

Guide to Value for Money Assessments



New Zealand Infrastructure Commission / Te Waihanga

The New Zealand Infrastructure Commission Te Waihanga seeks to transform infrastructure for all New Zealanders. By doing so our goal is to lift the economic performance of Aotearoa and improve the wellbeing of all New Zealanders.

We are an autonomous Crown entity, listed under the Crown Entities Act 2004, with an independent board. We were established by the New Zealand Infrastructure Commission/Te Waihanga Act 2019 on 25 September 2019.

Information on the Commission is available at www.tewaihanga.govt.nz/

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1. Introduction

1.1 Context

The New Zealand Infrastructure Commission's Infrastructure Priorities Programme (IPP) is designed to assess and prioritise infrastructure projects across the country. The process for determining a project as a priority is guided by our Assessment Framework.

This assessment framework is designed to help us identify projects that meet three key criteria:

- They are **strategically aligned** with the Commission's *Rautaki Hanganga o Aotearoa: The New Zealand Infrastructure Strategy 2022–2052* (Infrastructure Strategy) and other government strategies and agency plans.
- They offer **value for money** to ensure that we are getting the most for our infrastructure dollars.
- They are **deliverable** by the project's proponents and the construction industry.

The IPP assesses projects during three stages of their planning process. At all three of these stages, all three assessment criteria will be considered. At different stages, the relative importance of each criterion will shift, as projects further in their planning will need to have a greater emphasis on their deliverability than strategic alignment.

This document provides further information on how we will review **value for money** at all stages in the assessment process.

1.2 Who should use this document?

This document is designed to assist proponents making submissions and can also assist users of the IPP.

1.3 What this document contains

This document contains information for applicants and users about how our assessment teams will review a project's Value for Money case. Value for money broadly maps to the economic and financial cases under the Better Business Case model.¹

This document's primary goal is to give information to applicants about the process we will use to assess whether a proposal represents value for money. As our Assessment Framework conveys, one can think of this process as a series of questions. Based upon the answers and information available to answer these questions, we take a holistic approach to determining a Value for Money score. This document will contain information on the types of questions and the required detail we will rely upon to make our assessments.

We understand that value for money can be tested in many different ways. This document will help applicants understand how we will consider the types of analysis for determining a Value for Money assessment.

¹ <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/better-business-cases>

1.4 What is not in this document?

This document is not an applicant checklist or a scoring rubric.

Our framework has three key criteria: Strategic Alignment, Value for Money, and Deliverability. Projects will be required to meet all three of these for them to be deemed a priority.

Within each criterion, we assess performance holistically based upon a series of assessment questions, rather than a pass/fail for each one. This document gives applicants information on our approach. That is, how we will consider whether an applicant has answered these questions sufficiently to give us confidence that their project will deliver value for money.

1.5 How to navigate this document

This document is primarily designed for parties making submissions to the IPP at any stage of assessment within the Commission's IPP process. This document provides supplemental information to our Assessment Framework. We recommend that users review the Assessment Framework before reviewing this document.

Section 1 lays out what we mean by value for money, how it fits into the overall Assessment Framework and why it is important for prioritising projects.

Section 2 explains how value for money assessments will be completed. It walks through how these assessments change depending upon the planning stage of the proposal and the importance of value for money at each stage. It will also walk through the types of questions we will be asking at each stage to create a holistic picture of value for money.

Section 3 gives an overview of the types of methodologies we will consider for measuring Value for Money assessments. It will also provide an overview of other areas that we suggest candidates consider. Areas include additional analysis on risk and how to consider whether a project is likely to deliver value for money given the inherent uncertainty involved with delivering infrastructure projects.

Section 4 identifies resources applicants can use to learn more about the areas discussed in this document.

2. Defining Value for Money

2.1 What do we mean by Value for Money?

One of the Commission's core functions laid out in the New Zealand Infrastructure Commission/Te Waihanga Act 2019 is to coordinate, develop, and promote an approach to infrastructure that improves the wellbeing of New Zealanders. Central to this goal is understanding whether a given project is likely to provide value to society above the costs required to deliver, operate, and maintain it.

A project that provides value for money meets this objective.

National versus local value for money

Certain projects might deliver societal benefits in excess of costs at a local or regional level. However, in order to deliver these benefits locally, the project's funding may come from residents who may never realise them, making them worse off. With this situation in mind, the Commission was formed to take a system-level approach to infrastructure.

As a result, projects with a solid Value for Money case should demonstrate benefits that exceed costs at the national level. Applicants can learn more about how we consider whether a project will have national benefits in our Strategic Alignment guide.²

Box 1: Example of local and national benefit

A tourism initiative, such as a museum or music venue, may provide significant benefits to a local community. However, it may also draw existing tourism away from other regions. The IPP is designed to identify proposals that deliver value for money on a national scale.

Absolute versus relative value for money

Central to understanding whether a project is likely to deliver value for money is knowing the scale of the problem. This is a key feature of our assessment of projects at Stage 1. Any solution should provide benefits greater than the costs of a problem, or the costs of avoiding a problem. One can think of this as an assessment of absolute value for money.

However, it's possible that more than one solution could address a problem in a way that provides net societal benefits. In our assessment of value for money, applicants will need to show that their preferred option achieves higher net societal benefits than all other options.

In other words, we expect projects to deliver relative value for money in addition to absolute value for money. Section 3 will detail more about the methodologies that will be used to determine this.

