

Aspects and Impacts of SH Highway Activities

Aspects and Impact Register 2016



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1.0 Introduction

NZ Transport Agency has contracted AECOM to prepare a high level Aspects and Impacts Register of State Highway activities carried out by the Highways and Network Operations (HNO) group of the NZ Transport Agency (Agency). HNO are responsible for operating and maintaining the State Highway Network (SH).

The Transport Agency's Environmental and Social Responsibility (ESR) Policy states that in order to the implement the policy the Agency will continuously improve performance in the management of environmental and social impacts. In order to meet this requirement it is essential to understand what these impacts are.

The aspects and impacts have been grouped into the following State Highway activity phases:

- Planning and design of the SH;
- Physical construction works undertaken during SH upgrades or major renewals (Capital Works);
- Operation; and
- Maintenance activities.

1.1 Background

A previous impact/aspect register was prepared in 2004 and is contained within 'Transit¹ New Zealand's Social and Environmental Strategy discussion document (draft)'. This draft strategy discussion document contained a 'disaggregated list of the Impacts of State Highway Activities' and applied Transit's risk management process from the Risk Management Manual. However the list of impacts was incomplete and the document was never finalised.

The Environment and Urban Design team of the Agency's HNO group are currently updating the State Highway Environmental and Social Responsibility Plan (SH ESR Plan). This Plan gives effect to the ESR Policy including seeking to 'improve performance in the management of environmental and social impacts'. It was therefore considered prudent to generate and finalise an aspects and impacts list to use as a reference during the development of the SH ESR Plan for other purposes discussed below.

1.2 Purpose

The purpose of the Aspects and Impacts Register is to provide a reference for Agency staff and consultants involved in the various activities associated with the planning, design, construction, operation and maintenance of the SH. The Register should assist in the identification of the environmental and social impacts and opportunities relevant to their area of work or project.

The register will be a useful reference to assist with/in:

- Developing Agency business cases, particularly describing and understanding the social, geographic and environmental context, but also providing a list of potential environmental and social impacts of SH activities;
- Completing the Environmental and Social Responsibility Screen;
- Preparing Environmental and Social Management Plans for construction and maintenance works;
- Guiding the types of issues and impacts which should be covered in Assessment of Environmental Effects; and
- Preparing consenting strategies.

¹ Transit New Zealand was merged with Land Transport New Zealand to form the New Zealand Transport Agency (NZTA) in 2008

1.3 Method

In conjunction with the Agency, SH activities were divided up into the following four activity phases:

- Planning and design of the SH;
- Physical construction works undertaken during SH upgrades or major renewals (Capital Works);
- Operation; and
- Maintenance activities.

An aspects and impacts register was compiled for each of the activity phases. This was done based upon our understanding of Agency activities (consultation with relevant NZTA specialists, existing knowledge, documentation review and other activities undertaken to date) and those of other clients in similar industries. A review of the previous 2004 impact/aspect register was also undertaken.

The planning and design phase determines the extent of many environmental impacts during the construction and operation phases. In addition, there are opportunities to avoid impacts or maximise positive impacts during this phase. As such, these 'opportunities' to reduce negative impacts and increase positive impacts are captured where possible as part of the planning and design phase register.

1.3.1 Significant Impacts

No risk or significance criteria have been applied to the impacts, as the risks associated with each of the identified impacts will vary from location to location and project to project. The impacts identified and included in this register can have varying intensity and scale depending on the specific project or area the activity is being undertaken in.

1.4 Definitions

The following definitions based on ISO 14001 were used when compiling the aspects and impacts register.

Aspect - an element of an organisation's activities, products or services that can interact with the environment (including design). Aspects may include outputs (e.g. emissions to air, releases to water and to soil) as well as inputs (e.g. the use of resources or land).

Impact - any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects. The relationship between aspects and impacts is 'cause and effect'. Impacts can be negative when they relate to environmental risks or positive when they relate to environmental benefit or positive outcome.

Opportunity - an action that can be carried out to prevent or minimise a negative impact or maximise a positive impact.

