

BENEFITS FRAMEWORK

A technical paper prepared for the Investment Decision-Making Framework Review

4 JUNE 2020

A new benefits framework has been developed that outlines and organises types of benefits that align with enduring transport outcomes.

The framework is mode neutral and aligns with the Ministry of Transport's Transport Outcomes Framework and Treasury's Living Standards Framework. The benefits framework will be used in business cases, when recording information in Transport Investment Online (TIO) about new activities, and when reporting on benefits that are realised.

Three guidance documents have been developed:

- Land transport benefits management and benefits framework guidelines
- Non-monetised benefits manual
- Monetised benefits and costs manual (updated Economic Evaluation Manual).

While the benefits framework will not apply until 1 July 2020, the measures are already being used. Data and benefit information will be updated on an ongoing basis.

BENEFITS FRAMEWORK

Background

The Investment Decision-Making Framework (IDMF) enables Waka Kotahi NZ Transport Agency to consider the full range of costs and benefits relevant to investment decision making. Waka Kotahi has developed a benefits framework to categorise and describe the various contributions of land transport to the wellbeing of New Zealanders. In addition to impacts on journey times and travel costs, transport investment affects human health, social cohesion, environmental sustainability and urban design. To provide a system-based approach and long-term view on the benefits of land transport, the benefits framework is aligned with the Ministry of Transport's (MoT) Transport Outcomes Framework (TOF) as well as the New Zealand Treasury's Living Standards Framework.

Decision makers will be presented with:

- benefits that cannot easily be measured, for example impacts on community cohesion, so are expressed in descriptive terms (qualitative)
- benefits that can be expressed in numerical terms, for example the proportion of the population who use public transport (quantitative), and
- benefits that can be assessed in dollar terms, for example reduction in deaths and serious injuries (monetised).

To support this approach, Waka Kotahi provides guidance about which benefits can be assigned monetised values and which have qualitative or quantitative measurement.

In most cases monetised benefits may also be expressed as quantitative measures. The use of one does not exclude the other.

Benefits management

The Treasury defines benefits as the measurable improvement from an outcome perceived as an advantage by one or more stakeholders. MoT's TOF identifies five core outcomes that the government is seeking to achieve through the transport system: inclusive access, healthy and safe people, economic prosperity, environmental sustainability, and resilience and security. The Government Policy Statement on Land Transport (GPS) identifies the strategic priorities to focus investment of the National Land Transport Fund (NLTF) to deliver outcomes in the TOF.

Benefits management includes the identification, analysis, planning, realisation and reporting of benefits. The aim of benefits management is to:

- ensure we invest in the things that matter to the government and our community
- demonstrate an investment's contribution to outcomes
- ensure benefits are realistic, achievable and ultimately realised
- ensure value for money
- track the realisation of benefits following implementation
- embed lessons learned in order to continually improve.

The benefits framework is a tool that allows for consistent identification, measurement and monetisation of benefits throughout the National Land Transport Programme (NLTP) and, as it is aligned with the Treasury's Living Standards Framework, can also be applied to crown-funded initiatives.

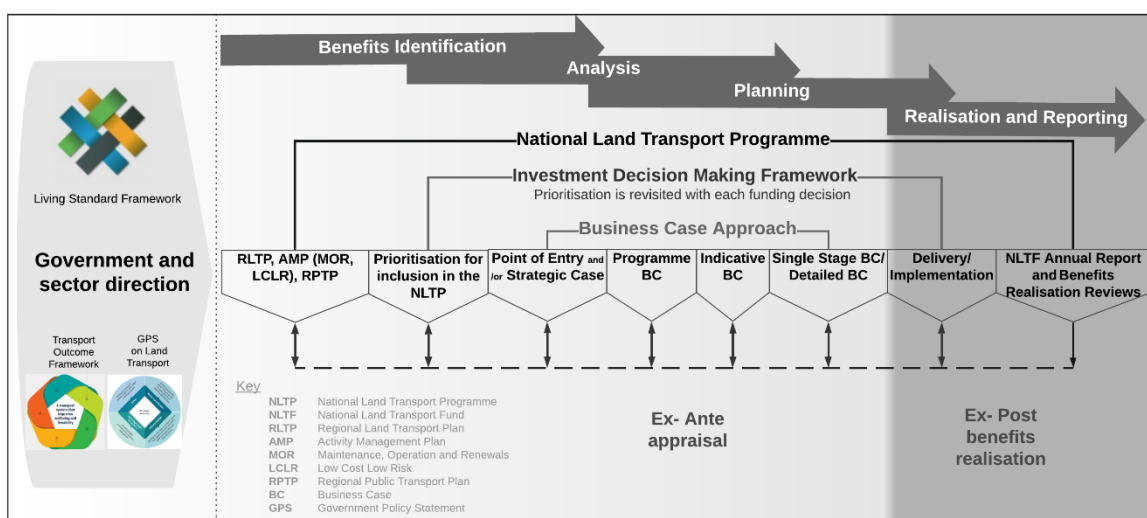
Benefits are identified and clarified throughout the development of a business case, starting with the identification of problems and opportunities and the benefits of addressing them. Figure 1 below outlines the various components of benefits management and investment decision making, identifying four phases of benefits management (identification, analysis, planning and realisation/reporting).

