

BUSINESS CASES AND RESILIENCE INSIGHTS

PURPOSE

This note is for Agency staff and consultants who are developing strategic and programme business cases to share insights gained from reviewing most of the initial 9 Priority Corridor Programme Business cases. It is hoped that this will enable more consistent consideration of resilience through the business case phases.

BACKGROUND

The insights and lessons discussed in this paper have been gathered by the Resilience Project Team. It reflects the thinking that has occurred during the project, and also through the review of some of the early programme business cases that have been developed.

A growing number of useful tools and information can be found [on the NZTA website](#) to assist with considering resilience.

WHY IS RESILIENCE IMPORTANT

Our customers, infrastructure partners and Government expect a transport network that is resilient, robust, reliable, able to adapt to adverse events and that protects them from harm. They expect us to maintain or quickly restore reasonable levels of service when things go wrong, and to be prepared for adverse events.

Furthermore, the state highway acts as a key lifeline providing access to key services, and is also a significant contributor and enabler of economic activity and social needs. With growing demands on the transport network and climate change (including an increasing incidence of extreme weather events), resilience is growing in importance as a network asset and organisational characteristic.

LESSONS FOR CONSIDERING RESILIENCE

Definitions

For the purpose of crafting a good Problem Statement and Investment Objective Statement, it is important to define early on what is considered to be resilience (as opposed to reliability¹), and to articulate this within the business case. For the purposes of the Resilience Business Improvement Project, we have considered Resilience to be 'the availability and restoration of road function when there is a weather or emergency event (unplanned), whether there is an alternative available and the

¹ Reliability may be considered to be related to impacts on travel time consistency related to poor geometrics, vehicle mix and demand/capacity issues.

road user information provided.’² This has driven a project vision that ‘Resilience is about preserving and quickly restoring access to the network in the face of unplanned events, enabling customers to complete their journeys’.

The definition should be in the context of other work, issues and problems that has been undertaken in the region or nationally. When defining resilience:

- First, it is important to define the time scale or magnitude of event that you are considering. Are you considering both high probability low impact (small floods, ice and snow), and low probability high impact events (such as large earthquakes). Our recommendation is that both are considered, or at least referenced if other work is already considering some aspects of this, to ensure that all resilience issues are documented.
- Secondly, you need to consider the type of disruptive events that are considered. The factor most inconsistently considered is road crashes. Some business cases have considered this to be a resilience issue; others don’t. However, the crash-related disruption issues are usually more directly related to a safety issue and is therefore better addressed by considering it as a safety problem. Unless this is carefully considered, there is a strong risk of double counting in later assessments of programmes. A closure resulting from a crash may also further be considered a reliability issue rather than resilience or safety, adding confusion to assessments. If crashes are retained in resilience assessments, then it is the impact on the network availability outcome which should be highlighted (not the direct crash costs) and explicitly identified as one of the various contributors to network outages. Inclusion is relatively straightforward as each crash outage is relatively short duration, and can be captured within the assessment of the short duration outages.

Reliability and resilience. These terms are often mixed up, and used interchangeably. While the impact may be relatively similar, the resulting investment decisions from these words may differ. Reliability is from the perspective of the road user, that their journey travel time is consistent or doesn’t vary too much between trips at the same time of a day or week. Whereas resilience is more focused on the ability of the corridor to withstand and recover from events that threaten its availability.

Strategic context

The business cases should include recognition of the contributing policy documents and general evidence base upon which the Problem and Benefit Statements, and Investment Outcome Statements are developed. This could include the:

- National Resilience Strategic Case
- National Resilience Programme Business Case
- Joint Resilience Operating Policy
- One Network Road Classification

Assessment

Consider the [One Network Road Classification](#).