Activity - the activity which generates a negative or positive impact on the environment. In some cases there is little differentiation between the aspect causing the impact and the specific activity.

1.5 Limitations

The Aspects and Impacts listed in the Register will not be accurate for all SH work but are intended to reflect the most common impacts that could result during the planning, design, construction, operation and maintenance of the SH. The intended purpose of the register is outlined in section 1.2.

2.0 State Highway Planning and Design

The way the State Highway Network is planned and designed affects the type of impacts that occur during construction, operation and maintenance of state highways. This section contains the aspects and impacts associated with transport/corridor planning, route selection and design (preliminary through to detailed).

It is important to understand how planning and design activities can influence the potential environmental and social impacts of construction, operation and maintenance. For this reason, opportunities are also identified in order to prevent or minimise a negative impact or maximise a positive impact.

Table 1: Aspects and Impacts of SH Planning and Design

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)) or opportunity (*)	
Transport Planning	Route protection of road corridor	Land use restrictions	+ / -
		Reduction in reverse sensitivity effects	+
	Route/corridor analysis and selection	Severance of communities by highway routes	-
		Fragmentation of habitat	-
		Reduction in quality of the setting of historic places or buildings and or their surrounds	-
		Integration with other transport modes	*
		Integration with surrounding land use	*
		Integration with surrounding landforms urban/rural/natural	*
		Protection of ecologically sensitive flora/fauna/habitat	*
	Designation of road corridor	Change to property values- economic gain or hardship	+/-
		Provision of space for mitigation measures such as stormwater treatment.	*
	Land acquisition	Stress to affected persons from property purchase procedures	-
		Creation of new public amenity e.g. open space	+
	Public Engagement process	Stress to affected persons from uncertainty over route choice	-
		Empowerment to the community from involvement in consultation process	+
Infrastructure Design	New or altered bridge	Change to visual amenity	+/-
	New or altered road corridor	Change to hydrological conditions	-
		Reduced water quality	-
		Severance of communities by highway design and routes	-
		Improved connectivity between communities and access to facilities including cultural/heritage sites	+
		Change to visual amenity	+/-
		Change in noise and vibration	+/-

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)) or opportunity (*)	
		Fragmentation/reduction of habitat	-
		Avoidance of ecologically sensitive areas	*
		Inclusion of multimodal transport e.g. bus and cycle lanes	*
		Protection/enhancement of Historic buildings and places	*
	Pavement design	Change to hydrological conditions/stormwater discharge through increased impervious surfaces	-
		Change in water quality through increased impervious surfaces	-
		Change in noise and vibration through use of pavement types	+/-
		Improved journey comfort – road roughness, in-vehicle noise and road alignment	+
		Reduction in waste through the use of recycled materials in pavements	*
	New or altered stormwater infrastructure	Change to hydrological conditions	+/-
		Change in water quality	+/-
	Geometric design	Change to visual amenity	+/-
		Integration with natural landforms	+/-
		Ecological barriers	-
	Noise barrier design	Change to visual amenity	+/-
		Improved noise mitigation	+
		Interference with overland flowpaths causing flooding	-
		Reduced connectivity to community facilities e.g. businesses, social interactions	-
	Provision of pedestrian and cycleway facilities	Improved community health (e.g. through low noise surfaces, reduced emissions, encouraging active modes of transport)	+
		Improved community safety and health	+
		Decrease in car emissions	+
	Lighting Design	Annoyance/nuisance to humans and other animals	-
		Interference with fauna behaviour	-
	Landscape Design	Planting design	Change to visual amenity
Integration with natural landforms			*
Creation of ecological corridors			*
Erosion control, increased filtering, reducing sediment release to watercourses			*

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)) or opportunity (*)	
		Mitigate loss of habitat or improvements to habitat (e.g. providing linkages or threatened plant species, or enhancing previously degraded habitat).	*
		Increased biodiversity	*
		Reduction in requirements/frequency for ongoing weed control	*

3.0 State Highway Capital Works

This section contains the aspects and impacts associated with the construction activities of building new SH assets, or renewals that are undertaken via a capital works contract. These impacts can be controlled during the construction phase. Where possible impacts should first be identified and avoided/minimised/managed through the planning and design phase (refer Table 1).