Benefit identification is also required as part of options appraisal (economic case) and benefits management planning (management case). It seeks to identify and describe potential impacts arising from transport investment options. Systems thinking, as part of the IDMF, requires that options be designed to address a problem, or take advantage of an opportunity, which may be preventing or enabling the achievement of transport system targets.

Economic appraisal of options has been performed through Cost Benefit Analysis using a Benefit Cost Ratio (BCR) tool. The Economic Evaluation Manual (EEM) provides details of how to complete this assessment, providing technical guidance with a focus on monetised estimates. The EEM's primary function was to provide consistency, transparency and comparability in valuing investment impacts.

Benefits management seeks to measure investment outcomes and help determine whether investments have achieved their intended benefits. Non-monetised benefit measures are used to identify and measure the impacts of investment. This includes developing an approach to evaluation during the planning phase and monitoring the actual impact after delivery (ex-post).

Figure 1: Benefits management



Benefits framework

Problem

The four phases of benefits management have drawn on different inputs and applied predominantly separate methodologies. The phases were performed using different information and for different purposes.

The EEM and framework for investment performance, for example, did not reference the same set of underlying potential benefits. In addition:

- different language was used to describe the same benefits
- tools and guidance were not aligned to the MoT TOF
- some benefits terminology was not mode neutral (eg *driver* frustration benefits)
- some benefits terminology was not direction neutral (eg vehicle emission *reduction* benefits).

Solution

Waka Kotahi developed a common benefits framework for use across the entire IDMF process. These benefits are mode neutral and aligned to the MoT's TOF. High-level benefit clusters have been developed to provide high-level categories and frame specific benefits.

Although intended to be comprehensive, this list of benefits is intended to help rather than restrict local decision making or business case development. Waka Kotahi will continue to support consideration of wider organisational, behavioural or cross-sectoral benefits where relevant and appropriate.

The benefits framework complements the move towards comprehensive appraisal of all relevant costs and benefits, including impacts that cannot be monetised. The new Appraisal Summary Table (AST) – refer to the IDMF Assessment design report – considers non-monetised impacts in economic assessment alongside monetised benefits and costs drawing from the benefits framework.

New benefits framework

In summary, the new benefits framework:

- is aligned with the enduring outcomes in the Ministry of Transport's TOF
- will be used in all stages of benefit management including benefits identification, option appraisal, business case assessment, reporting on benefits and benefits realisation post-implementation
- includes monetised, quantitative and qualitative benefits
- captures benefits to people, society and the environment
- is mode neutral.

Table 1 sets out the benefits framework.

The list of benefits is reproduced below:

- Impact on social cost and incidents of crashes
- Impact on system safety
- Impact on perception of safety and security
- Impact of mode on physical and mental health
- Impact of air emissions on health
- Impact of noise and vibration on health
- Impact on system vulnerabilities and redundancies
- Impact on system reliability
- Impact on network productivity and utilisation
- Wider economic benefit (productivity)
- Wider economic benefit (employment impact)
- Wider economic benefit (imperfect competition)
- Wider economic benefit (regional economic development)
- Impact on water
- Impact on land and biodiversity
- Impact on greenhouse gas emissions (GHG)
- Impact on resource efficiency
- Impact on user experience of the transport system
- Impact on mode choice
- Impact on access to opportunities
- Impact on community cohesion
- Impact on heritage and cultural value
- Impact on landscape
- Impact on townscape
- Impact on Te Ao Māori.

In the left-hand columns of Table 1, the benefits are organised in 'clusters' (eg Changes in human health comprising: impact on physical and mental health, impact of air emissions on health, and impact of noise and vibration on health), which facilitates mapping to the TOF.

In the central columns, the benefits are mapped against the monetised and other measures from the EEM. Colour coding illustrates gaps in the current EEM measurement framework and when these are likely to be filled. The right-hand columns map the benefits to the full set of investment performance measures, now referred to as the non-monetised benefit measures, including a new systematic numbering system.

