archaeological, architectural, cultural, historical, scientific, social, spiritual, technological or traditional value.

## 2.6 CULTURE AND HERITAGE

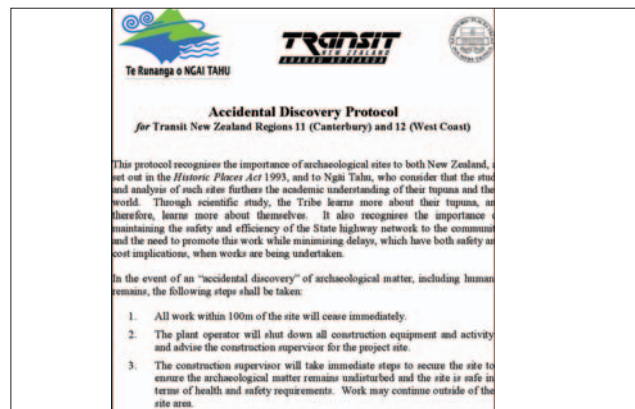
[Return to Table of contents](#) →

### EXAMPLES OF CURRENT PRACTICE

#### Regional heritage relationship management

Transit Canterbury-West Coast formalised relationships with key heritage stakeholders in the Canterbury West Coast region, namely the Historic Places Trust, Ngāi Tahu and the Department of Conservation. These relationships facilitated several successful heritage initiatives including the development of:

- a GIS database of heritage values along state highways;
- a regionally-specific Accidental Discovery Protocol between Transit staff the Historic Places Trust and Ngāi Tahu; and
- regular heritage training workshops for Transit staff and suppliers.



Transit, Historic Places Trust and Ngāi Tahu Accidental Discovery Protocol

#### Protecting heritage features

Transit demonstrated good practice in protecting heritage features affected by state highways in a number of projects. The north branch of the Waianakarua River (North Otago) is spanned by an 1870s historic stone bridge. Recent widening/strengthening (to improve safety and capacity) included detailed consultation with heritage advisors to ensure the historic significance of the bridge is retained. Likewise, heritage building preservation has been a major feature of the Wellington inner city bypass, State Highway 1. Transit preserved the heritage character of the area and has developed a heritage precinct involving relocation and exterior restoration of 26 buildings.



Relocation of 291 Cuba St

#### Collaborating on preserving archaeological features

In 2001, early investigative work for the Bell Block bypass on State Highway 3 north of New Plymouth uncovered the largest pre-1860 whare ever discovered. Further archaeological digs revealed the site had a full gun-fighting pā. Despite the increasing sensitivity of the archaeological material and associated issues, Transit remained open to the needs and preferences of the hapū and found a mutually agreeable solution.



Oropuriri archaeological dig, SH3, Bell Block, Taranaki

## 2.6 CULTURE AND HERITAGE

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Collaborating and Advocating</b> Collaborate and work in partnership with relevant stakeholders such as Historic Places Trust, Department of Conservation and local authorities to enhance cultural and heritage management around the state highway network.</p> <p><b>Monitor and Audit</b> Monitor implementation of the Transit, Department of Conservation and Historic Places Trust Memoranda of Understanding.</p> <p><b>Information Management</b> Develop database to ensure information on location of heritage structures and other special areas are reported, respected and recorded.</p>	<p>Guidelines for Managing Stakeholder Relationships and Consultation with Māori (Part II of Public Engagement Manual)</p> <p>Heritage Management Guidelines <a href="http://www.historic.org.nz/publications/HM_guidelines.html">http://www.historic.org.nz/publications/HM_guidelines.html</a></p> <p>NZHPT, DOC MOU Liaison Groups</p> <p>Consultation with Māori. BPG6.3 in SM011</p>
<b>Plan</b>	<p><b>Route Selection</b> Investigate and select route options for new or improved sections of state highways to avoid heritage sites.</p> <p>Plan new state highway route alignments to avoid significant cultural and archaeological sites, heritage structures and other important heritage and culture areas.</p> <p>Engage early with affected Māori stakeholders to ensure their needs and concerns are considered.</p> <p><b>Assessment of Environmental Effects (AEE)</b> Assess the effects on heritage sites from new or improved sections of state highways.</p> <p><b>Designation Conditions</b> Advocate for state highway designation heritage conditions that are consistent with the Environmental Plan.</p>	<p>District Plans</p> <p>Local Iwi Management Plans</p> <p>New Zealand Archaeological Association Database <a href="http://www.nzarchaeology.org">http://www.nzarchaeology.org</a></p> <p>Roads Traffic Authority Beyond the Pavement Urban Design Guidance Notes, Practice note 8 <a href="http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn08.pdf">http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn08.pdf</a></p> <p>Planning Policy Manual (SP/M/001) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>

## 2.6 CULTURE AND HERITAGE

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Plan</b>	<p><b>Archaeological Assessments (AA)</b></p> <p>AAs are usually commissioned for projects or developments where archaeological sites may be affected or are likely to be discovered. They are best commissioned early during the planning stages, to ensure sites can be avoided and protected or adverse effects minimised and relevant legislation complied with. These assessments may then form part of archaeological authority applications required under the HPA, or contribute to AEEs.</p>	<p>Guidelines for Writing Archaeological Assessments  <a href="http://www.historic.org.nz/heritage/gfx/gfx_archaeology/AGS2%20Arch%20Assessments%20Final.pdf">http://www.historic.org.nz/heritage/gfx/gfx_archaeology/AGS2%20Arch%20Assessments%20Final.pdf</a></p> <p>Guidelines for Archaeological Impact Assessment Reports in BPG6.6, SM011</p>
<b>Design</b>	<p>During the design of new projects, ensure locations of identified archaeological sites, heritage structures and other special areas are reported, respected and recorded.</p>	<p>New Zealand Archaeological Association Database</p> <p>NZHPT/DOC regional relationships with Transit</p>
<b>Build</b>	<p><b>Property Disposal</b></p> <p>When selling property with historic values owned by Transit, ensure sale complies with designation heritage covenants on the property. If no covenants exist, ensure property's historic value is protected where possible.</p> <p><b>Physical Works</b></p> <p>When undertaking physical works, Transit will ensure appropriate protocols are in place to ensure accidental discovery of possible archaeological sites, koiwi or taonga is managed in accordance with the requirements of Historic Places Act 1993 and Protected Object Act 1975.</p>	<p>State Highway Construction Contract Proforma Manual (SM031)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit</a></p> <p>Public Engagement Manual</p> <p>Risk Management Process Manual (AC/Man/1)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit</a></p> <p>Regional and Generic Accidental Discovery Protocol (SM030)</p>
<b>Maintain and Operate</b>	<p>Remedy or mitigate existing cultural and heritage sites adversely affected by existing state highways, where mitigation:</p> <ul style="list-style-type: none"> <li>• will not cause further damage or alteration to cultural and heritage features;</li> <li>• can be combined with maintenance or improvement works; and</li> <li>• is supported by cultural and heritage stakeholders.</li> </ul> <p>When undertaking physical works, ensure appropriate protocols are in place. If accidental discovery of archaeological sites, koiwi or taonga occurs, the situation is managed in accordance with the requirements of Historic Places Act 1993 and Protected Object Act 1975.</p>	<p>Regional and Generic Accidental Discovery Protocol (SM030)</p>



## 2.7 ECOLOGICAL RESOURCES

[Return to Table of contents](#) →

### OBJECTIVES

- E1** Promote biodiversity on the state highway network.
- E2** No net loss of native vegetation, wetlands, critical habitat or endangered species.
- E3** Limit the spread of plant pests.

### EFFECTS

New Zealand's ecological resources, in particular indigenous biodiversity, are significant. They provide genetic diversity, habitats for flora and fauna and contribute to our sense of national identity. As a result, the New Zealand Biodiversity Strategy 2000 has identified reversing the decline of indigenous biodiversity as a strategic priority.



State highway passing through a National Park

Furthermore, section 6 of the RMA identifies as matters of national importance:

- preservation of the natural character of the coastal environment (including the coastal marine area), wetlands and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development;
- protection of outstanding natural features and landscapes from inappropriate subdivision, use and development; and
- protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.

State highways can adversely affect ecological resources – habitat is lost to construction, quarries and stockpiles can destroy vegetation and disperse pest species, wildlife can be killed or repelled within an ecological corridor where the state highway passes and occupants of vehicles may drop litter.

### TRANSIT'S ROLE

To ensure these adverse effects do not occur or are appropriately mitigated, Transit aims to protect significant ecological resources when planning, designing, constructing and maintaining state highways.

Managing the state highway network provides opportunities to protect and enhance ecological resources. This is especially so where Transit retains ownership of land containing ecological resources. Transit aims to work effectively with concerned organisations such as Department of Conservation, New Zealand Conservation Authority, Forest & Bird and Fish & Game to ensure the state highway can be operated effectively while ensuring potential detrimental effects on ecological resources are avoided, remedied or mitigated. Transit also aims to ensure state highways limit the spread of plant pests into the environment.

### PERFORMANCE INDICATOR

Area of habitat loss and restoration.

## 2.7 ECOLOGICAL RESOURCES

[Return to Table of contents](#) →

### EXAMPLES OF CURRENT PRACTICE

#### Vegetation control

On State Highway 73 sight lines are maintained by hand trimming to avoid disturbing indigenous vegetation adjacent to the highway.



Hand trimming, SH73

#### Preserving ecological resources

A five-kilometre section of State Highway 73 that runs through Okuku, a West Coast scenic reserve, was widened and resurfaced. Transit used the slope profile and revegetation techniques on this section of the highway to manage and provide stable slopes and preserve adjacent ecological resources.

A traditional approach to stabilising the batter slopes would have been to cut the batter at 1:3 which would have resulted in 60,000 m<sup>2</sup> of land and native biodiversity being lost.

Instead, an innovative approach was taken to allow batters to be cut at 1:4. These batters are nearly vertical but designers and engineers were confident the design would be successful if vegetation was established to anchor the soil and stabilise the slope face. By working closely with the Department of Conservation, Transit was able to source local species to revegetate the area.



Realignment, SH73

#### Structure design

The design of the Otanerua eco viaduct on ALPURT B2 north of Auckland allows for the maximum preservation of the ecological function of the surrounding forest. By ensuring the project is context sensitive, the design of the bridge is such that in some sections the forest canopy trees will eventually reach full height. Underneath the bridge, in areas that required removal of vegetation, extensive replanting and irrigation have been undertaken to assist plant survival.