Table 2: Aspects and Impacts of State Highway Capital Works

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)	
Office facilities	Resource use (Energy and fuel)	Reduced availability of non-renewable resources	-
	Waste generation	Reduction in landfill space	-
Site preparation	Vegetation Clearance	Reduction in habitat e.g. loss of food sources, nesting sites	-
		Reduction and/or fragmentation of threatened or endangered species habitat	-
		Mortality to native fauna i.e. endangered/threatened species	-
		Destruction of threatened plant species/protected trees	-
		Loss of visual amenity	-
		Reduction in carbon sequestration	-
	Restricted or changed access to local roads and facilities	Community severance causing temporary change in local movement patterns, resulting in changes in opportunities for work, recreation or other social interaction	-
Waste Generation	Reduction in landfill space	-	
Installation of structures	New structure in watercourse	Change in hydrology	-
		Reduced fish passage	-
		Habitat destruction	-
		Change in benthic habitat	-
	Works (e.g. pavement resealing) over watercourse or coastal marine area	Sediment discharge - decreased water and benthic habitat quality	-
Earthworks	Compaction, topsoil removal	Reduction in soil health	-
	Discharges to air: dust/particulate matter, odour, gases from emissions	Human health impacts (e.g. respiratory effects, increased risk of lung disease)	-
		Annoyance/nuisance to humans and other animals	-
		Plant impacts (e.g. smothering, reduced photosynthesis)	-
	Discharges to water (sediment)	Increased turbidity of receiving waters, reduction in water quality	-
		Stress or mortality of freshwater/coastal species/loss of biodiversity from smothering	-
		Change in benthic habitat	-
	Waste Generation from excess fill material	Reduction in landfill space	-

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)	
	Site recontouring	Change in topography/lack of integration with surrounding landscape	-
		Change in visual amenity	-
		Damage to breeding areas	-
		Mortality to native fauna i.e. endangered/threatened species	-
		Damage to archaeological remains	-
		Damage to historic heritage	-
		Damage to property	-
		Damage to waahi tapu and/or taonga	-
	Discovery of historical contaminated soil	Mobilisation of contaminants into groundwater, air or surface water	-
		Remediation of contaminated soil, reducing potential for migration or leaching of historical contaminants	+
Application of asphalt or cement materials	Discharges to water (hazardous substances)	Reduction in water quality of receiving waters	-
		Stress or mortality of freshwater species/loss of biodiversity	-
	Discharges to air (dust/particulate matter, odour, gases from emissions and spray drift)	Human health impacts (e.g. respiratory effects, increased risk of lung disease)	-
		Annoyance/nuisance to humans and other animals	-
		Plant impacts (e.g. smothering, reduced photosynthesis)	-
	Material use	Depletion of non-renewable resources	-
	Production of waste	Reduction in landfill space	-
Water Use	Reduced baseflow leading to water resource depletion	-	
Machinery and equipment use (General)	Noise generation	Hearing and communication impairment	-
		Physiological, mental health and performance effects	-
		Nuisance	-
		Disturbance to fauna	-
	Vibration	Physiological, mental health and performance effects	-
		Damage to structures	-
		Nuisance	-
		Disturbance to fauna	-
	Discharges to air: dust/particulate matter, odour, gases from emissions	Human health impacts (e.g. respiratory effects, increased risk of lung disease)	-
		Annoyance/nuisance to humans and other animals	-
		Plant impacts (e.g. smothering, reduced photosynthesis)	-
		Increased greenhouse gas emissions	-
	Resource use (Energy and fuel)	Reduced availability of non-renewable resources	-
	Vehicle movement	Collisions of vehicles with fauna	-
Lighting	Annoyance/nuisance to humans and other animals	-	