Where it will be used

The benefits framework is intended for use by all business case practitioners across the land transport system, including territorial authorities and other co-funders. As noted above, the list of benefits within the framework provides a set of standard and consistent measures, without restricting practitioners from considering other benefits or measures where appropriate.

The benefits framework will be applied at a number of stages and tools within investment decision making:

- strategic case (problem identification or investment logic map)
- economic case (options assessment and appraisal)
- management case (benefits management planning)
- Multi-Criteria Analysis (MCA)
- Early Assessment Sifting Tool (EAST)
- Appraisal Summary Table (AST)
- investment prioritisation
- benefits realisation reporting
- post-implementation reviews.

Manuals

A new guideline providing descriptions of each of the benefits and instructions on how to use the benefits framework has been developed and is expected to be available for use from July 2020.

The EEM has been updated and renamed as the Monetised Benefits and Costs Manual (MBCM). It will continue to be the standardised guidance for assessing the monetised impacts of proposed activities.

A new manual on non-monetised (quantitative and qualitative) benefits has been developed – the Non-Monetised Benefits Manual. It provides guidance on the definition and available data for each of the non-monetised measures, alongside information on how to use them.

Non-monetised benefit measures

The benefits framework provides a common and enduring set of quantitative and qualitative measures for application across NLTP and investment decision-making processes.

There are currently 52 quantitative investment performance measures split over the 12 benefit clusters, with a large proportion of them associated with benefits in the Inclusive Access outcome (Table 1). Although primary associations are shown in the table, the quantitative measures might provide evidence of more than one benefit. For example, 10.2.1 'mode share' might be used as evidence for a number of the benefits, although only its primary association is shown in this table. Separate guidance will help practitioners in applying these measures. Forecasting methodologies for the quantitative benefits will be published as they are available to support their use in the assessment process alongside the forecast monetised benefits.

Some of the measures are listed as 'user to define'. As detailed in Table 1, work is underway to define specific quantitative metrics for these areas. It is expected that the investment performance measures will evolve over time to better provide evidence of the new benefits framework.

Centralised data is being gathered for each measure, where possible, to enable the pre-population of baseline of measures and the tracking of changes over time. Work is being done in Transport Investment Online (TIO) to better record location of investment so that transfer can be enabled between systems.

An internet-based tool (StoryMaps) is being rolled out to Approved Organisations and key stakeholders that provides geospatial information and data for the measures for which Waka Kotahi currently holds centralised data. Through planned capability-building interventions, it is expected that the availability of focused, centralised data for the benefits measures will contribute to evidence-based identification of transport problems and decision making.

Table 1: Benefits framework

MoT TOF	Benefit cluster	Benefit	Monetised Benefits and Costs Manual (EEM refresh) – monetised benefit measures			Non-monetised benefits – quantitative and qualitative measures									
			Currently in EEM as Monetised, Identified or Unidentified	Changes made 2019-2020 Monetised/updated valuation	Potential shift, 2020 Onwards Monetised/updated valuation	Quantitative		Shift to quantitative measure	Centralised data availability (as per last update at November 2019)						
			Old No.	New No.	Name	Description									
Healthy and safe people	1. Changes in user safety	1.1 Impact on social cost and incidents of crashes	Crash cost savings (Social cost of crash)		The EEM parameters value research	21	1.1.1	Collective risk (crash density)	Average annual fatal and serious injury crashes per kilometre of road section		Y (partial)				
						22	1.1.2	Crashes by severity	Number of crashes by severity		Y				
						23	1.1.3	Deaths and serious injuries	Number of deaths and serious injuries		Y				
						24	1.1.4	Personal risk (crash rate)	Average annual fatal and serious injury crashes per 100 million vehicle-kilometres		Y (partial)				
		1.2 Impact on a safe system	n/a	-			25	1.2.1	Road assessment rating – roads	Infrastructure risk rating		Y (partial)			
							26	1.2.2	Road assessment rating – state highways	KiwiRoad Assessment Programme (KiwiRAP) star rating (for state highways)		Y (partial)			
							27	1.2.3	Travel speed gap	Difference between safe and appropriate speed, and actual speed (under development)		Y (partial)			
	2. Changes in perceptions of safety	2.1 Impact on perceptions of safety and security	-			28	2.1.1	Access – perception	Perception of safety and ease of walking and cycling		Y (partial)				
	3. Changes in human health	3.1 Impact of mode on physical and mental health	Walking and cycling health benefits	Using updated health benefits values for active modes and electric bikes	The EEM parameters value research	20	3.1.1	Physical health benefits from active modes	User to describe	'Active modes' is an area of particular focus in relation to liveability and urban development and a measure has not yet been defined concentrating on the impact of active modes, an important social and community benefit of investment in active mode programmes and infrastructure. Other modes and health also need to be considered in the measure development.	N				
						3.2 Impact of air emissions on health	Vehicle emission reduction benefits (Air pollutants)	Using the latest version of the VEPM				14	3.2.1	Ambient air quality – NO ₂	Concentration of NO ₂ in µg/m ³
15												3.2.2	Ambient air quality – PM ₁₀	Concentration of PM ₁₀ in µg/m ³	Y
3.3 Impact of noise and vibration on health		Other external benefits (Noise)		Using the final results of the empirical research contracted out by the Waka Kotahi research team	13	3.3.1	Noise level	Noise level in dB Laeu (24h)		N					
					Other external benefits (Vibration)										
4. Changes in impact of unplanned disruptive events	4.1 Impact on system vulnerabilities	Risks reduction benefits (Natural/ environmental risks - eg water flows)		Two resilience research contracted out by the Waka Kotahi research team.	49	4.1.1	Availability of a viable alternative to high-risk and high-impact route	Percentage of high-risk, high-impact routes with a viable alternative		Y (partial)					