Otanerua eco viaduct, SH1

## 2.7 ECOLOGICAL RESOURCES

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Monitor</b> Monitor and implement Memorandum of Understanding between Transit and Department of Conservation.</p> <p><b>Information Management</b> Maintain and update information on ecological sites provided by Department of Conservation in Transit's GIS Spatial Viewer. Incorporate National Priority on Threatened Environment Classification Tool into Transit's Spatial Viewer.</p> <p><b>Collaborating and Advocating</b> Collaborate and work in partnership with relevant stakeholders such as the Department of Conservation and local authorities in order to ensure ecological resources are managed effectively.</p> <p><b>Designation and Resource Consent Conditions</b> Develop designation and resource consent proforma relating to protection of ecological resources.</p>	<p>Transit, DOC MOU Liaison Group</p> <p>Transit New Zealand Spatial Viewer</p>
<b>Plan</b>	<p>When planning, Transit expects to:</p> <ul style="list-style-type: none"> <li>• promote biodiversity on the state highway network; and</li> <li>• identify and protect significant ecological resources within state highway corridors.</li> </ul> <p><b>Route Selection</b> Investigate, consider and select, so far as is practicable, route options for new or improved sections of state highways that avoid significant ecological resources and maintain the ecological function of an area.</p>	<p>Transit New Zealand Spatial Viewer</p> <p>Planning Policy Manual <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p> <p>State Highway Control Manual (SM012)</p> <p>DOC/Transit Guidelines for State Highways within or adjacent to National Parks, Reserves and Conservation Areas <a href="http://www.transit.govt.nz/content_files/technical/ManualSection33_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection33_FileName.pdf</a></p>

## 2.7 ECOLOGICAL RESOURCES

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Plan</b></p>	<p><b>Assessment of Effects</b> Assess the effects on significant ecological areas for new or improved sections of state highways.</p> <p><b>Designation Conditions</b> Ensure new state highway designation conditions relating to the management of ecological resources are consistent with the Environmental Plan.</p>	<p>State Highway Biosecurity Policy (SM/012) found in: State Highway Control Manual, chapter 1 Statutory Framework, section 1.6.5 H <a href="http://www.transit.govt.nz/content_files/technical/ManualSection29_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection29_FileName.pdf</a></p> <p>Stream Ecological Valuation Auckland Regional Council TP 302</p> <p>Guidelines for Highway Landscaping (SP/M/020) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p> <p>Local Iwi Management Plans</p> <p>Roads Traffic Authority Beyond the Pavement Urban Design Guidance Notes, Practice note 8 <a href="http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn08.pdf">http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn08.pdf</a></p>
<p><b>Design</b></p>	<p>For new or improved highways, the location of the state highway, its alignment and profile, the cross-section design and other related features shall avoid, remedy or mitigate any adverse effects on ecological features, including waterways, and on public open space and recreation land.</p> <p>Slope stabilisation and revegetation projects should use indigenous vegetation whenever possible.</p>	<p>DOC/Transit Guidelines for State Highways within or adjacent to National Parks, Reserves and Conservation Areas <a href="http://www.transit.govt.nz/content_files/technical/ManualSection33_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection33_FileName.pdf</a></p> <p>Guidelines for Highway Landscaping (SP/M/020) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p> <p>Roads Traffic Authority Beyond the Pavement Urban Design Guidance Notes, Practice note 8 <a href="http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn08.pdf">http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn08.pdf</a></p> <p>State Highway Geometric Design Manual (Draft) (SHGDM) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit</a></p>

## 2.7 ECOLOGICAL RESOURCES

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Build</b>	<p>When working on or near Department of Conservation land, particular attention must be paid to preserving as much existing native vegetation as possible. Any restoration planting should be undertaken using native species found in the area, preferably raised from seed taken from public conservation land, in consultation with Department of Conservation.</p> <p>If species can be sourced from the area, low-growth native species should be used to reduce maintenance costs. Approved low-growth species are identified in Transit's Guidelines for Highway Landscaping. In some cases special methods of restoration may be required.</p> <p>On public conservation land any culverts should provide for fish passage to the level provided within the conservation management plan for the area.</p>	<p>Guidelines for Highway Landscaping (SP/M/020)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p> <p>DOC/Transit Guidelines for State Highways within or adjacent to National Parks, Reserves and Conservation Areas</p>
<b>Maintain and Operate</b>	<p>On the existing network:</p> <ul style="list-style-type: none"> <li>• identify and protect sensitive receiving environments to avoid them being adversely affected by the state highway by utilising the Spatial Viewer prior to works;</li> <li>• ensure contractors are aware of sensitive environments and remnant native vegetation and make adequate provisions to avoid adverse effects;</li> <li>• limit the spread of pest plants into state highway reserve and areas adjacent to state highways by ensuring imported fill material is not contaminated with exotic flora or fauna;</li> <li>• ensure visual quality and ecological function are maintained when undertaking vegetation control by adhering to the Guidelines for Highway Landscaping and Vegetation Control Specifications;</li> <li>• ensure visual quality is preserved by maintaining new plantings; and</li> <li>• manage accidental spills of hazardous/toxic substances to limit contamination of ecological resources in cooperation with regional authorities when responding to vehicle accidents on the state highway.</li> </ul>	<p>State Highway Biosecurity Policy (SM/012) found in: State Highway Control Manual, chapter 1 Statutory Framework, section 1.6.5 H  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=42&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=42&amp;action=edit</a></p> <p>DOC/Transit Guidelines for State Highways within or adjacent to National Parks, Reserves and Conservation Areas</p> <p>Guidelines for Highway Landscaping (SP/M/020)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p> <p>Vegetation Control Specification (TNZ C/21)  <a href="http://www.transit.govt.nz/content_files/technical/Specification126_pdfFile.pdf">http://www.transit.govt.nz/content_files/technical/Specification126_pdfFile.pdf</a>          Spills and contamination section</p> <p>Transit Spatial Viewer          see LTNZ intranet</p> <p>Contractors Social and Environmental Management Plan (SM030 and 031)</p>

## 2.8 SPILL RESPONSE AND CONTAMINATION

[Return to Table of contents](#) →

### OBJECTIVES

- S1** Design stormwater control and retention devices that can accommodate spills in areas of high environmental risk.
- S2** Ensure the removal, placement and disposal of contaminated soils is achieved in accordance with best practices.

### EFFECTS

Vehicle accidents on the state highway can result in spills, which may enter drinking water aquifers or find their way into rivers, lakes or coastal habitats. Clean-up is often difficult and sometimes impossible. In high-risk areas, such as unconfined aquifers or intersections with heavy tanker traffic, stormwater treatment systems can be fitted with mechanisms to collect and retain spillage.

Contaminated soils are a problem in the acquisition of industrial and agricultural properties, management of excavations and reinstatement of clean fill. If improperly managed, contaminated soils can inadvertently be dumped onto land intended for homes, schools and public places.

### TRANSIT'S ROLE

State highways are affected by contamination and spills in two ways, either through land acquisition or vehicle accidents.

#### Contaminated soils

Contractors moving excavated contaminated soil from either a widening or highway extension need to protect both workers' health and the environment. Transit conducts contaminated site investigations well in advance of construction and in consultation with the regional council, as the conclusions will affect land acquisition decisions and negotiations. Geotechnical and analytical costs and time when determining the nature and extent of contamination

are considerable, therefore contaminated sites receive detailed investigation ahead of time.

#### Spills

Contractors are required to manage spills resulting from construction and maintenance operations.

Spills resulting from vehicle accidents are the legal responsibility of the company and individuals involved. Frequent transport of any substance capable of causing environmental harm means it is foreseeable that a spill of that substance will occur at some time. If a spill leaves the site, the spiller is legally responsible for cleaning and repairing the receiving environment. This may include removing residues from the verge, stormwater systems, stream bed and stream banks, restocking fish and nursing injured bird life. These costs can mount very quickly, and take considerable time.

For major spills, the regional authority or fire service assume the role of incident response management. Transit staff, consultants and contractors assist in whatever way possible, usually by controlling traffic and making staff and equipment available. If residual spilled substances are found alongside the roadway Transit will either request that they be removed, or undertake removal and recover costs from the responsible parties.

### PERFORMANCE INDICATOR

None at this time.

## 2.8 SPILL RESPONSE AND CONTAMINATION

[Return to Table of contents](#) 

### EXAMPLES OF CURRENT PRACTICE

#### Use of stormwater control and retention devices

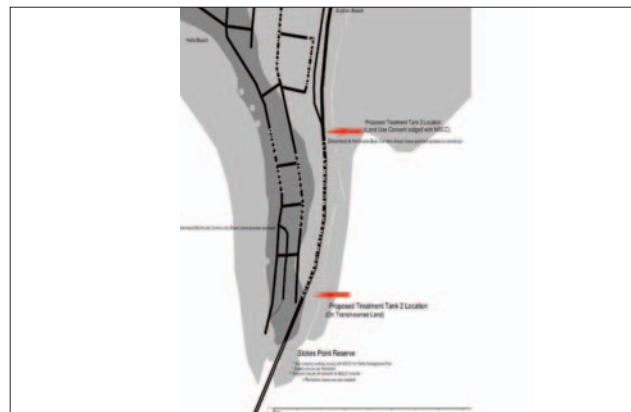
Careful planning and operational procedures can reduce the risk of spillage and simple precautions can prevent a spillage becoming a pollution incident. Transit can play an important role by designing stormwater control and retention devices that can accommodate large-scale spills in areas of high environmental risk.



Grafton gully stormwater and spill retention tank

#### Auckland Harbour Bridge Spill Containment and Stormwater Upgrade project

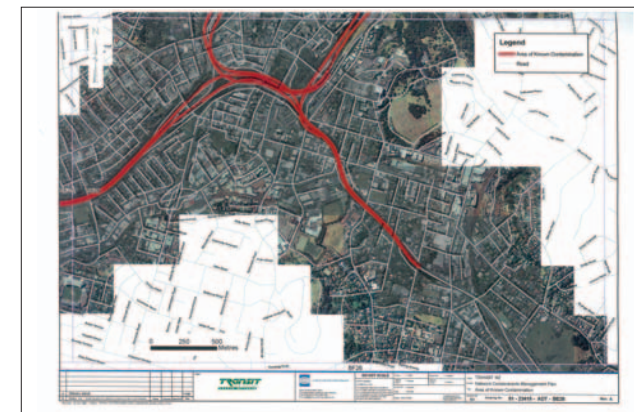
Covering 5.5 hectares, the Auckland Harbour Bridge represents a considerable catchment, which discharges into a major receiving environment – the Waitemata Harbour. This project will significantly reduce the risk of an accidental contaminant spillage on the Auckland Harbour Bridge entering onto land or water. In addition, site erosion issues (concerning Te Onewa Pā and possibly the local cliff face) from the existing bridge drainage system will be remedied as agreed with by local iwi and the Auckland City Council.



Plan to upgrade Auckland Harbour Bridge

#### Areas of known contamination mapped before work commences

In the early stages of project planning, areas associated with industrial or agricultural activity are clearly delineated.



Contaminated area designated before works

## 2.8 SPILL RESPONSE AND CONTAMINATION

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Collaborating and Advocating for Improved Emergency Preparedness and Spill Response</b></p> <p>Based on a survey of current practices, a draft Guide to Spill Response will be prepared, circulated and discussed with responsible agencies and organisations to better clarify roles and responsibilities.</p> <p>Ensure that contract proformas provide clarity for Transit contractors when responding to accidents and spills on the state highway network.</p>	<p>State Highway Maintenance Contract Proforma Manual (SM032)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p>
<b>Plan</b>	<p><b>Property Acquisition</b></p> <p>Identify high-risk properties such as orchards, quarries, factory sites and land used for fuel storage, chemical storage or mining and investigate the extent of contamination before purchase.</p> <p>If the property is contaminated, either the price is to be renegotiated/ revised or the owner required to take all necessary steps to remedy the contamination to an agreed level of acceptability and in compliance with any statutory requirements. Any remedial work carried out by the vendor will require time parameters and a level of satisfaction to be set for an agreed work programme as a pre-condition to settlement. The property purchase contract needs to agree who carries ongoing liability.</p> <p><b>Site Investigations</b></p> <p>Environmental investigations for soil contamination should occur concurrently with any geotechnical investigations wherever practicable to minimise disturbance. When environmental samples are taken, no drilling fluids are to be used during the drilling, to reduce the risk of cross-contamination between samples. Furthermore, environmental samples shall be collected with a hollow stem auger using a split spoon sampler to obtain undisturbed cores.</p>	<p>Process for Acquisition of Property (SM040)</p> <p>MfE (1999): Guidelines for Assessing and Managing Hydrocarbon Contaminated Sites in New Zealand (1999)</p> <p><a href="http://www.mfe.govt.nz/publications/hazardous/oil-guide-jun99/">http://www.mfe.govt.nz/publications/hazardous/oil-guide-jun99/</a></p>
<b>Design</b>	<p>Design stormwater management systems that can accommodate spills in high-risk areas.</p>	



## 2.8 SPILL RESPONSE AND CONTAMINATION

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Maintain and Operate</b></p>	<p><b>Contaminated Site Management</b></p> <p>The primary purpose of the management plan is to establish a framework that provides staff and consultants with a practical way to identify and deal with contamination as it is encountered during normal maintenance of its road network.</p> <p>Ensure RAMM and the Asset Owner’s Manual include details of all relevant contamination maintenance requirements.</p> <p>Maintain all relevant remedial mitigation measures, such as vegetation, cover, groundwater monitoring correctly to ensure that they continue to provide the designed level of mitigation.</p> <p><b>Spill Management</b></p> <p>Ensure spills are treated in accordance with contract proforma procedures and requirements of regional authorities.</p>	<p>Transit New Zealand Contamination Management Plan</p> <p>Network Maintenance Works Auckland Region December 2006, available from Environmental Manager</p>

## 2.9 RESOURCE EFFICIENCY

[Return to Table of contents](#) →

### OBJECTIVES

- RE1** Manage energy consumption and waste associated with Transit's business in a cost effective and sustainable manner.
- RE2** Make resource efficiency an integral part of all state highway activities.