2.2 How does value for money fit in the overall Assessment Framework?

Value for money is one of the three Assessment Criteria used in our Assessment Framework:

- **Strategic alignment:** Does a proposal support future infrastructure priorities and/or improve existing infrastructure systems and networks that New Zealanders need?
- **Value for money:** Does a proposal provide value to society above the costs required to deliver, operate, and maintain it?
- **Deliverability:** Can a proposal be successfully implemented and operated over its life?

To be assessed positively as a whole, a project must not fail any of the three criteria. Value for money is assessed alongside the other criteria and is considered equally important. A strong Value for Money proposal does not offset weak scores in the other criteria.

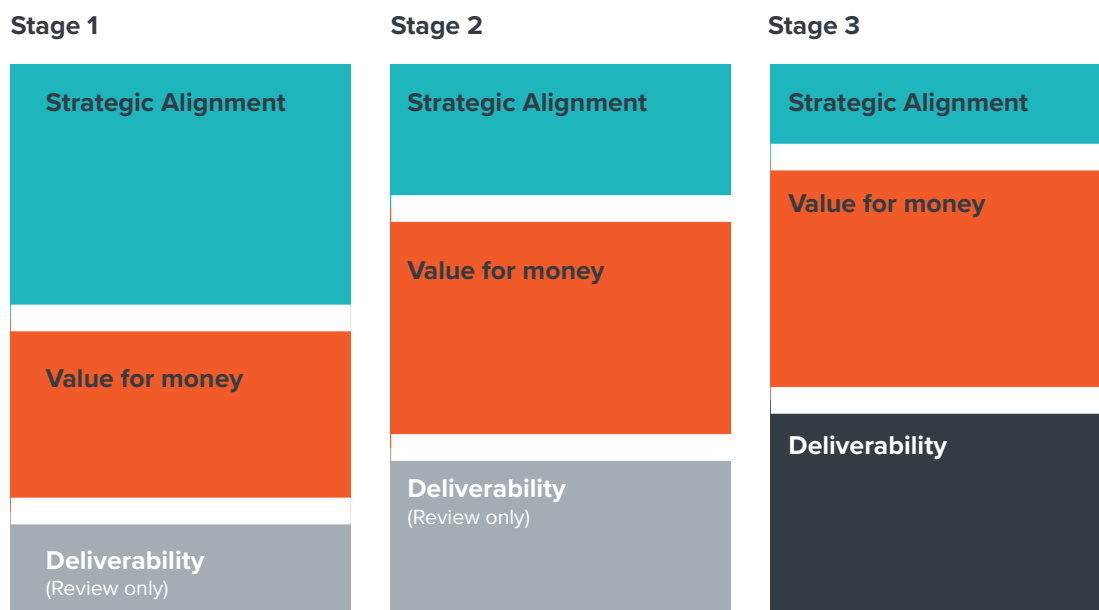
² Strategic Alignment guide here

2.3 How is value for money assessed at different stages?

The three assessment criteria are assessed at three stages in a project's planning process, aligned with the New Zealand Treasury's Better Business Case guidance.

Value for money assessments are completed at each stage in this Framework. As a project progresses, value for money will become a larger part of the overall assessment (Figure 1).

Figure 1: Assessment focus evolves as proposals proceed through stages



Stage 1

A Stage 1 proposal identifies a problem or opportunity that may require an infrastructure solution. At Stage 1, value for money is a contributing component of the assessment.

Stage 2

A Stage 2 proposal identifies and assesses a set of options for addressing the problem or opportunity. At Stage 2, value for money is a core focus of the assessment.

Stage 3

A Stage 3 proposal identifies a preferred option for addressing the problem or opportunity. At Stage 3, value for money and deliverability are the core focus of the assessment. All proposals should include an assessment of value for money before an investment decision is made.

3. Process for assessing value for money

Applications to the IPP apply at three different stages, roughly corresponding to Treasury's Better Business Case process. At each stage, we will test whether a proposal meets the requirements across the three criteria (Strategic Alignment, Value for Money, and Deliverability).

When we assess value for money, we focus on different questions at each assessment stage, reflecting the type of information that is expected to be available at each stage:

1. Problem definition (Stage 1): Has the applicant investigated and considered that a significant problem exists?
2. Options analysis (Stage 2): Has the applicant considered a wide range of options to address the problem identified in Stage 1?
3. Testing the Value for Money case of the preferred option (Stage 3): Is the preferred option, developed and scoped in detail, likely to optimise value for money?

This section details how we will assess whether applicants have appropriately conducted the required analysis at each of these stages. We do this by asking a series of questions at each stage. This section is designed to provide transparency to applicants about what we are asking and to lay out what types of analysis we would like to see from applicants to help us answer these questions.

3.1 Value for Money assessments at Stage 1

Value for Money assessments at this stage focus on the size of problems or opportunities relative to potential solutions. At this stage, we are assessing whether applicants have investigated that significant problem or opportunity exists. Ideally, this investigation would include some analysis of the scale of the problem.

We want to ensure that applicants have determined whether the scale of the problem or avoided problem is large enough such that a viable solution is likely to have benefits that exceed the cost of the project. As an illustrative example, the cost of a bridge or tunnel across the Cook Strait is likely to significantly exceed the costs from weather-related ferry disruptions to freight over a given period. This means that a business case seeking to replace the ferry with a fixed link is unlikely to be able to identify an option that delivers value for money.

We are also interested in seeing how the applicant has considered what options might be available at later stages of planning. This includes reform options, use of existing assets, or new capital investment.

What applicants should demonstrate at this stage

At this stage, our Strategic Assessment focuses on whether applicants investigated whether a significant problem or opportunity exists.