- First, it gives you an indication of the importance of the road (to be considered alongside of the Criticality Framework).
- Second, it gives you some initial descriptive customer levels of service expectations as well as some metrics to assess your corridor against. Outage statistics should be reported along

² One Network Road Classification Performance Measures Framework and One Pagers – The Road Efficiency Group

the lines of the ONRC metrics, but also extend to report on distribution of outage durations. It is noted that there are few useful targets or acceptable thresholds defined in the ONRC for its metrics, and only relative comparison is encouraged. We recommend this is done, and at least appended to the business case. Note that the Resilience Project has also provided further definition of level of service and the thresholds of when particular levels of interventions are reasonable. This is presently provisional and being tested with REG.

Similar to road safety, we recommend considering at least 5 years of data for previous events to capture the variability between seasons and between years for HFLI events. This should be supplemented with the experience of NZTA operational staff and contractors. Information can be extracted from TREIS, however, the information in this system is variable across the country (although it has improved in recent years). The data will need to be cleaned and audited before it can be relied upon. This then allows investigating causes, and plotting of events on maps to assess issues such as clustering or relationship between cause and consequences. A method for undertaking assessments at a regional level can be found on the resilience web page.

You also need to consider the [high impact low probability events](#), which will typically not be picked up in a 5 year period, and outside of the experience of local staff.

Scientific/engineering assessment will be needed to justify probabilities and impacts. A national scan has been completed and can be accessed by the above link. This should be the starting point for any resilience assessment.

Within your assessment, you need to discuss the extent of the outage for the scenarios you are assessing: does it affect all of the traffic lanes, are all vehicle types disrupted. For example, could there still be 4WD access, are HPMVs able to use the route, can emergency vehicles use the route?

Consider the interdependency of other infrastructure services. Do industries such as telecommunications, water and electricity or emergency services rely on access to their facilities via your route to help in the recovery following an event.

Don't forget to include social impact assessments as well as economic impacts.

Benefit statements should consider improved recovery time as well as avoiding disruption

Use should be made of as wide a range of sources as possible, as there is no complete reference.

Investment objectives

The investment objective will guide what the recommended programme will look like. It should therefore be specific and measurable. A good example of an investment objective is – *We will steadily reduce the number (and duration) of unplanned incidents on the route so that it has no full closures resulting in a delay of more than 2 hours by 2030.*

Alternative routes

Alternative routes are an important factor to consider. You need to consider whether there are viable alternative routes to the corridor (or section of the corridor) that you are considering. Viable should include considering the length and travel time of the detour, whether it has capacity for the additional demand, and whether all vehicles are able to use the route.

If an alternative route is likely to have capacity constraints, consider if just certain periods of the day or day of the year have the issue or whether it is a permanent problem when in use.

When the alternative route is likely to be required for a long period you may also need to consider maintenance of the alternative route, and whether there are any social impacts of higher volumes on the route or from re-routed trips.

Finally, and most importantly, you need to consider whether it is a life lines route and whether users have viable alternatives to the route for access to emergency services. Current government direction also places a strong emphasis on the economic impact of a closure, and therefore the implication on freight movements (including HPMVs) needs to be considered.

It should be noted that it is very reasonable for a programme business case to recommend investment on the alternative route instead of the corridor that was the focus of the study, to strengthen network redundancy benefits.

Note that the ONRC accepts detours as viable on alternative route that add less than two hours of travel compared to the original route.

Also consider whether an event type is likely to take out the alternative route as well as the corridor you are focussing on.

Social impacts

A key consideration of a road outage is the impact that it has on a community's social needs and patterns, and its ability to function as normally as possible. A social assessment framework has been developed to assist in the framework and can be found on the resilience website.

Responses and development of programmes

When considering responses, within a programme business case, be sure to consider the whole range of operations including improved maintenance, operational changes, signage, alternative modes (including rail), traveller information, and emergency response plans, as well as capital improvements. There are many times when the most pragmatic and efficient response is not a capital improvement.

Assessment of reduction of network disruptions (numbers and durations) needs to be explicit in terms of which and how a cause is targeted and the expected (justified) effect of the intervention.

CONTACT

If you want to discuss any of this further, please contact the Resilience Project on:

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