An office waste audit in progress at Transit's National Office

### EFFECTS

The administration, design, construction and maintenance of state highways involve the use of finite resources like electricity, fossil fuels, new aggregate materials and water or hydrocarbon binders.

Road building and maintenance activity resource use affects the society and environment by:

- production and transport of road building materials (such as rock, gravel, concrete and bitumen);
- disposal of waste material generated during excavation, repair and resurfacing works;
- use of fuel by construction and maintenance vehicles;
- use of paint for road markings;
- production and use of plastic and metal materials in road structures, signs, safety devices and markers;
- use of electricity with street lighting, traffic signals and variable message signage; and
- vehicles' use of petrol and oil results in emission of particles and carbon dioxide that affect local air quality and global climate conditions.

### TRANSIT'S ROLE

Having direct control over use and disposal of road building materials in construction and maintenance means this is the best place to focus efforts.

Existing office programmes: reduce waste, energy use and paper consumption and report regularly on performance.

The major contribution to improving the energy efficiency of the land transport sector as a whole is managing demand for travel and getting best use of the existing state highway network.

### PERFORMANCE INDICATORS

Reducing energy use by 3% per m<sup>2</sup> of office space over the previous 12-month period, and reducing the non-recycled wastage from Transit offices by 5% per staff member, compared with the previous year's waste sort results, by making staff more aware of energy and resource issues and providing facilities to allow recycling to take place.

Annual reporting of the amount of recycled products used in new roading and/or reconstruction utilising cost-effective recycled pavement materials, including glass and aggregate. The trend is for increasing utilisation of recycled materials.

## 2.9 RESOURCE EFFICIENCY

[Return to Table of contents](#) →

### EXAMPLES OF CURRENT PRACTICE

#### Reuse of existing pavement

By recycling the existing pavement in Wanganui, Transit reduced the need for new aggregate when reshaping a section of state highway. Transit used the 'in-situ stabilisation' technique to create an improved surface for resealing. Recycling saved material and reduced labour costs by about \$30,000. Construction time – and disruption to the local community – was reduced from eight to four days.



London St, Wanganui

#### Energy efficient lighting for ALPURT B2

The Northern Gateway Alliance, an alliance of organisations working in partnership to deliver the Northern Motorway extension in Auckland, have paid close attention to opportunities for energy efficiency in carriageway lighting.

The project team has elected to use flat glass (aeroscreen) lanterns to minimise environmental light pollution. This will require lights to be placed closer together, although the energy efficiency of the design is maintained due to the selection of energy efficient lamps.

The lamps will be high output high pressure sodium, with an efficacy of approximately 125 lumens/watt. This compares well with other lamp types. Output from high output high pressure sodium bulbs is:

- 12% better than standard high pressure sodium lamps;
- 40% better than metal halide lamps;
- 43% better than compact fluorescent lamps;
- 78% better than induction lamps; and
- 140% better than mercury vapour lamps.

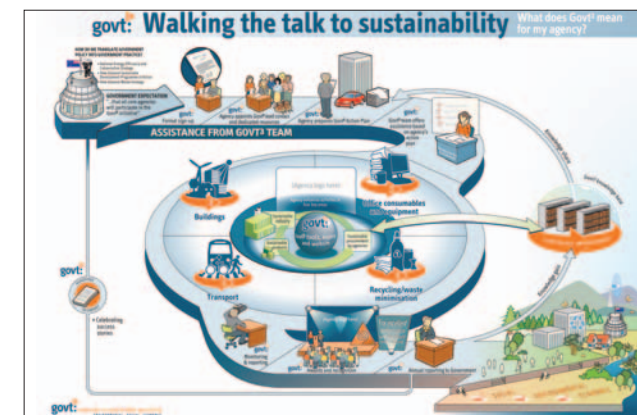
Carriageway lighting system has been designed to minimise the number of lanterns required, consistent with lighting design guidelines set out in AS/NZS 1158.

#### Govt<sup>3</sup>

The Govt<sup>3</sup> programme, led by Ministry for the Environment, aims to:

- implement government's sustainable development policies;
- use government purchasing power to promote sustainable practice;
- reduce government's emission of greenhouse gases and expenditure on energy; and
- benchmark, monitor, improve, report and celebrate success in sustainability of government activities.

Transit has been an active member of the Govt<sup>3</sup> programme since January 2004.



Ministry for the Environment Govt<sup>3</sup>

## 2.9 RESOURCE EFFICIENCY

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p>Test, trial and endorse cost-effective and low-risk road building and maintenance techniques to achieve resource efficiency and include successful techniques in state highway specifications.</p> <p>Provide templates and guidelines to network consultants for preparation of state highway corridor resource efficiency plans and ensure plans are developed and implemented.</p> <p>Encourage storage and sharing of fill and materials within and between project phases and regions.</p> <p>Assess effectiveness of current state highway resource efficiency practices.</p> <p><b>Train</b></p> <p>Promote training in resource efficient approaches to highway design, construction and maintenance.</p>	
<b>Office Operations</b>	<p>Adopt cost-effective energy conservation practices.</p> <p>Purchase cost-effective energy efficient products.</p> <p>Dispose of all waste requiring permanent disposal in an environmentally responsible and cost-effective manner.</p> <p>Adopt Transit Travel Plans.</p>	<p>Environmental Policy Manual, Waste and Energy Management Policy (SP/M/023)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit</a></p> <p>Corporate Services Manual section 2T see LTNZ intranet</p> <p>MfE Govt<sup>3</sup> programme</p> <p><a href="http://www.mfe.govt.nz/issues/sustainable-industry/govt3/index.html">http://www.mfe.govt.nz/issues/sustainable-industry/govt3/index.html</a></p>
<b>Plan</b>	<p>Reduce the energy consumption of vehicles travelling on the state highway network as that relates to improvements in road characteristics.</p> <p>Reduce, reuse, recycle and substitute resources to lessen the amount of waste requiring permanent disposal.</p>	<p>Environmental Policy Manual Waste and Energy Management Policy (SP/M/023)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit</a></p>

## 2.9 RESOURCE EFFICIENCY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Plan</b>	Actively manage the demand for travel on the state highway network in accordance with Travel Demand Management policy and guidelines.	<p>Land Transport NZ Economic Evaluation Manual  <a href="http://www.ltsa.govt.nz/funding/manuals.html">http://www.ltsa.govt.nz/funding/manuals.html</a></p> <p>Investigation &amp; Reporting (SM030)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>Travel Demand Management Policy (TDM)  <a href="http://www.transit.govt.nz/planning/tdm.jsp">http://www.transit.govt.nz/planning/tdm.jsp</a></p> <p>Planning Policy Manual (SP/M/001)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>
<b>Design</b>	<p>Reduce, reuse, recycle and substitute resources to lessen the amount of waste requiring permanent disposal.</p> <p>Identify resource efficiency techniques in project methodology statements.</p> <p>Specify sustainable procurement practices in tender documents.</p>	<p>State Highway Professional Services Contract Proforma Manual (SM030) – Design &amp; Project Documentation  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>Environmental Policy Manual Waste and Energy Management Policy (SP/M/023)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit</a></p> <p>Sustainable Procurement Report  <a href="http://www.med.govt.nz/templates/ContentTopicSummary___29536.aspx">http://www.med.govt.nz/templates/ContentTopicSummary___29536.aspx</a></p> <p>Transit Specification for Basecourse Aggregate (TNZ M/4)  <a href="http://www.transit.govt.nz/content_files/technical/Specification23_pdfFile.pdf">http://www.transit.govt.nz/content_files/technical/Specification23_pdfFile.pdf</a></p> <p>Transit Specification for Asphaltic Concrete (TNZ M/10)  <a href="http://www.transit.govt.nz/content_files/technical/Specification31_pdfFile.pdf">http://www.transit.govt.nz/content_files/technical/Specification31_pdfFile.pdf</a></p>

## 2.9 RESOURCE EFFICIENCY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Build</b>	<p>Adopt energy conservation practices such as heating, air conditioning and automation systems.</p> <p>Purchase energy efficient products like lighting, refrigeration and heat pumps.</p> <p>Reduce the energy consumption of vehicles travelling on the state highway network as that relates to improvements in road characteristics.</p> <p>Reduce, reuse, recycle and substitute resources to lessen the amount of waste requiring permanent disposal.</p> <p>Dispose of all waste requiring permanent disposal in an environmentally responsible and cost-effective manner.</p> <p>Establish and implement Site Travel Plans during construction.</p>	<p>State Highway Construction Contract Proforma Manual (SM031)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit</a></p> <p>Environmental Policy Manual Waste and Energy Management Policy (SP/M/023)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=51&amp;action=edit</a></p> <p>Transit Specification for Basecourse Aggregate (TNZ M/4)  <a href="http://www.transit.govt.nz/content_files/technical/Specification23_pdfFile.pdf">http://www.transit.govt.nz/content_files/technical/Specification23_pdfFile.pdf</a></p> <p>Transit Specification for Asphaltic Concrete (TNZ M/10)  <a href="http://www.transit.govt.nz/content_files/technical/Specification31_pdfFile.pdf">http://www.transit.govt.nz/content_files/technical/Specification31_pdfFile.pdf</a></p>
<b>Maintain and Operate</b>	<p>Dispose of all waste requiring permanent disposal in an environmentally responsible manner.</p> <p>Use recycled street furniture such as trash bins used in Wellington that are fabricated from aluminium and recycled plastic. (They are 25% cheaper than the traditional bins.)</p>	<p>State Highway Maintenance Contract Proforma Manual (SM032)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p>

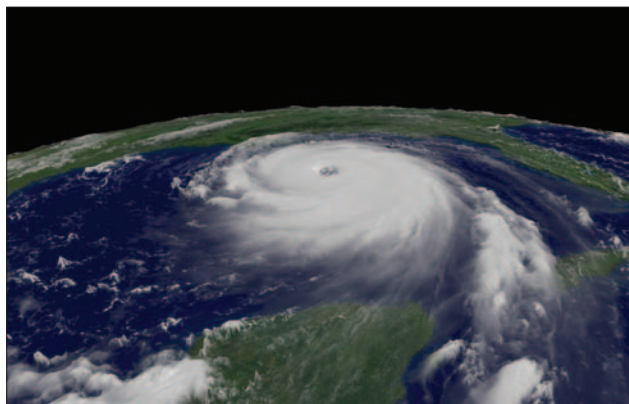
## 2.10 CLIMATE CHANGE: ADAPTATION AND MITIGATION

[Return to Table of contents](#) →

### OBJECTIVES

- C1** Manage increased hazards of climate change impacts on state highway infrastructure.
- C2** Collect and analyse information on greenhouse gas (GHG) emissions and the impact of climate change on the functioning of the state highway to support decision-making.
- C3** Mitigate activities associated with the construction, operation and maintenance of state highways to effect a net reduction of GHG from transport.

### EFFECTS



Category 5 hurricane

Climate change is the long-term alteration of the earth's climate as a result of human activity. It occurs when heat is trapped in the atmosphere by an over-abundance of greenhouse gases, causing the earth's average surface temperature to rise. As a consequence of global warming, it is predicted that sea level around New Zealand will rise by between 9 and 88 centimetres over the next 100 years.