Our Value for Money Assessment at this stage determines whether applicants have considered whether potential solutions to the problem are proportionate to the cost of the problem.

The table below lays out the series of questions we will be asking to holistically assess value for money at Stage 1, along with how applicants can demonstrate a strong value for money case.

Table 1: How to demonstrate value for money in Stage 1

Question	A strong value for money case could include...
Has the applicant considered potential options for investigation at later stages?	An early identification of potential options that would address the problem are realistic. A potential solution should not cost significantly more than the problem. A high-level review of regulatory reform solutions, better use of existing assets, and non-built solutions in addition to new capital expenditure.
Has the applicant demonstrated that there is an approach to address the problem/opportunity that could provide value for money?	

We understand that applicants may not have identified a full range of options to address problems and opportunities. At Stage 1, it is not necessary to identify and develop specific options to solve the problem. However, it is expected that applicants are aware of the potential types of options available and have a broad understanding of their costs, compared to the size of the problem. Evidence of this could include acknowledgement of previous work on the problem, an order of magnitude cost estimate based on previous projects, and an analysis of how the problem has evolved since then.

Example of a strong and weak value for money case at Stage 1

As outlined in the Assessment Framework, proposals are given a Red, Amber, or Green rating for value for money depending upon the strength of their case. The following example illustrates what we would consider a strong versus a weak value for money case at Stage 1.

Table 2: Examples of a strong and weak value for money case in Stage 1

Stage 1	Stage 1
Example of a strong value for money case	Example of a weak value for money case
Growth in outer suburbs of Campbellton is putting pressure on the existing Campbellton drawbridge. Congestion of the bridge leads to lost productivity equal to \$250 million per year. The population of Campbellton is projected to grow 3% per year over the next 20 years and this problem is expected to worsen. Possible options include a new bridge, increasing take-up of different modes of transport, or diverting marine traffic. Previous work on a new drawbridge put the capital cost in the \$50 million range.	A new Campbellton bridge is critical. It is a key piece of infrastructure that connects residents to the city centre. A four-lane bridge will be an opportunity to upgrade the existing option.

3.2 Value for Money assessments at Stage 2

Value for Money assessments at this stage are more detailed. They focus on two key areas:

- whether a longlist of options was developed and filtered in a rigorous way to create a shortlist
- whether the resulting shortlist was assessed using appropriate methodologies.

Strong Value for Money assessments at this stage should give confidence that at least one of the shortlisted options is likely to deliver value for money.

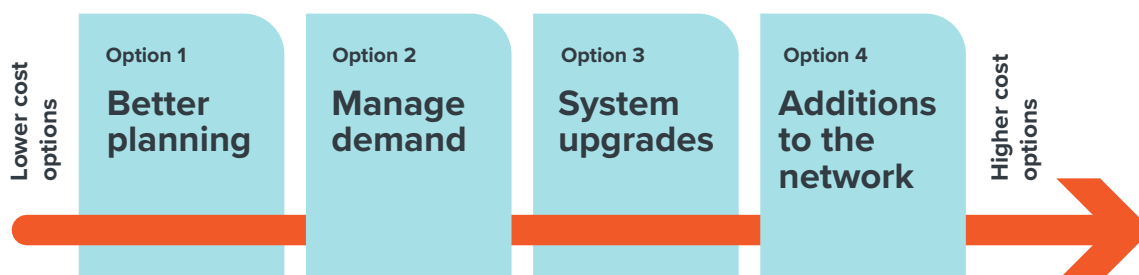
What applicants should demonstrate at this stage

At Stage 2, we are focused on determining whether the applicant has appropriately considered a wide range of options that *could* solve the problem, and then identifying a shortlist that will do so in the most efficient way.

The process for doing this begins with a longlist of options that is filtered to a shortlist. We want to see that applicants have robustly created a longlist and filtered it using an appropriate and consistent methodology. The range of options should include low-cost or non-built options alongside higher-cost ones.

At a high level, applicants should demonstrate that they are not simply considering a varied mix of capital expenditure. Consistent with the Commission's Infrastructure Strategy, we want to see that candidates have appropriately considered a range of options to address the problem, from improved asset management planning to new capital expenditure.

Figure 2: Range of options for a strong value for money case



Following a robust longlist and shortlist process provides confidence that the preferred solution will deliver value for money with the greatest certainty.

Our assessment process involves a series of questions at Stage 2 to identify if the longlist was appropriately developed and filtered to a shortlist using a robust methodology that considers value for money.

Table 3: How to demonstrate a strong value for money case in Stage 2

Question	A strong value for money case could include...
Have the longlisted and shortlisted options been developed to a reasonable maturity (for example, scope, cost)?	A thorough consideration of a range of options (ideally 8 to 12 options) with detailed descriptions of scope. Preliminary estimates of cost for each option. Inclusion of a do-minimum and/or non-built solution.
Has an appropriate and consistent methodology been used to assess options on the shortlist?	Use of a well-known methodology to narrow the longlist to a shortlist. Multi-criteria analysis (MCA) with some measure of value for money included as an objective. Use of tools such as rapid cost-benefit analysis can be helpful in this stage.
Do we have confidence that at least one of the final options will provide value for money?	A process that includes consideration of costs and benefits as a factor in the shortlisting process. This could include MCA with cost of options having a meaningful weight, or use of rapid cost-benefit analysis or cost-effectiveness analysis to assess options.

We want to see that a consistent methodology was used to narrow longlisted options. A popular way to do this is using MCA, which lays out a set of key criteria for the proponent along with relative weights for importance, and scores each option against these criteria. While MCA is a useful tool for narrowing options, the weights chosen can limit the ability to assess value for money, particularly if benefits are weighed heavily in the analysis. As part of our process for determining whether value for money, we will assess whether cost is given an appropriate weight, ideally 50% of the score.