	on access to social and economic opportunities	and redundancies	Risk reduction benefits (Human-made risks)			50	4.1.2	Level of service and risk	User to describe	A project is underway to add to the existing work on 'Kilometres of road and rail infrastructure susceptible to coastal inundation with sea level rise', a measure that has been identified as one aspect of this user to define measure. The new research focuses on state highways and rail and its scope expands beyond sea level rise to other associated climate change impacts, such as storm surges and floods. There is also a project underway that is identifying the key resilience risks (risks to level of service) in the transport sector.	N
Economic prosperity	5. Changes in transport costs	5.1 Impact on system reliability	Journey time reliability benefits		The EEM parameters value research	5	5.1.1	Punctuality – public transport	Percentage of scheduled service trips between 59 seconds before and 4 minutes 59 seconds after the scheduled departure time of selected point		N
						6	5.1.2	Travel time reliability – motor vehicles	Coefficient of variation; standard deviation of travel time DIVIDED BY average minutes travel time (as per Austroads)		N
						11	5.1.3	Travel time delay	Difference between average travel time A and average travel time B in minutes per kilometre		N
						52	5.1.4	Temporal availability – road	Number and duration of resolved road closures: urban >=2 hours; rural >=12 hours		Y
		5.2 Impact on network productivity and utilisation	Travel time saving Vehicle operating cost savings PT charge Walking and cycling cost savings		The EEM parameters value research	1	5.2.1	Spatial coverage – freight	Percentage completion of the strategic high productivity motor vehicle freight network		Y
						7	5.2.2	Freight – mode share value	Number of vehicles TIMES average load per vehicle in NZD, expressed as percentages		Y (partial)
						8	5.2.3	Freight – mode share weight	Number of vehicles TIMES average load per vehicle in tonnes, expressed as percentages		Y (partial)
						9	5.2.4	Freight – throughput value	Number of vehicles TIMES average load per vehicle in NZD		Y (partial)
						10	5.2.5	Freight – throughput weight	Number of vehicles TIMES average load per vehicle in tonnes		Y (partial)
						29a	5.2.6	Access to key economic destinations (all modes)	Proportion of population living within travel threshold (15 minutes, 30 minutes or 45 minutes) of key social and economic opportunities (including work) by different modes (walking, cycling, public transport, private motor vehicle) in the morning peak		Y
	6. Wider economic impact	6.1 Wider economic	(WEB) Productivity	Using the dynamic WEB technical paper			Nil				