In 2007 the Intergovernmental Panel on Climate Change (composed of all members of the United Nations World Meteorological Organisation and Environment Program) issued their 4th report, which found climate change will have the following global effects.

The transport sector is both a significant contributor

PROBABILITY	EFFECT
<b>virtually certain &gt; 99%</b>	Most land areas will experience fewer cold days and nights, and more hot days and nights, over the course of the 21st century.
<b>very likely &gt; 90%</b>	Frequency of heat waves and very heavy rainfall events will both increase over most land areas.
<b>likely &gt; 66%</b>	Increase of droughts, incidence of extreme high sea level, and intense tropical cyclone activity.

to greenhouse gas emissions (generating 19% of New Zealand's total greenhouse gas emissions and 44% of CO<sub>2</sub> emissions (source: MfE), as well as being exposed to risk from the effects of climate change on the design, location and maintenance of transport infrastructure. For example, changes in temperature will affect pavement surfaces and plant pest management practices.

In New Zealand, climate change is predicted to change rainfall patterns, which will affect water availability, stormwater management and incidences of flooding and landslips. Extreme weather events will be 20 times more frequently occurring over the next century. The rise in sea level and predicted increase in coastal storms will affect protection and location of coastal infrastructure including causeways, bridges and protection works.

## 2.10 CLIMATE CHANGE: ADAPTATION AND MITIGATION

[Return to Table of contents](#) →



Flood-damaged bridge, Wanganui

### TRANSIT'S ROLE

Transit has a dual role in responding to climate change: adaptation to extreme weather events and mitigation of greenhouse gas emissions from construction, operation and maintenance of the state highway network. Both roles are emerging and will develop over time.

#### Adaptation

Amendments to design specifications for bridges and culverts ensure climate change impacts are considered at the design stage. These amendments followed adoption of a position paper, *Climate Change Impacts on the State Highway Network (2005)*, which concluded current asset management practices are sufficiently responsive to climate change impacts. Since adopting this position, the certainty surrounding climate change science has

improved significantly. It is likely therefore that Transit's position on climate change adaptation will be reviewed as certainty around predictions on climate change effects improves.

#### Mitigation

##### Construction

Recently, overseas studies estimate 10% of a national highway's greenhouse gas emissions arise from construction, predominantly concrete, steel and asphalt. Careful selection of materials in the design phase can decrease overall emissions, extend a highway's life and reduce maintenance impacts.

##### Operation

Operationally, Integrated Planning Travel Demand Management can reduce dependency and frequency of single occupancy vehicle use, reduce congestion and improve optimal traffic flow thus making more efficient use of existing resources.

##### Maintenance

Substantial costs are incurred by the need to do extensive plant pest removal and large-scale mowing on many sections of the state highway. There are two sides to the current maintenance expenditure – environmental cost and financial cost. Environmentally, the use of agrichemicals and fuel increased greenhouse gas emissions and pollution, especially from overspray. Financially, the cost of mowing equipment represents a significant amount of inherent greenhouse gas from equipment manufacture,

operation and maintenance. Low-growth vegetation and native planting can reduce emissions from mowing and chemicals used for vegetation control.

#### Land use planning

While technology is contributing to improvements through fuel efficiency and cars are becoming cleaner each year, this is often offset by the increase in the number of cars and logged kilometres. The long-term answer may therefore lie in the development of energy efficient liveable communities that foster economic development, mobility, safety and social equity by protecting the environment.

### PERFORMANCE INDICATOR

None at this time.



## 2.10 CLIMATE CHANGE: ADAPTATION AND MITIGATION

[Return to Table of contents](#) →

### EXAMPLE OF CURRENT PRACTICE: ADAPTATION AND MITIGATION

#### Major infrastructure construction

Some Transit capital projects have already considered impacts of climate change. The new causeway to Auckland's State Highway 18 Upper Harbour Bridge was designed and built 0.3 metres higher than the existing causeway, which was then raised to match it. The Manukau Harbour Crossing and Tauranga Eastern Motorway projects are also considering climate change impacts on the proposed infrastructure.



Widening of the SH18, Upper Harbour Causeway completed, June 2006

#### Carbon Offsetting programme – multiple benefits

This west Waikato project is designed to reduce the current maintenance load and mitigate the operational carbon footprint.

This area includes large sidings that require high maintenance of plant pest removal. Planting them out will remove the need to do plant pest maintenance, improve the visual appeal of the state highway and assist in controlling erosion.



Aerial view of SH1 looking north from Oram Road to Mercer

The total carbon offset by this planting programme can be calculated using an average of the uptake for scrubland and large trees. Scrubland absorbs CO<sub>2</sub> at a rate of 7 tonnes per ha per annum, while large trees absorb CO<sub>2</sub> at a rate of 16 tonnes per ha per annum. Taking into account a clear zone of 9 m and estimating 65% will be scrubland with the remaining 35% in large trees, this works out to an average of 10.2 tonnes of sequestered CO<sub>2</sub> per ha per annum. This project will conform to the international ISO 14064 and be independently verified by LandCare Research.

## 2.10 CLIMATE CHANGE: ADAPTATION AND MITIGATION

[Return to Table of contents](#) →

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>National Office Initiatives</b></p>	<p><b>Information Management: Work with industry to improve data gathering techniques</b></p> <p>Current practices use ‘top down’ information systems from petrochemical sales to estimate vehicle emissions. Better information comes from development of ‘bottom up’ methodologies using real data from New Zealand based on traffic measurements to determine present and future implications of alternative roadings proposals (TDM, integrated transport planning, bus lanes, ITS) and broader policy options (fuel efficiency import standards, fuel efficient speed limits, type and size of car imports) on greenhouse gas emissions.</p> <p><b>Collaborating and Advocating</b></p> <p>Work with the Ministries of Transport, Environment and Economic Development to gain a better understanding of policies and options available to improve effective management of greenhouse gas emissions from the state highway network.</p> <p><b>Active Participation</b></p> <p>Advocate for government to:</p> <ul style="list-style-type: none"> <li>• improve emissions standards of vehicles and fuel quality;</li> <li>• monitor greenhouse gas emissions; and</li> <li>• better integrate transport networks and land use.</li> </ul> <p>Monitor climate change information and developments to identify when and how to:</p> <ul style="list-style-type: none"> <li>• amend design and maintenance standards; and</li> <li>• review Transit’s policy position on climate change adaptation.</li> </ul> <p>Engage with the climate change research sector to:</p> <ul style="list-style-type: none"> <li>• encourage research that is useful for end users; and</li> <li>• keep abreast of developments in information and processes.</li> </ul> <p>Report annually to the Transit Board on Transit’s exposure to the impacts of climate change.</p>	<p>The Greenhouse Gas Protocol: A corporate accounting and reporting standard</p> <p>World Resources Institute and World Business Council for Sustainable Development (March 2004)</p> <p>ISO 14064 parts 1,2,3:2006</p> <p>Specification with guidance at the organisation, project and verification levels</p>

## 2.10 CLIMATE CHANGE: ADAPTATION AND MITIGATION

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Plan</b></p>	<p><b>Regional Growth Strategies: Reduce congestion and travel demand, promote energy efficient transport modes</b></p> <p>Integrate land use and transport planning (e.g. by supporting the development of regional growth strategies) and adopt TDM measures to provide travel choice, reduce the need and distance of travel, reduce congestion and promote alternative transport modes.</p> <p><b>Analysis: Avoid high-risk locations</b></p> <p>Analyse climate change impacts, risks, benefits and costs early at the planning phase of projects so that high-risk routes/locations can be avoided. High-risk routes/locations include those where:</p> <ul style="list-style-type: none"> <li>• future adaptation would not be cost-effective;</li> <li>• future adaptation would not be feasible for engineering/technical reasons; and</li> <li>• climate change impacts could have significant adverse effects on communities and the environment because inundation leads to community severance and local flooding.</li> </ul> <p><b>Energy Efficiency</b></p> <p>Transit's Waste and Energy Management Policy (WEMP) aims to reduce the impacts of road building and office activities by improving energy efficiency, reducing waste to landfill and therefore reducing greenhouse gas emissions.</p>	<p>Travel Demand Management Policy (TDM)  <a href="http://www.transit.govt.nz/planning/tdm.jsp">http://www.transit.govt.nz/planning/tdm.jsp</a></p> <p>Climate change impacts on the state highway network: Transit New Zealand's Position – July 2004  <a href="http://www.transit.govt.nz/planning/environment/Climate-change-Sept04.pdf">http://www.transit.govt.nz/planning/environment/Climate-change-Sept04.pdf</a></p> <p>Climate change uncertainty and the state highway network: A moving target  <a href="http://www.transit.govt.nz/content_files/news/ConferencePaper36_PDFFile.pdf">http://www.transit.govt.nz/content_files/news/ConferencePaper36_PDFFile.pdf</a></p> <p>Climate change effects and impacts assessment: A guidance manual for local government in NZ  <a href="http://www.mfe.govt.nz/publications/climate/effects-impacts-may04/index.html">http://www.mfe.govt.nz/publications/climate/effects-impacts-may04/index.html</a></p> <p>UK Climate Impacts Programme website  <a href="http://www.ukcip.org.uk">www.ukcip.org.uk</a></p> <p>MfE website and case studies  <a href="http://www.mfe.govt.nz">http://www.mfe.govt.nz</a></p>
<p><b>Design</b></p>	<p>Assess the greenhouse gas emissions potentially generated by different project designs in terms of:</p> <ul style="list-style-type: none"> <li>• the slope and surfacing of the pavement; and</li> <li>• route design to promote free-flowing traffic.</li> </ul> <p><b>Structural Design</b></p> <p>Follow guidance on climate change located in Transit's standards and guidelines, including Transit's Bridge Manual and pavement specifications.</p>	<p>Bridge Manual (SP/M/022)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=38&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=38&amp;action=edit</a></p>

## 2.10 CLIMATE CHANGE: ADAPTATION AND MITIGATION

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Design</b>	<p>In factoring climate change adaptation into design, consider the following:</p> <ul style="list-style-type: none"> <li>the intended design life of the infrastructure and whether climate change impacts may manifest within the intended design life; and</li> <li>whether future-proofing the design is required so later retro-fit is feasible and cost-effective.</li> </ul>	
<b>Maintain</b>	<p><b>Asset Management</b></p> <p>Conduct sensitivity analyses of all Transit regions to identify high-risk routes and locations and to inform the development of asset management strategies.</p> <p>Rationalise the cost of adapting to climate change by building climate change adaptation in during routine infrastructure upgrades.</p> <p>Consider more proactive asset management measures to reduce the vulnerability of network assets to climate change impacts. Measures that are cost-effective and will fit with existing processes should be assessed, including:</p> <ul style="list-style-type: none"> <li>collaborating with local authorities on catchment management such as periodically removing debris (e.g. fallen trees) from river catchments and monitoring and protecting river bed levels at bridge foundations; and</li> <li>developing a scour screening procedure to identify at-risk bridges and culverts in coordination with the seismic screening procedure.</li> </ul> <p>Work with Scope and Standards Review Committee to modify infrastructure standards incrementally to protect state highways from climate change impacts.</p> <p>Ensure maintenance standards comply with agreed pavement condition levels of service (e.g. pavement smoothing).</p>	
<b>Operate</b>	<p><b>Demand Management</b></p> <p>Actively manage demand on the state highway network through discouraging short and single occupancy motor vehicle travel and encouraging the uptake of cycling, walking and non-car high occupancy modes.</p>	

## 2.11 VISUAL QUALITY

[Return to Table of contents](#) →

### OBJECTIVES

- VQ1** Incorporate multi-purpose landscaping as an integral part of all new state highway construction projects.
- VQ2** Improve the visual quality of the existing state highway network.

### EFFECTS

As state highways pass through urban, rural and natural landscapes they create visual effects for road users, adjacent land users and on the surrounding environment.