For example, a process that weights costs at 10% of the score will not enable us to determine whether the shortlisted preferred options deliver value for money since the score is so heavily weighted towards benefits or other factors. Our assessment may include an analysis of what the shortlisted options may have been if cost had a greater weight, and compare with the applicant's shortlist in their business case.

A further discussion of methodologies for shortlisting and longlisting is covered in the following section.

Some applicants may put forward a programme of projects for review, rather than individual projects. In these cases, we would expect the applicant to compare the costs and benefits of the programme approach versus completing the projects individually as part of the optioneering process.

The table below lays out other questions that can assist in assessment of a project's Value for Money case, although they are not required.

Example of a strong and weak value for money case at Stage 2

The following example illustrates what we would consider a strong versus a weak value for money case at Stage 2.

Table 4: Examples of strong and weak value for money cases at Stage 2

Stage 2	Stage 2
Example of a strong value for money case	Example of a weak value for money case
We examined 10 options to address the problem of congestion on the Campbellton bridge. Based upon a series of agreed upon objectives, we narrowed the longlist using MCA and rapid cost-benefit analysis to 3 options. The preferred option, a new two-lane bridge with a bus lane, has a benefit-cost ratio of 2.2. This result was robust to different input assumptions, and to cost escalations up to 65%. The rough cost estimate for the preferred option is in line with similar bridges of this length and complexity built in New Zealand.	All longlist options include new capital expenditure to varying degrees. The preferred option was arrived at using consultation from stakeholders including residents and business owners. The preferred option was arrived at using MCA. A study, commissioned by a local business group, found that a new bridge would generate \$450 million in additional economic activity using a model applied to much larger transport projects.

3.3 Value for money assessments at Stage 3

At Stage 3, we expect applicants to demonstrate whether the preferred option, in a sufficiently scoped and designed form, still maximises value for money under a range of scenarios. We also want to see evidence that the applicant has robustly considered the whole-of-life costs of the project.

What applicants should demonstrate at this stage

Stage 2 was largely focused on narrowing a longlist to a shortlist and preferred option. However, at Stage 2, the full scope and details of the preferred option may not be fully known. At Stage 3, we expect this information to be available and to allow candidates, and assessors, to demonstrate whether the shortlisted options, or different options deliver value for money.

Key questions that we will ask at this stage will include the following.

Table 5: How to demonstrate a strong value for money case in Stage 3

Question	A strong value for money case could include...
Does the preferred option maximise value for money?	At a minimum, a full cost-benefit analysis of the preferred option, along with scenario testing around different assumptions. Other methodologies can reinforce a value for money case but should not be the primary method.
Has an appropriate and consistent methodology been used to assess options on the shortlist?	Use of cost-benefit analysis, scenario testing, and sensitivity testing, at a minimum.

Do we have confidence that at least one of the final options will provide value for money?	In addition to the above, a proposal should provide analysis that considers the uncertainty in the value for money case given the project's characteristics. For instance, for large, complex projects, we would expect to see a consideration and analysis of whether a preferred option delivers value for money under a range of different scenarios around cost and benefits, as well as assumptions (like discount rates and time periods).
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Additional questions that can assist in assessment of a Stage 3 value for money case include:

- Is there a clear and actionable plan in place to measure the costs, benefits, and outcomes of the project?
- Have non-quantified costs and benefits been thoroughly considered?
- Have all feasible funding and financing options been considered?

In addition to these questions, project proponents should have assessed risk and uncertainty that might affect their preferred option's costs and benefits.

A strong value for money case in this stage should demonstrate not just that a project's cost will exceed its benefits in some scenarios, but that the project is likely to deliver net positive benefits under a range of different scenarios given the project's characteristics. We expect candidates to appropriately test ranges around a project's costs and benefits. Examples of this include:

- sensitivity testing costs and benefits using different assumptions of model inputs (discount rates, time periods, inflation rates)
- adjusting costs and benefits upwards/downwards to account for areas such as project complexity, project size, location, and/or industry constraints.

An overview of the tools to do this is covered in the next section.

Example of a strong and weak value for money case at Stage 3

The following example illustrates what we would consider a strong versus a weak value for money case at Stage 3.

Table 6: Examples of strong and weak value for money cases at Stage 3

Stage 3	Stage 3
Example of a strong value for money case	Example of a weak value for money case
The preferred option has a benefit-cost ratio (BCR) of 2.2 after full information on scope and design are available. Different discount rates or time horizons do not meaningfully change this outcome. Given the complexity of the project, the type (level of service increase), and the cost (high), risks to the analysis are weighted to the downside. Making different assumptions for costs and travel demand to account for this, BCRs range from 1.4 to 2.6, confirming the project will likely be net positive.	Using full information, the BCR was 1.1. Sensitivity tests around the discount rate and the time horizon yield BCRs from 1.0 to 1.2; other risks to costs or benefits were not sensitivity tested. This information was supplemented with the analysis of economic impacts from Stage 2.

4. How to assess value for money

This section provides more details on the tools applicants might use to assess value for money across the stages.

4.1 Core methods for determining value for money

Developing a longlist and shortlist

There may be many approaches to solve a given problem. However, some might be more efficient than others. A solution that solves a problem at the lowest cost will provide the greatest social benefit. To ensure that we are maximising the outcomes we achieve from investment, it is important to comprehensively assess the alternative options available to us, rather than prematurely settling on a single solution.