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-))	
		Interference with fauna behaviour	-
Hazardous substances use, storage and transportation	Hazardous substances spill	Pollution to receiving waters	-
		Contamination of soil and/or groundwater	-
Dust suppression of haul roads - watering	Water Use	Reduced baseflow leading to water resource depletion	-
	Discharge of water/sediment runoff	Reduction in water quality of receiving waters	-
		Stress or mortality of freshwater species/loss of biodiversity	-
Landscaping	Over compaction of soil	Change in soil health	-
	Implementation of planting design	Good/poor plant health and longevity as a result of site preparation and planting practices	+/-

4.0 State Highway Operation

This section contains the aspects and impacts associated with the day to day operations of the SH, including the movement of freight and people using a variety of transport modes, including- trucks, bicycles, walking and public transport. Considered in this section are the aspects associated with the enduring infrastructure of the SH Network such as stormwater discharges and barriers to animals, people and communities, as well as impacts associated with the movement of vehicles e.g. emissions to air.

Table 3: Aspects and Impacts of SH Operation

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)	
Movement of vehicles	Discharges to land	Soil and groundwater contamination	-
	Collision with animals	Fauna mortality and injury	-
	Discharges to land	Spread of pest plants	-
	Litter generation	Reduced amenity	-
	Fuel/resource Use	Reduced availability of non-renewable resources	-
	Discharges to air: dust/particulate matter, odour, gases from emissions	Increases in greenhouse gas emissions	-
		Human health impacts (e.g. respiratory effects)	-
		Nuisance	-
		Plant impacts (e.g. smothering, reduced photosynthesis)	-
	Noise generation	Hearing and communication impairment	-
		Physiological, mental health and performance effects	-
		Disturbance e.g. sleep	-
	Vibration	Building structural damage (including heritage features)	-
		Disturbance e.g. sleep	-
	Discharges to water (storm water)	Change to hydrological conditions	-
Lighting (Headlights)	Reduced sleep for nearby occupants	-	
	Interference with fauna navigation	-	
Movement of people (walking/cycling)	Litter generation	Reduced amenity	-
	Decreased vehicle use	Improved health and community interaction	+
		Reduction in greenhouse gas emissions	+
Presence of Infrastructure	Cycling and walking facilities (pedestrian bridges, cycleways, footpaths etc.)	Increased connectivity	+
	Noise barriers/bunds	Change to visual amenity	+/-
		Noise mitigation	+
		Interference with overland flow paths causing flooding	-
		Reduced connectivity to community facilities e.g. businesses, social interactions	-
Highway Vegetation	Changes to roadside amenity	+/-	

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-))	
		Provision of habitat/ecological corridor	+
		Corridor for spread/movement of pest plants and animal pests	-
	Occupation of watercourses/CMA (e.g. bridges, stormwater culvert)	Barrier to fish movement/migration	-
		Change in benthic habitat	-
		Change to hydrological conditions	-
		Ongoing change to morphology/coastal processes e.g. coastal erosion/fish barrier	-
	Discharges to water (stormwater)	Pollution (sediment/contaminants) to receiving waters	-
		Change to hydrological conditions	-
	Roads and associated infrastructure	Community severance	-
		Community access to facilities, including culture/heritage sites	+
		Ongoing barrier to fauna - reduced range/gene flow/reduction in available habitat	-
	Pavement	Change in noise environment	+/-
	Lighting (Streetlights)	Reduced sleep for nearby occupants	-
		Interference with fauna navigation	-
Vehicle accidents	Hazardous substances spill	Pollution to receiving waters	-
		Contamination of soil and/or groundwater	-
	Waste Generation	Reduction in landfill space	-

5.0 Maintenance

This section contains the aspects and impacts associated with SH maintenance activities such as resurfacing, pavement, maintenance of structures, vegetation management and control (physical and chemical), and stormwater infrastructure maintenance. These activities may involve physical work adjacent to or in the coastal marine area, in areas with specific cultural significance, or near heritage features, or other sensitive environments.