Motorist safety may be at risk if errant vehicles strike hard non-frangible objects on the shoulder of state highways. Road safety barriers and frangible plants can mitigate the risk of hard structures to driver safety.

Motorists need highway landscapes with clear sightlines. Planting provides drivers with visual cues, which interpret the road ahead. Lighting clarifies night vision and personal security for pedestrians and cyclists.

Landscaping affects how state highways complement surrounding scenery. Road and landscape design will affect visual amenity and personal security of communities adjacent to or using a state highway. Landscaping and design elements impact how state highway neighbours, cyclists and pedestrians use facilities provided for them on state highways.

Roadside plantings can add to the biodiversity of surrounding areas if suitable species are selected and

maintained well. Landscaped areas can ameliorate vehicle emission impacts on local air and water quality. Planting can enhance slope stability and reduce the need for hard engineered structures to control erosion.

In many areas, grass verges are favoured as roadside landscape treatment, due to the low visual impact, low establishment costs and standardised maintenance regimes. Where access to roadside areas is difficult for maintenance crews, planted areas can reduce capital and maintenance costs by requiring less frequent mowing and pest control and decreasing illegal dumping, vandalism and graffiti of road structures.

### TRANSIT'S ROLE

Transit has direct control over the environmental and social effects of roadside plantings and the visual appearance of state highways. Careful road planning, urban design and landscape design should be undertaken to inform site-specific responses.



Highway landscape native vegetation

Section 6 of the RMA recognises the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development as a matter of national importance. As state highways cross the length and breadth of New Zealand, Transit has an important role in meeting this objective.

New construction considers adoption of 'no net loss' principles, which have already been implemented on several projects. For example, if wetlands are filled in or destroyed there should be new wetlands constructed or rehabilitated such that the total amount is at least as great if not more than originally present. New planting should use native species if at all possible and low-growth vegetation must be considered where appropriate in order to reduce long-term maintenance costs and use of agrichemicals.

Transit works with local authorities during planning and design stages to support local planning and urban design objectives and ensure new state highways blend into their surroundings.

Transit consults with adjacent landowners, including custodians of natural areas such as the Department of Conservation, local authorities and Queen Elizabeth II Trust, to support ecological and visual quality values of areas surrounding state highways.

### PERFORMANCE INDICATOR

None at this time.

## 2.11 VISUAL QUALITY

[Return to Table of contents](#) →

### EXAMPLES OF CURRENT PRACTICE

#### Ara Harakeke – the flax pathway

Five kilometres of cycle pathway adjacent to SH1 north of Plimmerton skirts the edge of the 'Taupo Swamp' wetland, before winding up the valley to the saddle of Pukerua Bay.

Landscape architects fitted the cycle pathway into a narrow area between the new highway and the swamp, without adversely affecting the swamp.

Designers took into account the proximity of the roadway to the swamp and to regenerating bush. Additional planting has been carefully detailed to reflect adjacent vegetation and provide visual stimulus to users of the pathway.



The cycle pathway along SH1 north of Plimmerton received a bronze award for Sustainability in Landscape Design from the New Zealand Institute of Landscape Architects

#### Whakatane Entranceway

A landscape plan has been prepared to revitalise the entranceway to Whakatane township. The objectives of the plan are to:

- enhance and retain views of significant features such as White Island;
- signal the change in speed and surroundings as drivers move from a rural to an urban environment;
- enhance streams and improve biodiversity; and
- reduce maintenance costs by up to \$8,000 per annum.

The project team will use locally-sourced plant species and planting patterns that reflect their surroundings. The team will assess the success of the project based on maintenance costs, rates of plant self-seeding for regeneration, plant canopy cover for weed suppression, the presence of birds and other wildlife and public feedback.



Whakatane Entranceway – Concept Plan

#### Grafton Gully

Landscape treatments and design elements on Grafton Gully provide a transition from the upper gully to an urban streetscape in the lower gully.

The landscaping works are more cost-effective than grass. Over the years, ongoing maintenance costs of motorway berms, particularly on steep slopes with difficult access, have proved to be expensive. The enhanced visual appearance of the concrete works softens and better integrates gully structures into the surrounding environment.



Grafton Gully

## 2.1 VISUAL QUALITY

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Legislative Compliance</b> Develop designation and resource consent proforma relating to highway landscaping.</p> <p><b>Quality Response</b> Develop specifications for maintaining landscaped areas.</p> <p>Provide advice on the selection of external experts, including identification of approved and/or accredited landscape design, landscape suppliers and landscape maintenance providers.</p> <p>Assess the effectiveness of current state highway landscape practices.</p> <p><b>Training</b> Promote training in highway landscaping to professional services consultants and landscape architects by means of an innovative web-based learning program.</p> <p>Ensure appropriate linkages to urban design commitments.</p>	
<b>Plan</b>	<p><b>Route Selection</b> Ensure as part of project urban design plan that route options for new or improved sections of state highways limit adverse effects on surrounding landscapes.</p> <p><b>Designation and Consent Conditions</b> Seek reasonable conditions, where 'reasonable' includes consideration of:</p> <ul style="list-style-type: none"> <li>• actual impacts of the proposal on the surrounding environment; and</li> <li>• cost-effectiveness of treatment mechanisms.</li> </ul>	<p>Guidelines for Highway Landscaping (SP/M/020) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p> <p>Planning Policy Manual (SP/M/001) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>

## 2.11 VISUAL QUALITY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Plan</b></p>	<p><b>Impact Assessment</b> Complete a landscape and visual assessment to identify the appropriate landscape/lighting options to mitigate adverse effects of highway projects on visual quality and the surrounding landscape.</p> <p><b>Signage</b> For guidance on signage, refer to the Planning Policy Manual.</p> <p><b>Resource Management</b> Control vegetation to maintain safety standards, and protect road structures.</p> <p><b>Designation and Consent Conditions</b> Ensure conditions are consistent with the Urban Design Policy and Guidelines for Highway Landscaping.</p> <p><b>Lighting Adjacent to State Highways</b> For guidance, refer to the Planning Policy Manual.</p> <p><b>Lighting on State Highways</b> State highways should provide adequate levels of safety for all state highway users through the design, installation and maintenance of lighting.</p>	<p>Planning Policy Manual (SP/M/001) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p> <p>State Highway Control Manual (SM012) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=42&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=42&amp;action=edit</a></p>



## 2.11 VISUAL QUALITY

[Return to Table of contents](#) 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Design</b>	<p><b>Lighting Design</b></p> <p>Design state highway lighting as an integrated part of the overall design process.</p> <p>Consider:</p> <ul style="list-style-type: none"> <li>• placement of lights and lighting fixtures (safety/glare);</li> <li>• energy efficiency of lighting;</li> <li>• light spill/pollution of adjacent areas and impact in rural areas and of light spill on visibility of the night sky (visual amenity); and</li> <li>• consistency of theme in lighting structures.</li> </ul> <p><b>Mitigation Selection</b></p> <p>Treat disturbed vegetation and landforms in accordance with Transit's Guidelines for Highway Landscaping.</p> <p>Seek expert advice to ensure highway landscaping is appropriate for site conditions for the long term.</p> <p>Ensure that road architecture (signs, barriers etc.) placement contributes to the visual quality of the area.</p> <p>Ensure the design of structures (bridges for vehicles and pedestrians, retaining walls) is visually integrated into the surrounding environment.</p> <p>Ensure shotcrete application is visually integrated into the surrounding environment.</p> <p><b>Legislative Compliance</b></p> <p>Ensure highway landscaping complies with local plan rules, designation and resource consent conditions.</p>	<p>Geometric Design Manual</p> <p>State Highway Control Manual</p> <p>AS/NZS 1158 'Lighting for Roads and Public Spaces'</p> <p>AS/NZS 4282 'Control of Obtrusive Effects of Outdoor Lighting'</p> <p>Guidelines for Highway Landscaping (SP/M/020)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p> <p>State Highway Professional Services Contract Proforma Manual (SM030)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>Planning Policy Manual (SP/M/001)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p> <p>Beyond the Pavement – RTA Urban and Regional Design Practice note 15 – Roadscape elements  <a href="http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn15.pdf">http://www.rta.nsw.gov.au/constructionmaintenance/downloads/urbandesign/urban_design_practice_notes_part_b_pn15.pdf</a></p> <p>RTA Bridge Aesthetics Design Guide  <a href="http://www.shop.nsw.gov.au/pubdetails.jsp?publication=3866">http://www.shop.nsw.gov.au/pubdetails.jsp?publication=3866</a></p> <p>RTA Shotcrete Design Guide  <a href="http://www.shop.nsw.gov.au/pubdetails.jsp?publication=5858">http://www.shop.nsw.gov.au/pubdetails.jsp?publication=5858</a></p>

## 2.11 VISUAL QUALITY

[Return to Table of contents](#) 

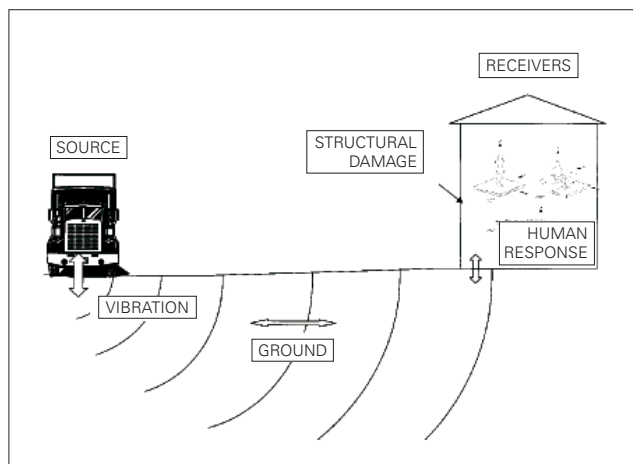
TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Build</b>	Treat disturbed vegetation and landforms in accordance with Transit's Guidelines for Highway Landscaping.	Guidelines for Highway Landscaping (SP/M/020) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a>
<b>Maintain and Operate</b>	<p>Treat disturbed vegetation and landforms in accordance with Transit's Guidelines for Highway Landscaping.</p> <p>Ensure maintenance contractor performance meets vegetation management and litter collection standards.</p> <p>Prioritise and apply multi-purpose landscaping to the existing network. Give priority to achieving multiple objectives such as:</p> <ul style="list-style-type: none"> <li>• improve safety performance;</li> <li>• reduce ongoing maintenance costs (e.g. replacing large grassed areas with native/low-growth/wildflower species);</li> <li>• treat poor-quality existing landscaped areas;</li> <li>• soften visual impact of hard structures;</li> <li>• manage erosion;</li> <li>• enhance biodiversity; and</li> <li>• respect community preferences.</li> </ul> <p>Promote the Adopt-a-Highway programme to work in partnership with local communities to beautify state highways according to plans agreed to by Transit.</p>	<p>State Highway Maintenance Contract Proforma Manual (SM032) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p> <p>Annual Plan Instructions Manual (SM018) <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=40&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=40&amp;action=edit</a></p> <p>Adopt-a-Highway programme</p>

## 2.12 VIBRATION

[Return to Table of contents](#) →

### OBJECTIVES

- V1** Plan and design new state highways to avoid or reduce adverse vibration effects.
- V2** Mitigate vibration where levels are unreasonable and exceed relevant criteria set in New Zealand or internationally accepted thresholds.
- V3** Avoid or reduce, as far as is practicable, the disturbance to communities from vibration during construction and maintenance.



Impact of traffic vibration

### EFFECTS

Vibrations are low frequency pressure waves that can be annoying, especially to people who may fear that the vibration they are experiencing is damaging their home. However, despite people being able to perceive vibrations, the levels are often well below the minimum threshold to cause damage to properties.

Typically, intermittent or transient vibrations, commonly associated with construction activity, have the most potential to damage buildings and structures. Such damage may be structural, such as cracking of floor slabs and foundations or cracked plaster. The effects of traffic-related vibration are most common near major roads with high traffic flows. If a road surface is uneven, for instance around utility covers and trenches, the effects of vibrations can become more pronounced, especially when heavy vehicles pass by.