The key focus of the Stage 2 assessment of value for money is therefore to check whether a proposal has identified and tested a wide range of options for addressing the problem or opportunity.

This approach is common in project appraisal. Treasury and the New Zealand Transport Agency (NZTA) have developed guidance and tools for identifying, considering and filtering options.

At a minimum, projects with a strong value for money case will include a longlist that involves the following:

- a wide range of **realistic** options for addressing the problem and objectives identified in Stage 1
- 8 to 12 options with appropriately detailed descriptions
- inclusion of a Do Nothing or Do Minimum option.

To filter these options to a shortlist, we expect applicants to apply a consistent methodology to test and compare across all options. This methodology should include a consideration of the advantages, disadvantages and trade-offs of each option. It should enable identification of a shortlist of options that best address the problem defined in Stage 1 and the objectives set by the applicant.

A common approach for longlist filtering is MCA. MCA uses multiple, often qualitative criteria, to compare different alternatives and options. MCA is useful for reducing an initial longlist of options that align with strategic objectives to a smaller, filtered list of options for more detailed assessment.

MCA is not best suited to measure whether a project will deliver value for money. It can, however, help to identify options that are more likely to deliver good value for money and give confidence that an assessment has adequately considered a wide range of options before arriving at a shortlist.

Rapid cost-benefit analyses can also be used to filter a longlist of options to a shortlist. However, it should not be used to determine value for money of the preferred option.

Core tools we expect to see in value for money cases

There are a number of different analytical tools that are used in practice for measuring whether a project is delivering value.

Based upon research around best practices, a strong value for money case should use a combination of four of the following tools.

- **Cost-Benefit Analysis (CBA):** Systematically measures the effects of a project over its lifetime, including the project's social, economic, and environmental impacts. It does this by quantifying the present value of a project's costs and benefits. A key output of a CBA is typically a Benefit-Cost Ratio (BCR), with ratios over 1 indicating that the benefits of the project are higher than its cost. This indicates that the project is net beneficial to society.
- **Scenario testing:** Assesses project outcomes under a range of possible futures to better understand and manage uncertainty. Scenarios can be modelled in detail or assessed qualitatively.
- **Qualitative risk assessment:** Identifies, estimates, and mitigates risks the project has a clear enough future. Qualitative risk assessment involves:

- o identifying the full range of project risks
- o estimating their likelihood of occurrence and expected impact on the project
- o developing mitigations to key risks
- o reassessing risks after mitigations have been applied. Qualitative risk assessment is a useful tool for all proposals.

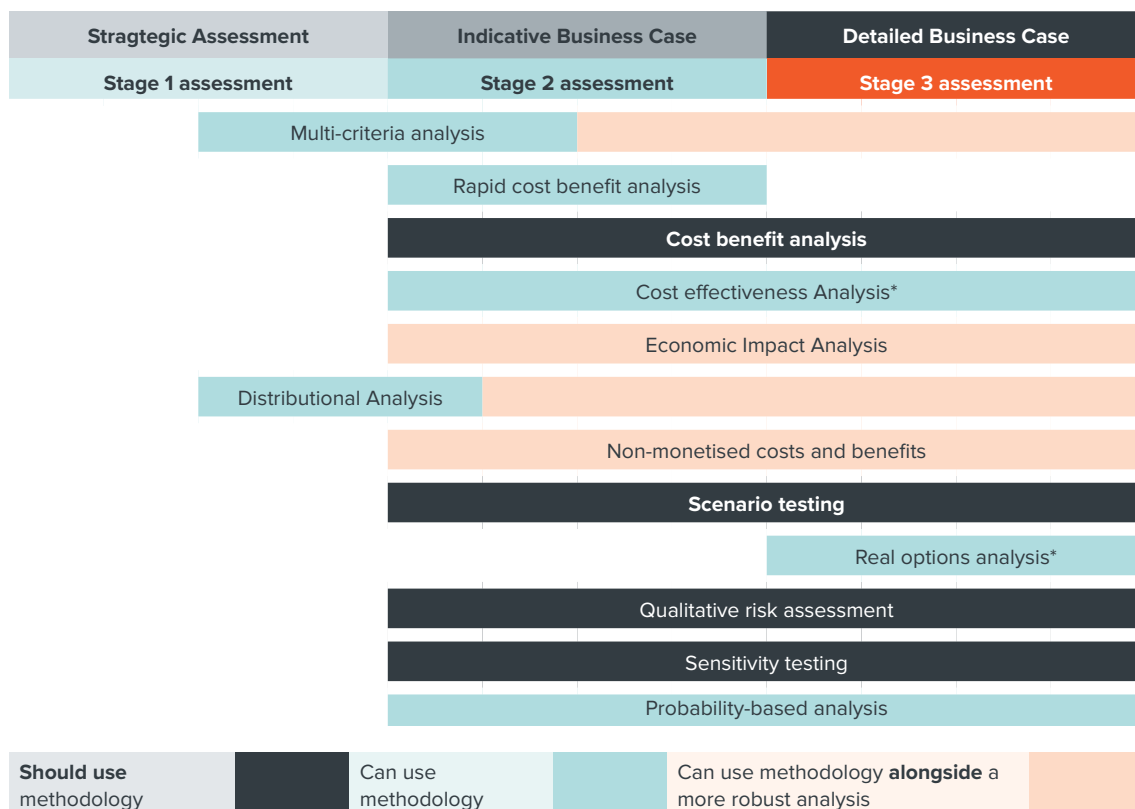
- **Sensitivity testing:** Determine the potential impacts of risks on project outcomes by varying key inputs and modelling assumptions. Sensitivity analysis is used to test how the costs and benefits of each option change if there is a change in a particular input or assumption, set of inputs and assumptions, or set of assumed changes in the outcomes.³

