

New Zealand

Measuring the costs and benefits of resilience



TYPE OF TOOL
*Methodology/
Guidelines/
Requirements*



MAIN SECTORS
Transport



THEME
Resilience



INFRASTRUCTURE GOVERNANCE PILLARS
*Critical infrastructure resilience;
Fiscal sustainability, affordability and
value for money*

In a nutshell



OBJECTIVE: New Zealand has developed a methodology for valuing and monetising the costs and benefits of resilience in transport infrastructure to help identify projects with greater resilience.



Agency in charge
New Zealand Transport Agency



Levels of government
National



Year of implementation
2020



Current status
Fully operational

Overview

Project appraisal tools can be used to assess the present and future benefits and costs of resilience projects, such as the reinstatement of infrastructure after landslips. Factors like the frequency of natural hazard events and the costs to people's lives, businesses or access to essential services can be weighed up to help decision makers consider a wider range of options in response to natural hazard events. New Zealand is especially prone to events like earthquakes, volcanic activity and extreme weather events causing floods and landslides. To help identify projects with greater resilience, the New Zealand Transport Agency has developed a methodology for valuing and monetising the costs and benefits of resilience in transport infrastructure. The methodology focuses on evaluating the benefits, which are substantially more complex than the estimation of costs. It values benefits of resilience as the avoided costs of disruption including user-related costs (e.g. diversion, waiting (en route and postponement), cancellation), other direct costs (e.g. injury/loss of life, repair/reinstatement, environment, essential services) and indirect impacts (e.g. impacts to non-users, disaster preparedness, wider economic benefits). The resilience benefits are estimated as adjustments to the standard appraisal for the non-disruptive state. If options are being considered with different levels of resilience, then the value of an option relative to base can be assessed as:

$$\text{Value of Option relative to Base Case} = \underbrace{\text{Net change in benefits of resilience}} + \text{Net change in benefits in non disruptive state}$$

$$\text{Net increase in benefits of resilience} = \underbrace{\text{Net reduction in expected costs of disruption}}$$

$$\text{Expected costs of disruption under the Base Case} - \text{Expected costs of disruption under the Option}$$

For example, flooding causes annual costs of disruption of \$1 million along a particular route. An alternative route is being considered that provides transport cost savings valued at \$3 million per year. The new route is also subject to some flooding, but due to higher elevation, the annual cost of disruption is estimated to be \$0.4 million. The annual benefits of the alternative route relative to the base case are then estimated as \$3.6 million (\$3 million plus a \$0.6 million reduction in disruption costs).

REFERENCES:

- NZ Transport Agency (2020), *Better measurement of the direct and indirect costs and benefits of resilience*, <https://www.nzta.govt.nz/resources/research/reports/670>