Other factors that affect the extent of vibration effects being reported include:

- standard of road construction;
- ground conditions;
- nature and state of road surface;
- vehicle type, weight, speed and suspension; and
- proximity, nature and design of buildings and structures near a highway.

### TRANSIT'S ROLE

Transit seeks to avoid or reduce adverse vibration effects when planning and designing new roads by selecting routes that avoid creating adverse traffic vibration effects as well as designing roads which minimise traffic vibration.

The Planning Policy Manual demonstrates how potential reverse-sensitivity vibration issues should be managed and places a strong emphasis on working with other stakeholders such as local councils and developers to achieve satisfactory outcomes. Transit seeks to ensure new vibration-sensitive developments establishing in close proximity to the state highway network take into account the existing and projected traffic vibration environment.

Transit seeks to avoid traffic vibration issues being caused by uneven road surfaces, especially as a result of works around utility covers and trenches, by requiring a smooth surface to be laid after the works are complete.

When constructing new or upgraded state highways, Transit seeks to control and manage the potential adverse effects of vibration through the implementation of project-specific Construction Management Plans. These plans provide for the implementation of measures to minimise the effects of vibration associated with activities such as blasting and the use of certain types of equipment like impact pile drivers and pavement breakers.

## 2.12 VIBRATION

[Return to Table of contents](#) →

### PERFORMANCE INDICATOR

None at this time.

### EXAMPLES OF CURRENT PRACTICE

#### Reducing vibrations associated with pile driving during construction

Vibratory pile drivers are sometimes used during the construction phase of road projects. They advance piles by vibrating them into the ground and are especially effective for soils that are vibratory mobile such as sands and silts. This kind of equipment was used to drive piles to support a temporary platform used during the construction of a new bridge in Grafton Gully, Auckland. The actual device was a 'variable frequency vibro hammer' that allowed the frequency of the hammer to be controlled, reducing annoyance to neighbouring residents during the piling operation.



A vibrating hammer being used to drive sheet piles

#### Surveying properties susceptible to vibration

An important element of any plan to manage potential vibration issues, especially during the construction phase of a road project, is an assessment of buildings and structures at risk from vibration. As part of the Meeanee Road intersection upgrade project in Napier, comprehensive surveys of buildings were undertaken prior to construction commencing. The findings provide a baseline against which assessments can be made of any perceived or actual impacts of any vibration generated during construction on these buildings.



Meeanee Road intersection upgrade, Napier – properties at risk of potential vibration effects were surveyed prior to construction

## 2.12 VIBRATION

[Return to Table of contents](#) 

### IMPLEMENTATION PLAN

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>National Office Initiatives</b></p>	<p><b>Vibration Management Guidance</b></p> <p>Provide assistance, support and guidance for use when:</p> <ul style="list-style-type: none"> <li>• undertaking vibration assessments for new and upgraded state highways;</li> <li>• determining best practicable option to avoid, remedy or mitigate exposure to unreasonable levels of traffic vibration associated with state highway network;</li> <li>• seeking designation vibration conditions for new or upgraded state highways;</li> <li>• dealing with reverse-sensitivity vibration issues near state highway network;</li> <li>• minimising vibration associated with construction and maintenance activities on the state highway network; and</li> <li>• handling and managing vibration complaints.</li> </ul> <p><b>Revise Provisional Complaint Procedure</b></p> <p>Review and revise the provisional State Highway Control Manual policy for handling and managing vibration complaints.</p> <p><b>Information Management</b></p> <p>Develop a comprehensive network-wide vibration information management system to enable relevant information to be stored, analysed and used efficiently ensuring vibration issues are managed effectively.</p> <p><b>Collaborate and Advocate</b></p> <p>Collaborate and work in partnership with relevant stakeholders such as the Ministry of Transport, Land Transport New Zealand and local authorities in order to enhance vibration management around the state highway network including supporting and facilitating appropriate vibration management research initiatives.</p>	<p>Planning Policy Manual (SP/M/001) – Reverse Sensitivity Policy and Guidelines  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf</a></p> <p>State Highway Control Manual (SM012), Section 5.5  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=33&amp;data_key=&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=33&amp;data_key=&amp;action=edit</a></p>

## 2.12 VIBRATION

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>National Office Initiatives</b>	<p><b>Audit</b></p> <p>Review the content and quality of work undertaken on behalf of Transit by consultants and contractors involved in vibration management activities.</p>	
<b>Plan</b>	<p><b>Route Selection</b></p> <p>Investigate and select route options for new or upgraded state highway sections thus avoiding sensitive receiver exposure to unreasonable levels of traffic vibration.</p> <p><b>Assessment of Effects</b></p> <p>Assess the noise effects of new or upgraded sections of state highways in accordance with appropriate New Zealand and overseas guidance.</p> <p><b>Designation Conditions</b></p> <p>Determine reasonable vibration requirements when seeking new or altering existing designations, including the designation of existing local roads, by using RMA processes. Conditions should refer to vibration criteria that deliver a reasonable vibration level and implement best practicable option.</p> <p><b>Local Planning Processes</b></p> <p>Influence proposed policy statements and plan provisions to improve consistency with accepted noise management practice in relation to planning, construction, use and maintenance of the state highway network.</p>	<p>Contact Transit Environmental Manager, National Office</p> <p>State Highway Professional Services Contract Proforma Manual (SM030)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>MfE (2006) – A Guide to Preparing a Basic Assessment of Environmental Effects</p> <p><a href="http://www.mfe.govt.nz/publications/rma/aee-guide-aug06/aee-guide-aug06.pdf">http://www.mfe.govt.nz/publications/rma/aee-guide-aug06/aee-guide-aug06.pdf</a></p> <p>NZ / ISO Standard 2631-2, Australian Standard AS 2670-2: 1990 'Evaluation of Human Exposure to Whole-body Vibration – Continuous and shock-induced vibration in buildings (1 to 80 Hz)'</p> <p><a href="http://www.saiglobal.com/shop/Script/Details.asp?DocN=stds000000931">http://www.saiglobal.com/shop/Script/Details.asp?DocN=stds000000931</a></p> <p>German Standard DIN 4150-3:1999 'Structural Vibration – Effects of vibration on structures'</p> <p><a href="http://webstore.ansi.org/ansidocstore/product.asp?sku=DIN+4150%2D3%3A1999">http://webstore.ansi.org/ansidocstore/product.asp?sku=DIN+4150%2D3%3A1999</a></p> <p>Norwegian Standard NS 8176E:2005 'Vibration and Shock: Measurement of vibration in buildings from land based transport and guidance to evaluation of its effects on human beings'</p>

## 2.12 VIBRATION

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<b>Plan</b>	<p><b>Reverse Sensitivity</b></p> <p>Avoid potential future vibration effects from state highway network by implementing Reverse Sensitivity Policy and Guidelines. Encourage local authorities and developers to provide, within developments:</p> <ul style="list-style-type: none"> <li>• separation areas/buffer zones between state highways and vibration-sensitive locations;</li> <li>• vibration mitigation including design, construction, siting and orientation of vibration-sensitive buildings and activities; and</li> <li>• no complaint instruments on land titles where appropriate.</li> </ul>	<p>Planning Policy Manual (SP/M/001)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p>
<b>Design</b>	<p><b>Design Approach</b></p> <p>In situations where elevated levels of traffic vibration cannot be avoided, design new or upgraded state highways in order to remedy and/or mitigate adverse effects by implementing appropriate design measures; for example, designing roads so that a surface, which minimises excessive traffic vibration, can be applied if necessary.</p> <p>Ensure vibration design solutions comply with urban design and highway landscaping approaches, do not create adverse environmental effects themselves or excessive maintenance obligations and balance mitigation benefits with whole-of-life costs.</p> <p><b>Durability of Mitigation Measures</b></p> <p>Ensure physical vibration mitigation measures are designed to have a life expectancy of at least 20 years and take into account maintenance requirements.</p> <p><b>Design Plans</b></p> <p>Ensure design solutions to mitigate and manage traffic vibration effects associated with a new or upgraded state highway project are fully detailed in design documentation; for example, Vibration Management Plan.</p>	<p>State Highway Geometric Design Manual (Draft) (SHGDM)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=19&amp;action=edit</a></p> <p>NZ Supplement to Pavement Design – A Guide to the Structural Design of Road Pavements (Austroads, 2004)</p> <p><a href="http://www.transit.govt.nz/content_files/technical/ManualSection147_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection147_FileName.pdf</a></p> <p>MfE New Zealand Urban Design Protocol</p> <p><a href="http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf">http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf</a></p> <p>Urban Design Implementation Principles</p> <p><a href="http://www.transit.govt.nz/content_files/planning/urban/Urban-Design-Policy.pdf">http://www.transit.govt.nz/content_files/planning/urban/Urban-Design-Policy.pdf</a></p> <p>Guidelines for Highway Landscaping (SP/M/020)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=31&amp;action=edit</a></p>

## 2.12 VIBRATION

Return to Table of contents →

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Build</b></p>	<p><b>Property Acquisition and Disposal</b></p> <p>When acquiring property, ensure agreements that include a requirement to manage traffic vibration effects are fully considered and aligned with related commitments such as designation conditions or content of any Vibration Management Plan.</p> <p>When disposing of property, implement Reverse Sensitivity Policy and Guidelines in order to facilitate compatible land use opportunities and controls in close proximity to state highways and to avoid creating new or exacerbating existing (and where possible projected) traffic vibration issues.</p> <p><b>Construction Vibration</b></p> <p>Ensure Construction Management Plans, or equivalent, include a vibration management component. This should detail consultant and contractor obligations during the construction phase in relation to:</p> <ul style="list-style-type: none"> <li>• before and after surveys of properties at risk of vibration effects;</li> <li>• monitoring and reporting requirements including results of risk assessments and vibration measurements;</li> <li>• identifying appropriate vibration mitigation measures to be implemented; and</li> <li>• procedures for maintaining contact with stakeholders and managing vibration complaints.</li> </ul> <p>Utilise equipment and techniques to minimise vibration issues when a state highway is under construction. This includes, for example, restricting hours of operation of activities likely to cause excessive vibration such as earthmoving, blasting, pile-driving and pavement breaking.</p>	<p>Planning Policy Manual (SP/M/001) – Reverse Sensitivity Policy and Guidelines  <a href="http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf">http://www.transit.govt.nz/content_files/technical/ManualSection413_FileName.pdf</a></p> <p>Caltrans, US – Transportation and Construction Induced Vibration Guidance Manual  <a href="http://www.dot.ca.gov/hq/env/noise/pub/vibrationmanFINAL.pdf">http://www.dot.ca.gov/hq/env/noise/pub/vibrationmanFINAL.pdf</a></p> <p>State Highway Construction Contract Proforma Manual (SM031)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit</a></p> <p>Transit’s Public Engagement Policy (copies available from Transit Environmental Manager, National Office)</p> <p>Risk Management Process Manual (AC/Man/1)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit</a></p>







## 2.12 VIBRATION

Return to Table of contents 

TRANSIT ACTIVITIES	METHODS	TOOLKIT
<p><b>Maintain and Operate</b></p>	<p><b>Asset Management</b></p> <p>Ensure the RAMM system and all appropriate documentation, including Asset Owner's Manuals, include details of all relevant traffic vibration mitigation measures and their maintenance requirements.</p> <p>Maintain vibration mitigation measures, including road surfaces, correctly to ensure that they continue to provide the designed level of mitigation.</p> <p><b>Utility Structures</b></p> <p>Require utility operators wishing to add or renew existing services within carriageway to thrust bore rather than using open trenches and then backfilling on completion.</p> <p>Require a smooth surface around utility covers, trenches and other similar utility structures, particularly on routes in urban areas that carry a high percentage of heavy vehicles.</p> <p><b>Heavy Vehicle Vibration</b></p> <p>Consider reducing the speed of heavy vehicles and / or re-routing such vehicles to roads less susceptible to vibration or to roads through areas where there are less sensitive receivers.</p> <p><b>Complaint Management</b></p> <p>Ensure vibration complaints are managed, investigated and resolved in accordance with:</p> <ul style="list-style-type: none"> <li>• Guideline for Handling Environmental Complaints; and</li> <li>• Provisional Vibration Policy until such time that the Board adopts an alternative policy position.</li> </ul>	<p>State Highway Professional Services Contract Proforma Manual (SM030)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>State Highway Maintenance Contract Proforma Manual (SM032)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p> <p>Transit's Guideline for Handling Environmental Complaints (copies available from Transit Environmental Manager, National Office)</p> <p>State Highway Control Manual SM012, Section 5.5</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=33&amp;data_key=&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=33&amp;data_key=&amp;action=edit</a></p>