We consider that **cost-benefit analysis** is the best available tool for measuring value for money. This is because CBA provides the most objectivity and rigour to justify and support an investment decision. Only an assessment of costs and benefits can reveal the opportunity cost of spending. This assessment should be objective. This means the inclusion and measurement of costs and benefits should follow best practice. For example, applicants may refer to the New Zealand Transport Agency's (NZTA) Monetised Costs and Benefits manual for transport projects.⁴ They could also refer to Treasury's CBAX tool to assist their measurement of costs and benefits.⁵

In addition to providing a net benefit assessment, cost-benefit analysis can also be used to compare and rank projects designed to address the same problem. As such, we expect all applicants to perform a cost-benefit analysis of their preferred option at Stage 3. Cost-benefit analysis can also be used to narrow longlist options.

The following figure lays out when we expect these four core methodologies to be used across all stages.

Figure 3: Appropriate value for money methodologies for assessment stages



³ Sensitivity testing and Scenario analysis can look similar in practice. However, the purpose of these analyses is fundamentally different. Sensitivity analysis aims to determine the potential impacts of risks on project outcomes by varying inputs and assumptions to see how much they change expected outcomes. This also highlights which inputs have the largest impact on outputs. Scenario analysis helps to ensure that preferred options are robust to different futures and uncertainty by testing how robust options are against several alternative scenarios, rather than developing one assumed future.

⁴ <https://www.nzta.govt.nz/resources/monetised-benefits-and-costs-manual/>

⁵ <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/investment-planning/treasury-cbax-tool>

4.2 Complementary methods for determining value for money

In our assessment of value for money, the following tools will be considered as complementary to the core methods discussed above. A project that relies primarily on these methods will have a weaker value for money case. We recommend applicants use these tools to enhance their measurement of value for money.

Rapid CBA

A Rapid CBA applies standard CBA principles and techniques to compare options using the same present value concept of comparing benefit and costs. The only difference is the depth of the analysis. Rapid CBA:

- focuses on quantifying only the most material economic costs and benefits
- has a lower level of precision about design, costs, and benefits
- makes additional simplifying assumptions relative to a standard CBA process.

A rapid CBA can be suitable for removing inefficient options from a longlist or for identifying shortlisted.

However, this tool is not particularly robust and should not ever be used to select a preferred final option or as a definitive measurement of a project's costs and benefits, for example, at Stage 3.

Cost-Effectiveness Analysis

Cost-effectiveness analysis is concerned with maximising a single outcome or small number of outcomes within a given cost constraint.

Cost-effectiveness analysis can be used in limited cases for Stage 2 and Stage 3. For instance, when there is one primary quantifiable outcome/objective of an investment, but this is difficult to monetise. In the case of a new school, valuing the full benefits of that school is difficult, but benchmarking costs using a cost-per-student metric provides useful information to determine whether the preferred option is cost effective compared with other options and whether the project as a whole is cost effective relative to other alternative projects.

But since cost-effectiveness analysis never quantifies the benefits of the objective of the project, cost effectiveness cannot assess if spending on the project provides value for money. As such, cost effectiveness should only be used in a limited set of cases.

Economic Impact Analysis

Economic impact analysis estimates the effect that a project or programme will have on the structure of the economy, or on the economic welfare of groups of people. Economic impacts are usually expressed in terms of number of jobs, income effects, tax revenue, and good/service output etc, broken down by sector and/or location.

We do not consider economic impact analysis to be a suitable tool for assessing overall value for money at any stage.

Traditionally, economic impact assessments have focused on jobs and economic activity. Often, projects have used input-output tables to generate multipliers for jobs. Research into these analyses have found them not to be robust for assessing value for money. Impact multipliers from input-output tables tend to overstate economic benefits.⁶ The New Zealand Treasury suggests multiplier effects should be ignored since resources counted as benefits for any project or programme are already utilised elsewhere in the economy unless there is high unemployment.⁷

⁶ See Hannum 2015 for example.

⁷ See New Zealand Treasury 2015.

Economic impact analysis is narrower than cost-benefit analysis. It does not consider social, cultural, or environmental outcomes. Our mandate at the Commission is to ensure that infrastructure improves the wellbeing of all New Zealanders. This mandate extends beyond direct economic benefits.

Unlike standard cost-benefit analysis, economic impact analysis attempts to measure economic benefits that are downstream from the investment itself. For instance, for new transport infrastructure, a cost-benefit analysis might measure the direct benefit to users saving time on their commutes. An economic impact analysis might measure the growth in economic activity in a region, or nationally, of a specific investment. As the benefits being measured become less direct, analyses can be more sensitive to assumptions. It also makes decomposing the benefits directly related to the project more difficult, thus rendering value for money judgements challenging.

Further, economic impact analyses often do not consider the overall impacts of projects. For instance, a transport investment may lead someone to work more hours, leading an economic impact analysis to show that the benefit of the project on the person's increase in wages. However, a more holistic assessment would account for any utility the individual gains from working less.

Multi-Criteria Analysis to test relative value for money

MCA is useful for comparing options where a project's impacts cannot be easily monetised or quantified. In these instances, MCA can be used as a complementary tool alongside more robust methodologies that outline the monetised costs and benefits (i.e., CBA). Detailed MCA guidance can help improve consistency of application across projects.