Table 4: Aspects and Impacts of SH Maintenance

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)		
Office facilities	Resource use (Energy and fuel)	Reduced availability of non-renewable resources	-	
	Waste generation	Reduction in landfill space	-	
Installation/maintenance of structures	New structure in watercourse	Change in hydrology	-	
		Reduced fish passage	-	
		Habitat destruction	-	
		Change in benthic habitat	-	
	Works (e.g. pavement resealing) over watercourse or coastal marine area	Sediment discharge - decreased water and benthic habitat quality	-	
Machinery use (general)	Noise generation	Hearing and communication impairment	-	
		Disturbance (e.g. sleep disturbance)	-	
		Physiological, mental health and performance effects	-	
	Vibration	Disturbance e.g. sleep	-	
		Building structural damage	-	
	Collision with animals	Collision with animals causing fauna mortality and injury	-	
	Discharges to air: dust/particulate matter, odour, gases from emissions	Human health impacts (e.g. respiratory effects, increased risk of lung disease)	-	
		Annoyance/nuisance to humans and other animals	-	
		Plant impacts (e.g. smothering, reduced photosynthesis)	-	
	Change to traffic flows	Reduced connectivity to community facilities e.g. businesses, social interactions	-	
		Nuisance e.g. Increased traffic congestion	-	
	Fuel consumption	Depletion of non-renewable resources	-	
	Earthworks	Vegetation Clearance	Loss of habitat	-
			Fauna disturbance	-
Increased erosion			-	
Machinery movement		Spread of plant pests	-	
Recontouring		Reduction in soil quality	-	
		Damage to archaeological material	-	

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-)	
		Loss of heritage values	-
	Discharges to air (dust/particulate matter, odour, gases from emissions)	Human health impacts (e.g. respiratory effects, increased risk of lung disease)	-
		Annoyance/nuisance to humans and other animals	-
		Plant impacts (e.g. smothering, reduced photosynthesis)	-
	Discovery of historical contaminated soil	Mobilisation of contaminants into groundwater, air or surface water	-
		Remediation of contaminated soil, reducing potential for migration or leaching of historical contaminants	+
	Discharges to water	Sediment discharge - decreased water and benthic habitat quality	-
Hazardous substances use, storage and transportation	Hazardous substances spill	Pollution to receiving waters	-
		Contamination of soil and/or groundwater	-
Resurfacing with bituminous material	Discharges to water	Reduced freshwater/coastal water quality	-
	Discharges to air (dust/particulate matter, odour, gases from emissions and spray drift)	Human health impacts (e.g. respiratory effects, increased risk of lung disease)	-
		Annoyance/nuisance to humans and other animals	-
		Plant impacts (e.g. smothering, reduced photosynthesis)	-
		Increased greenhouse gas emissions	-
	Water use	Reduced baseflow leading to water resource depletion	-
	Material use	Depletion of non-renewable resources	-
Production of road resurfacing waste	Reduction in landfill space	-	
Vegetation/berm maintenance	Vegetation trimming or removal	Change to visual amenity	-/+
		Loss of habitat	-
		Fauna disturbance	-
		Spread of plant pests	-
	Weed spraying	Human health impacts (e.g. respiratory effects, increased risk of lung disease)	-
		Non-targeted species loss	-
		Water contamination - reduced freshwater/coastal water quality	-
		Indirect detrimental effects to insects and animals	-
	Movement of contaminated machinery between sites	Introduction/spread of pest plants/organisms	-

Activity(s)	Aspect	Impact (beneficial (+) / adverse (-))	
Work on unsealed sections of pavement	Dust	Human health impacts (e.g. respiratory effects)	-
		Annoyance/nuisance to humans and other animals	-
		Plant impacts (e.g. smothering, reduced photosynthesis)	-
	Discharges to water	Sediment discharge - decreased water and benthic habitat quality	-
Dust control	Water Use	Reduced baseflow leading to water resource depletion	-
Clean up of vehicle accidents	Hazardous substances spill	Pollution to receiving waters	-
		Contamination of soil and/or groundwater	-
	Waste Generation	Reduction in landfill space	-