## 3.1 IMPLEMENTATION PLAN - GENERAL METHODS FOR ALL IMPACTS

[Return to Table of contents](#) 

GENERAL METHODS		TOOLKIT
<p><b>Contract Management</b></p> 	<p>Ensure Transit's LTMA objectives and Environmental Policy, specifically in relation to adverse social and environmental effects, are reflected in all contract documentation and contract management.</p> <p>Ensure consultants and contractors take account of the adverse effects of relevant activities by completing the:</p> <ul style="list-style-type: none"> <li>• Social and Environmental Management Standard z/19 (SM030);</li> <li>• Contractors Social and Environmental Management Plan z/4 (SM030); and</li> <li>• Contractors Quality Plan – Environmental Management (SM032).</li> </ul> <p>Review how Transit's policies and objectives as specified in this plan are being met as part of contract management reviews.</p>	<p>Project Management Manual (SM011)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=47&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=47&amp;action=edit</a></p> <p>State Highway Professional Services Contract Proforma Manual (SM030)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>State Highway Construction Contract Proforma Manual (SM031)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=27&amp;action=edit</a></p> <p>State Highway Maintenance Contract Proforma Manual (SM032)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=28&amp;action=edit</a></p> <p>Contract Management Review (CMR) programme</p>
<p><b>Risk Management</b></p> 	<p>Monitor, report and manage risks relating to adverse social and environmental effects of Transit's activities throughout project lifecycle including operation and maintenance.</p> <p>Regularly update any risks relating to adverse social and environmental effects of Transit's activities on the relevant risk register.</p>	<p>Risk Management Process Manual (AC/Man/1)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=41&amp;action=edit</a></p>
<p><b>External Experts</b></p> 	<p>Engage suitably qualified external experts to provide advice about adverse effects and management.</p>	<p>National Office to provide advice to regions on the selection of external experts, including identification of approved and/or accredited professional service providers</p>
<p><b>Complaint Management</b></p> 	<p>Manage, investigate and resolve, as appropriate, complaints in accordance with Transit's Guideline for Handling Environmental Complaints.</p>	<p>Transit's Environmental Complaint Procedure</p> <p>National Office to provide advice to regions and oversee complaint management</p>



## 3.1 IMPLEMENTATION PLAN - GENERAL METHODS FOR ALL IMPACTS

[Return to Table of contents](#) 

GENERAL METHODS		TOOLKIT
<p><b>Relationship Management</b></p> 	<p>Ensure project-specific Memoranda of Understanding and side agreements that relate to management of adverse social and environmental effects are consistent with Transit's Environmental Policy and other social and environmental issue-specific guidance.</p> <p>Ensure consistency with consultation requirements of the Resource Management Act 1991 and Heritage Act 1993.</p> <p>Ensure existing Memoranda of Understanding with the New Zealand Historic Places Trust and Department of Conservation are implemented.</p> <p>Engage Māori, stakeholders and public in accordance with Transit's Public Engagement Manual to ensure appropriate consideration of cultural and heritage issues in decision-making.</p>	<p>Transit New Zealand's Public Engagement Policy</p> <p>Māori consultation in accordance with Stakeholder Relationship Management System (SRMS)</p> <p>State Highway Professional Services Contract Proforma Manual (SM030)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>State Highway Stakeholder Agreement Proforma Manual (SM033)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=37&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=37&amp;action=edit</a></p> <p>Annual Plan Instructions Manual (SM018)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=40&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=40&amp;action=edit</a></p> <p>Department of Conservation (DOC) Memorandum of Understanding and Liaison Group</p> <p>DOC / Transit Guidelines for State Highways within or adjacent to National Parks, Reserves and Conservation Areas</p> <p>Historic Places Trust Memorandum of Understanding and Liaison Group</p>
<p><b>Permitted Activities</b></p> 	<p>Ensure construction and maintenance activities that do not require a resource consent are managed in accordance with permitted activity requirements so as to avoid adverse social and environmental effects.</p> <p>Have a clear understanding as to what Transit activities are permitted and what activities require a consent from a local or regional consent authority.</p> <p>If emergency works are repeatedly needed in an area, for example, due to slope instability and flooding, then a proactive consent should be obtained instead of using the RMA's emergency provision.</p> <p>Check the consultant has adequately prepared the Contractors Social and Environmental Management Plan prior to work commencing and contractor understands the requirements.</p>	<p>Consult the relevant local and regional plan and planning authority</p> <p>s330 of the Resource Management Act</p> <p>State Highway Professional Services Contract Proforma Manual – z/4 Contractors Social and Environmental Management Plan (SM030)</p> <p><a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p>

## 3.1 IMPLEMENTATION PLAN - GENERAL METHODS FOR ALL IMPACTS

[Return to Table of contents](#) 

GENERAL METHODS		TOOLKIT
<p><b>Designation and Resource Consent Conditions</b></p> 	<p>Ensure compliance with all designation and resource consent conditions.</p> <p>Notify consenting authority prior to works commencing as required in resource consents.</p> <p>Communicate forward construction and maintenance work plans with regional authority.</p> <p>Make use of global consents for repetitive works such as culvert maintenance, bridge painting and CMA application to ensure consistently good performance and lessen workloads for all parties.</p> <p>Prepare consents well ahead of works to ensure adequate assessment of effects, consultation and processing times.</p> <p>Check the consultant has adequately prepared the Contractors Social and Environmental Management Plan prior to work commencing and contractor understands and brings this into effect.</p>	<p>Project Management Manual (SM011): BPG 7.2 Statutory Frameworks  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=47&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=47&amp;action=edit</a></p> <p>State Highway Professional Services Contract Proforma Manual – z/4 Contractors Social and Environmental Management Plan (SM030)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p>
<p><b>Urban Design</b></p> 	<p>Ensure a project's urban design objectives are set at the Project Feasibility Report/Scoping stage and include as part of the options selection criteria. Objectives should reflect urban design policy and the New Zealand Urban Design Protocol (UDP).</p> <p>Mitigation, remedy and avoidance of adverse effects in a manner consistent with UDP.</p> <p>Integrate concept and detailed design with engineering / urban design solutions.</p> <p>Mitigation measures identified at planning and design phase are built or improved through innovation during construction.</p> <p>Ensure mitigation takes into account maintenance requirements.</p>	<p>Planning Policy Manual (SP/M/001)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=46&amp;action=edit</a></p> <p>MfE New Zealand Urban Design Protocol  <a href="http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf">http://www.mfe.govt.nz/publications/urban/design-protocol-mar05/urban-design-protocol-bw.pdf</a></p> <p>Urban Design Implementation Principles  <a href="http://www.transit.govt.nz/content_files/planning/urban/Urban-Design-Policy.pdf">http://www.transit.govt.nz/content_files/planning/urban/Urban-Design-Policy.pdf</a></p> <p>State Highway Professional Services Contract Proforma Manual (SM030)  <a href="http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit">http://www.transit.govt.nz/technical/view_manual.jsp?content_type=manual&amp;=edit&amp;primary_key=48&amp;action=edit</a></p> <p>Urban Design Professional Services Guide PSG/12  <a href="http://www.transit.govt.nz/content_files/planning/urban/PSG12.pdf">http://www.transit.govt.nz/content_files/planning/urban/PSG12.pdf</a></p> <p>NSW RTA Beyond the Pavement Urban Design Practice notes  <a href="http://www.rta.nsw.gov.au/constructionmaintenance/urbandesign/index.html">http://www.rta.nsw.gov.au/constructionmaintenance/urbandesign/index.html</a></p>

## 3.2 GLOSSARY

[Return to Table of contents](#) 

### **Adopt-a-Highway**

A formal agreement between Transit and a community group, where the community group agrees to enhance the landscaping on a section of state highway. Transit provides support, safety assistance and guidance from the Guidelines for Highway Landscaping.

### **Asset Owner's Manual**

The manual aims to ensure a seamless transfer of responsibilities between the capital works and the network management consultants during the handover phase of physical works following project completion (see SM030 minimum standard z/15).

### **Biodiversity**

The New Zealand Biodiversity Strategy (2000) defines biodiversity as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

### **Bituminous emulsions**

A dispersion of two liquids that would not normally mix, e.g. water and oil. It is a semi-liquid mix of bitumen particles and water that is used when sealing a road.

### **Carbon sink forest**

The New Zealand Climate Change Office states that growing forests are termed as forest sinks because of their ability to absorb carbon dioxide. Trees convert carbon dioxide from the atmosphere into carbon stored in the form of wood and soil organic matter.

### **Climate change**

This is defined in the RMA as a change in climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

### **dBA or decibel**

The decibel (dB) is a measure of sound pressure level. The A-weighting is a system of adjustments to sound of different frequencies to take account of the way the sensitivity of the human ear varies with sound frequency.

### **Designation**

A designation is defined in the RMA as a provision made in a district plan that gives effect to a requirement made by a requiring authority under s168 of the RMA. Transit New Zealand is a requiring authority. For example, a designation could provide notice to the community of an intention by Transit to use land for developing a state highway in the future.

## 3.2 GLOSSARY

[Return to Table of contents](#) →

### **District plan**

This is defined in the RMA as an operative plan approved by a territorial authority under schedule 1 of the RMA and includes all operative changes to such a plan (whether arising from a review or otherwise).

### **Energy conservation**

A reduction in energy use (as defined in the Energy Efficiency and Conservation Act 2000).

### **Energy efficiency**

A change to energy use that results in an increase in net benefits per units of energy (as defined in the Energy Efficiency and Conservation Act 2000).

### **Energy intensity**

The energy use per unit of output or activity (e.g. the amount of energy consumed per office employee or per unit of floor space) (Energy Efficiency and Conservation Authority).

### **Environment**

The Environment Act 1986 defines environment as including:

- (a) Ecosystems and their constituent parts including people and communities; and
- (b) All natural and physical resources; and
- (c) Those physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes; and
- (d) The social, economic, aesthetic and cultural conditions which affect the matters stated in paragraphs (a) to (c) of this definition or which are affected by those matters.

### **Grassed swale**

An open vegetated drainage channel or shallow trough-like depression running alongside a road and explicitly designed to carry, detain, partly treat and promote the filtration of stormwater run-off.

### **Guidelines for Highway Landscaping**

Transit's guidelines to foster best practice in landscape management within state highway corridors. The guidelines discuss how Transit aims to maximise opportunities to contribute to broader environmental, social and economic objectives when it carries out landscaping work and also maps a process of landscape assessment, design, establishment and ongoing management.

## 3.2 GLOSSARY

[Return to Table of contents](#) 

### **Intelligent Transport Systems (ITS)**

This is defined in the Transit ITS Strategy as the integrated application of advanced information, electronic, communications and other technologies to the management and operation of surface transportation systems. Examples include motorway monitoring, incident management and ramp signalling.

### **Kyoto Protocol**

The Kyoto Protocol is an international agreement to address global warming and delay climate change. It aims to reduce the total greenhouse gas emissions of developed countries (and countries with economies in transition) to 5% below the level they were in 1990. This protocol has been signed by the New Zealand Government.

### **Landfills**

This is defined in the New Zealand Waste Strategy as an area used for the controlled disposal of solid waste.