But the key weakness of MCA are the criteria used for evaluation. There is no assurance that the criteria and their weights are appropriate. So, any project that scores highest on MCA may not provide value for money and may not have benefits that exceed costs. MCA can be a useful tool for identifying and narrowing options on a longlist but we do not consider it an effective tool for assessing overall value for money.

Criteria within an MCA may directly lead to significant drivers of cost to a project but given significant weight in the overall score. If applicants are using MCA to help narrow their longlist, they should carefully consider how non-monetary criteria and their weights may affect the project's value for money case.

If an applicant uses MCA as part of their optioneering process, we will consider whether project cost is given an appropriate weight, ideally 50% of the score. If project cost is given a lower weighting, then it may lead to poor value for money choices when choosing between alternative options. For example, if cost is assigned a 20% weighting, while various benefit categories are assigned a total weighting of 80%, then it implies that the project sponsor is willing to accept a 100% increase in project cost in exchange for a 25% increase in project benefits.

More generally, if a proposal uses an MCA as the key evidence for value for money of alternative options, we may consider whether the results are robust to changes in weighting of costs and benefits, and in particular whether results are robust to assigning a 50% weight to project cost.

Non-monetised costs and benefits

Where possible, costs and benefits should be monetised. But this might not always be possible. If impacts cannot be monetised, then quantification of impacts is the next best option. Where impacts cannot be quantified, then qualitative evidence or "narrative analysis" is still useful.

Impacts that may be difficult to monetise include cultural impacts, equity and distributional impacts, Māori values, value of open space, and mental health impacts etc.

Non-monetised costs and benefits can be used in Stage 2 and Stage 3 to support a more robust analysis. For example, when a project's impacts cannot be expressed in monetary units. This analysis is useful for:

- resolving "line calls" where two options have similar monetised BCRs, and
- asking structured questions about how large non-monetised benefits would have to be to select an option with a relatively lower monetised BCR.

Non-monetised costs and benefits is not a robust tool for decision-making by itself but can be used to support a more holistic and robust analysis. It does so by:

- increasing the contextual and holistic understanding of less tangible factors such as mental health, local history and needs, and cultural and indigenous values; and
- captures perspectives and values of stakeholders who prioritise non-monetary factors.

Like MCA, applicants who use non-monetised benefits to assess longlisted or shortlisted options should carefully consider how solutions that deliver these non-monetised benefits affect the hard costs of the project, and therefore, the value for money assessment.

As such, non-monetised impacts may provide important information for decision-makers to fully understand the impacts of the option being considered.

4.3 Dealing with uncertainty

Infrastructure projects can deal with deep uncertainty around their costs and benefits. Literature on major infrastructure projects has shown cost overruns are very common.^{8,9,10} Cost-benefit analysis of these projects can often be affected by optimism bias which overstates benefits.^{11,12}

This uncertainty can have a significant impact on whether a project ultimately delivers value for money. As such, we expect projects submitted for assessment should contain some analysis of the risks and uncertainties surrounding the project.

When is a project "likely" to provide value for money?

Literature has highlighted that infrastructure projects in their planning stages either overestimate benefits, underestimate their costs, or both most of the time. When we are assessing value for money, we are looking for more than just whether a project as a benefit cost ratio of 1 or above. We will assess the likelihood of this ratio staying above 1 after accounting for this uncertainty around benefits and costs.

We know that different projects will face different risks. Examples include:

- cost uncertainty involving larger, more complex projects with new construction techniques
- large numbers of critical interdependencies in projects that could lead to cost escalation
- divergent interests leading to schedule hold-ups
- customisation requirements to meet local physical conditions or regulatory requirements
- high visibility of the project leading to scope creep.

We expect applicants to consider how any of these characteristics will impact their project's value for money proposition.

To account for this uncertainty, one of our value for money assessment questions in Stage 3 is:

Is the preferred option likely to provide value for money under different scenarios and assumptions?

The definition of "likely" is rooted in the probability that a certain outcome occurs. There is no set definition of what "likely" would mean.

⁸ Flyvbjerg, Bent. (2013). 'Over budget, over time, over and over again: Managing major projects', 321-44.

⁹ Flyvbjerg, B., Skamris Holm, M. K., & Buhl, S. L. (2004). What causes cost overrun in transport infrastructure projects? *Transport reviews*, 24(1), 3-18.

¹⁰ Lind, H., & Brunes, F. (2015). Explaining cost overruns in infrastructure projects: a new framework with applications to Sweden. *Construction management and economics*, 33(7), 554-68.

¹¹ Flyvbjerg, B., & Bester, D. W. (2021). The cost-benefit fallacy: Why cost-benefit analysis is broken and how to fix it. *Journal of Benefit-Cost Analysis*, 12(3), 395-419.

¹² Flyvbjerg, B. (2008). Public planning of mega-projects: overestimation of demand and underestimation of costs. *Decision-making on Mega-projects: Cost-benefit analysis, planning, and innovation*, 120-44.

The IPCC¹³ framework states that “likely” means greater than a two-thirds chance of occurring, but not necessarily certain.

Likelihood Scale	
Term	Likelihood of Outcome
Virtually certain	99-100% probability
Very likely	90-100% probability
Likely	66-100% probability
About as likely as not	33-66% probability
Unlikely	0-33% probability
Very unlikely	0-10% probability
Exceptionally unlikely	0-1% probability

New Zealand guidance around the definition of “likely” comes from accounting treatment of liabilities on a firm or government balance sheet. This guidance does not set quantifiable limits, but requires a change in accounting treatment if it is probable that an expense will occur.^{14,15,16} The United States Security and Exchange Commission also has regulatory standards for the definitions of “probable”, “reasonably possible” and “remote”, with “probable” meaning the event or events are likely to occur.¹⁷

To help determine the probability of a project being likely to deliver value for money, two mechanisms are useful: (1) scenario analysis and (2) Monte Carlo simulation of results over a distribution of key parameters. These tools can give applicants a good understanding of a potential range of outcomes, but ultimately, applicants will need to use their judgement about how the above risks will affect their project’s Value for Money case, and how likely those risks are likely to occur.