		benefit (productivity)									
		6.2 Wider economic benefit (employment impact)	(WEB) Labour supply								
		6.3 Wider economic benefit (imperfect competition)	(WEB) Imperfect competition								
		6.4 Wider economic benefit (regional economic development)	(WEB) Regional economic development (including tourism)	Using technical note on tourism							
Environmental Sustainability	7. Changes in natural environment	7.1 Impact on water	External benefits (Water quality and flows)			16	7.1.1	Water quality	User to describe	Both the development of a measure and the data to feed it is under development and builds on research and methodology development contained in NZTA Research Report 585 'Risk assessment of road stormwater run-off'. Work in 19/20 will focus on capturing and 'cleaning' input data, model development as well as end user testing. Further work is likely in 20/21 to finalise the development phase of the model/tool before work on the model moves to an update and maintain phase.	N
		7.2 Impact on land and biodiversity	Other external benefits (Ecological impact) Other external benefits (Special area)			12	7.2.1	Biodiversity	User to describe	From a land transport system perspective one of the more appropriate biodiversity measures is likely to relate to habitat connectivity/severance (primarily terrestrial and freshwater habitat). Initial work needs to focus on understanding where the land transport system interfaces with Significant Natural Areas to understand the scale of potential impacts. Once this is known, work can then focus on understanding the state of the habitat and the impact that land transport has on that habitat.	N
						N/A	7.2.2	Productive land	User to describe		N
	8. Changes in climate	8.1 Impact on greenhouse gas emissions	Vehicle emission reduction benefits (GHG emissions)			17	8.1.1	CO ₂ emissions	Tonnes of CO ₂ equivalents emitted		Y
						18	8.1.2	Mode shift from single occupancy private vehicle	User to describe	Potential research may be required about precedents for the best way to measure vehicle occupancy (and whether technological options are now available) and the best measures in general to provide evidence of impact of changing mode on greenhouse gas emissions.	N
	9. Changes in resource efficiency	9.1 Impact on resource efficiency				19	9.1.1	Resource efficiency	User to describe	Work is underway to determine appropriate resource and energy efficiency measures for inclusion in the Sustainability Monitoring Framework. This work will also inform state highway contract KPIs and this measurement set.	N
							9.1.2	Embodied carbon	User to describe		N
							9.1.3	Energy use	User to describe		
	Inclusive access	10. Changes in access to social	10.1 Impact on user experience	Driver frustration reduction benefits	The EEM parameters value research	3	10.1.1	People – throughput of pedestrians, cyclists and public transport boardings	Number of pedestrians, cyclists and public transport boardings		Y

and economic opportunities	of the transport system						cyclists and public transport boardings			
		Seal extension benefits			28	(Repeat) 2.1.1	Access – perception	Perception of safety and ease of walking and cycling		Y
		PT user benefits from new or improved facilities and services			31	10.1.2	Pedestrian delay	Pedestrian time lost due to intersection delay		N
					39	10.1.3	Ease of getting on/off public transport services	Percentage of low floor and wheelchair accessible services		N
					40	10.1.4	Network condition – cycling	Percentage travel on cycle network classified as complying with defined level of service (facility type)		N
					41	10.1.5	Network condition – road	Percentage travel on road network classified as smooth as per defined level of service		N
					44	10.1.6	People – throughput	Number of pedestrians, cyclists, public transport boardings and motor vehicles (excl. public transport) TIMES average number of people per vehicle		N
		User benefits from new or improved facilities and services (walking, cycling)	Using the interim guidance on valuing quality improvements to footpaths and the pedestrian environment. This captures benefits associated with improved quality of experience for pedestrians.	Using the final results of the research on valuing quality improvements to footpaths and the pedestrian environment. This captures benefits associated with improved quality of experience for pedestrians	45	10.1.7	People – throughput (UCP)	Number of pedestrians and cyclists		N
					47	10.1.8	Traffic - throughput	Number of pedestrians, cyclists and motor vehicles by vehicle type		Y
					48	10.1.9	Travel time	Average travel time in minutes		N
	10.2 Impact on mode choice	-			2	10.2.1	People – mode share	Number of pedestrians, cyclists, public transport boardings, and motor vehicles (excl. public transport) TIMES number of people per vehicle, expressed as percentages		N
					18	(Repeat) 8.1.2	Mode shift from single occupancy private vehicle	User to describe	See 8.1.2	N
					30	10.2.2	Accessibility – public transport facilities	Number of bus or train stops that are fully accessible		N
					32	10.2.3	Spatial coverage – cycle lanes & paths	Percentage completion of the strategic cycle network		Y
					33	10.2.4	Spatial coverage – cycling facilities	Number of people living within 500m of a high quality cycling facility		N
					34	10.2.5	Spatial coverage – public transport – employees	Number of employees within 500m of a bus stop or 1km from a rail or bus rapid transit station		Y
					35	10.2.6	Spatial coverage – public transport – resident population	Number of people within 500m of a bus stop or 1km from a rail or bus rapid transit station		Y

	12. Changes in Te Ao Māori *	12.1 Impact on Te Ao Māori	Other external benefits (eg iwi, Māori values)			NA	12.1.1	Te Ao Māori	User to describe		
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* It is not part of the TOF outcomes but is part of Te Ara Kotahi our Māori Strategy.