### **Leq**

Leq is a measurement for sound levels. It is the time averaged noise level (that is, the constant noise level, which would contain an equal amount of sound energy to the actual fluctuating noise level).

### **Leq (24 hour)**

The logarithmic average of the hourly Leq values taken over the 24-hour period of a full day.

### **Limited Access Road (LAR)**

Limited Access Roads are 'declared' under the Transit New Zealand Act or created under the Public Works Act as a means of controlling access between roads and adjoining properties.

### **Local authority**

This is defined in the RMA as meaning a regional council or territorial authority.

## 3.2 GLOSSARY

[Return to Table of contents](#) →

### **Long Term Community Council Plans (LTCCPs)**

The purpose of a LTCCP as defined by the Local Government Act 2002 is to:

- (a) describe the activities of the local authority; and
- (b) describe the community outcomes of the local authority's district or region; and
- (c) provide integrated decision making and co-ordination of the resources of the local authority; and
- (d) provide a long term focus for the decisions and activities of the local authority; and
- (e) provide a basis for accountability of the local authority to the community; and
- (f) provide an opportunity for participation by the public in decision making processes on activities to be undertaken by the local authority.

### **LTMA**

Land Transport Management Act 2003. Its purpose is to contribute to the aim of achieving an integrated, safe, responsive and sustainable land transport system.

### **National Energy Efficiency and Conservation Strategy**

The Strategy's purpose is to promote energy efficiency, energy conservation and renewable energy and move New Zealand towards a sustainable energy future. For more information see <http://www.eeca.govt.nz/default2.asp>

### **National Environmental Standards**

National Environmental Standards are regulations issued under the RMA by central government that prescribe technical standards, methods or requirements for environmental matters. They apply nationally, meaning that each local council must enforce the same standard (although councils can impose stricter standards when local conditions permit).

National Environmental Standards may cover things such as:

- water quality, level or flow;
- air quality;
- soil contaminant levels;
- noise; and
- monitoring requirements.



## 3.2 GLOSSARY

[Return to Table of contents](#) →

### **National State Highway Strategy**

This Strategy describes Transit's goals and objectives, policies and plans and priorities for the state highway system. It also provides the basis for Transit to consult with road user organisations and other stakeholders on Transit's priorities for planning, operating, maintaining and improving the state highway system.

### **New Zealand Waste Strategy**

This central government Strategy addresses solid, liquid and gaseous wastes and sets national targets to reduce these waste streams.

### **Noise mapping**

Assessment of noise levels either by physically monitoring the site or by modelling sites.

### **NZTS**

New Zealand Transport Strategy (2002), updated in 2008.

### **OECD**

Organisation for Economic Co-operation and Development. For more information see <http://www.oecd.org/home/>

### **PPM (SP/M/001)**

Transit's Planning Policy Manual, which sets out policy and guidelines on integrated planning and development of state highways.

### **Public Conservation Lands**

Lands and water areas administered by the Department of Conservation for whatever purpose, including the natural and historic resources of those areas covered by this General Policy. Reserves administered by other agencies are not included in this definition.

### **RAMM**

Road Assessment Maintenance and Management system.

### **Recycle**

Transforming a waste resource/product into a new product.

## 3.2 GLOSSARY

[Return to Table of contents](#) →

### **Reduce**

Using fewer resources/inputs.

### **Regional plans**

This is defined in the RMA as meaning an operative plan (including a regional coastal plan) approved by a regional council or the Minister of Conservation under Schedule 1; and includes all operative changes to such a plan (whether arising from a review or otherwise).

### **Resource Management Act 1991 (RMA)**

This is New Zealand's primary environmental legislation. Its purpose is to promote the sustainable management of natural and physical resources.

### **Retrofit**

The process of modifying the existing network to improved standards.

### **Reuse**

Using the same resource more than once.

### **Reverse sensitivity**

The legal vulnerability of an established activity to complaint from a new land use.

### **Road user services**

Road user services are facilities that provide for road users' needs and enhance their travel. Examples of these services include:

- rest areas and toilet facilities; and
- clear guide and information signs.

### **Sensitive receiver**

Any person(s) affected by, or sensitive to, impacts associated with activities within their environment. A sensitive receiving environment is of a similar nature, but refers to natural systems or processes.

## 3.2 GLOSSARY

[Return to Table of contents](#) →

### **Sensitive water body**

This is a water body that has one or more of the following:

- high ecological/biodiversity/threatened species values;
- potential to impact on human health (e.g. source of drinking water/food supply, recreation);
- high cultural/Maori significance; and/or
- low levels of disturbance and contamination from other sources.

### **Significant habitats or vegetation**

Criteria that define significant habitats or vegetation are:

- range of genetic and ecological diversity;
- population diversity and pattern (of ecosystems, species and landforms);
- rarity factors and/or special features;
- naturalness/intactness of the area;
- size and shape of the population (affecting the long-term viability of species, communities and ecosystems and biodiversity);
- inherent ecological viability/long-term sustainability;
- relationship between natural areas and other areas of modified character;
- vulnerability to 'threat processes' liable to disturb existing equilibrium; and
- management effort required to maintain or enhance an area's significance (including the degree of intervention and the degree of restoration potential).

### **SHCM (SP/M/012)**

The State Highway Control Manual sets out Transit's procedures and policies with regard to state highways and details procedures for protection, control, asset management and work execution.

### **Spill containment facilities**

These facilities can be permanent or temporary and are designed to collect hazardous material, generally released as a result of a traffic accident, to prevent the material entering the environment.

## 3.2 GLOSSARY

[Return to Table of contents](#) →

### **State highway**

National roads managed by Transit on behalf of the Crown including motorways and excluding local roads managed by district councils.

### **Statement of Identified Māori Interest (SIMI)**

A mechanism developed under Transit's Guidelines for Managing Stakeholder Relationships and Consultation with Māori (part 2 of Public Engagement Manual) that sets out Transit's expectations and methods for consulting and recording consultation outcomes.

### **Stormwater detention ponds**

Basins constructed to temporarily store water run-off in order to reduce peak flows and to allow some contaminants to settle out. They are often dry between rain events.

### **Substitute**

Using a resource:

- of lower quality instead of higher quality;
- of plentiful supply instead of scarce supply;
- from a renewable source instead of a non-renewable source; or
- constructed from a fundamentally different material.

This includes changing a process to eliminate the use of a resource.

### **Territorial authority**

This is defined under the Local Government Act 2002 as a city or district council.

### **Thrust boring**

A method of forming a pilot bore by driving a closed pipe or head from a thrust pit into the soil that is displaced. This is primarily used by utility services as a means of laying pipes or cables under a road, without needing to dig a trench across the road.

### **TNZ VC 09:2006 'Vegetation control specification'**

This Transit specification sets out the requirements for vegetation management for the state highway network.

## 3.2 GLOSSARY

[Return to Table of contents](#) →

### Transit New Zealand (Transit)

Transit is a Crown entity established under the Transit New Zealand Act 1989 and continued under the Land Transport Management Act 2003.

### Urban Design Protocol 2004

This is a formal undertaking, led by the Ministry for the Environment, between signatory parties that agree to support and demonstrate the principles outlined in the document. Its purpose is to accelerate quality urban design to create places that people use and value. The protocol has no force in law. Transit is a signatory to this protocol.

### Wahi tapū

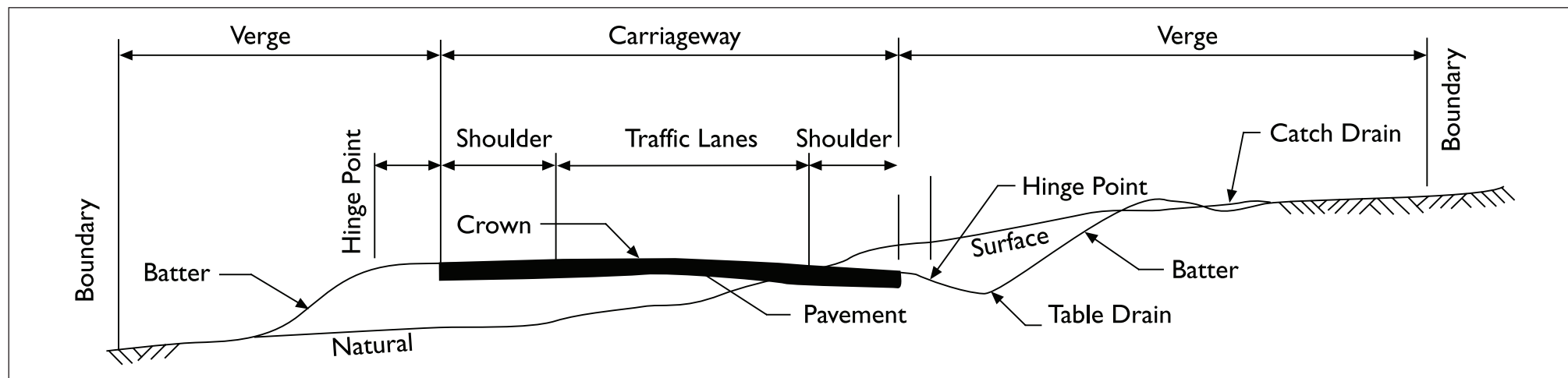
The Historic Places Act 1993 defines wahi tapū as a place sacred to Māori in the traditional, spiritual, religious, ritual or mythological sense.

### Waste

Any material, solid, liquid or gas that is unwanted and/or unvalued, discarded or discharged (as defined in the New Zealand Waste Strategy).

### Waste audit

A systematic, documented, periodic and objective evaluation of an organisation's performance in managing waste.



Common terms used to define features within a state highway corridor are detailed on the diagram above:

Source: Transit New Zealand, Draft Geometric Design Manual (based on an Austroads diagram)

**National Office**

Victoria Arcade, Level 2  
44 Victoria Street  
Private Bag 6995  
Wellington 6141

**Tel** 64 4 894 5400

**Fax** 64 4 894 6100

**Northland Office**

CPO Building, Level 1  
Rathbone Street  
PO Box 1899  
Whangarei 0140

**Tel** 64 9 430 4355

**Fax** 64 9 459 6944

**Auckland Regional Office**

Qantas House, Level 13  
191 Queen Street  
PO Box 1459  
Auckland 1140

**Tel** 64 9 368 2000

**Fax** 64 9 368 2059

**Hamilton Regional Office**

BNZ Building, Level 4  
354 Victoria Street  
PO Box 973  
Hamilton 3240

**Tel** 64 7 903 5100

**Fax** 64 7 957 1437

**Tauranga Office**

405 Cameron Road  
PO Box 430  
Tauranga 3140

**Tel** 64 7 927 6009

**Fax** 64 7 578 2009

**Napier Regional Office**

Napier Library Building  
22 Station Street  
PO Box 740  
Napier 4140

**Tel** 64 6 835 1750

**Fax** 64 6 835 0283

**Wanganui Regional Office**

Seddon House  
Park Place  
PO Box 345  
Wanganui 4540

**Tel** 64 6 349 6520

**Fax** 64 6 345 7151

**Wellington Regional Office**

Logical House, Level 8  
186–190 Willis Street  
PO Box 27477  
Wellington 6141

**Tel** 64 4 801 2580

**Fax** 64 4 801 2599

**Marlborough Roads Office**

The Forum, Level 1  
Unit 2.4, Market Street  
PO Box 1031, Blenheim 7240

**Tel** 64 3 577 1850

**Fax** 64 3 577 5309

0800 MARLRDS (0800 627 573)

**Christchurch Regional Office**

Pacific Brands House, Level 7  
123 Victoria Street  
PO Box 1479  
Christchurch 8140

**Tel** 64 3 366 4455

**Fax** 64 3 365 6576

**Dunedin Regional Office**

Broadbase House, Level 2  
62–66 Tennyson Street  
PO Box 5241  
Dunedin 9058

**Tel** 64 3 477 8527

**Fax** 64 3 477 9237