As an indicative starting place, a good Value for Money case may seek to demonstrate that after a rigorous testing of different scenarios of risk to costs and benefits (for instance, using Monte Carlo analysis), a project delivers net social benefits more than 66% of the time.

These probabilities may vary depending upon the risk tolerance of project sponsors. It may be the case that decision-makers and the public expect a much higher level of certainty for spending significant amounts of public money; or, conversely, they may be willing to accept a risky portfolio of investment.

Scenario analysis

Scenario analysis centres on a qualitative assessment of the likely factors or situations that might materially affect outcomes. These scenarios might relate to the likelihood of alternative government policies, technology change, or a change in the underlying economy that might affect the cost of borrowing or procuring particular goods and services.

Often scenario analysis will cover three cases: (1) a base or central case, (2) an optimistic scenario, and (3) a pessimistic scenario. In general, little consideration is given on weighting the probability of alternative scenarios. Instead, the scenarios can draw out two different factors and events, which influence costs and benefits.

¹³ https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

¹⁴ Public Finance Act 1989.

¹⁵ Treasury Guidance on Recognising Liabilities and Expenses, <https://www.treasury.govt.nz/sites/default/files/2013-11/rle-nov13.pdf>

¹⁶ PBE IPSAS 19 Provisions, Contingent Liabilities and Contingent Assets. <https://www.xrb.govt.nz/dmsdocument/3490>

¹⁷ <https://www.sec.gov/rule-release/34-49544>

Monte Carlo analysis

In contrast, Monte Carlo simulation focuses on a quantitative assessment of the costs and benefits of projects. Monte Carlo simulation draws random parameters from set out potential outcomes to create alternative models of the key impacts and calculates the costs and benefits of the project under each set of parameters.

This approach can reveal how the interaction of factors drives the results and highlights the sensitivity of results to key parameters. This analysis is useful because it can highlight that a likely benefit and cost profile for a set of inputs is not always the same as the mean or median outcome. It can be useful for highlighting what the range of outcomes could look like.

Monte Carlo analysis is a powerful yet easy-to-apply tool that should be applied as a key component of assessment methodologies. A Monte Carlo analysis can easily be performed using a spreadsheet to give an applicant a range of cost and benefit outcomes given certain parameters. Resources on uncertainty analysis are provided in the next section to assist applicants.

Opportunities and real options analysis

Aside from scenario and Monte Carlo analysis, large, complex projects could benefit from considering opportunities generated by making single investments. Sometimes, completion of one project can create powerful network effects such as opportunities for future investments. These effects can often only be revealed once the project is completed. For example, a project applicant could examine the opportunity for firms to invest in expanding production in a local area impacted by new infrastructure.

Project proponents must carefully consider when and where real options analysis is required and where a simpler qualitative “opportunities analysis” may be sufficient.¹⁸ The Commission’s research on advance site protection provides a good overview of real options analysis and the benefits of doing so.¹⁹

¹⁸ https://motu-www.motu.org.nz/wpapers/10_05.pdf

¹⁹ <https://media.umbraco.io/te-waihanga-30-year-strategy/4empu4ca/protecting-land-for-infrastructure.pdf>

5. Resources for Applicants

Below is a series of guidance documents and tools that applicants can use to measure value for money in their projects.

Value for money Methodologies

Treasury's Guide to Social Cost Benefit Analysis: <https://www.treasury.govt.nz/publications/guide/guide-social-cost-benefit-analysis>

Treasury's CBAX tool

- **Tool:** <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/investment-planning/treasurys-cbax-tool>
- **Guidance:** <https://www.treasury.govt.nz/publications/guide/cbax-tool-user-guidance>

NZ Transport Agency's Monetised Benefits and Costs Manual: <https://www.nzta.govt.nz/assets/resources/monetised-benefits-and-costs-manual/Monetised-benefits-and-costs-manual.pdf>

Uncertainty analysis guidance

Infrastructure Australia, Guide to Risk and Uncertainty Analysis: <https://www.infrastructureaustralia.gov.au/guide-risk-and-uncertainty-analysis>

United Kingdom guidance and research on reference class forecasting

- **Background:** <https://nic.org.uk/app/uploads/RNA-Reference-Class-Forecast.pdf>
- **Research:** <https://assets.publishing.service.gov.uk/media/6093d448e90e0726f52fc54c/updating-the-evidence-behind-the-optimism-bias-uplifts-for-transport-appraisals.pdf>

Flexibility in Engineering Design by Richard de Neufville and Stefan Scholtes: <https://direct.mit.edu/books/book/2955/Flexibility-in-Engineering-Design>

The New Zealand Infrastructure Commission's Research Insights report on advance site protection: <https://tewaihang.govt.nz/our-work/research-insights/protecting-land-for-infrastructure-how-to-make-good-decisions>

Optioneering guidance

Treasury's guides for Better Business Cases: <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/better-business-cases/indicative-and-programme-business-cases>

NZ Transport Agency's guidance on Optioneering: <https://www.nzta.govt.nz/planning-and-investment/funding-and-investing/optioneering/optioneering-overview/>