

Multi-criteria analysis: user guidance

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Version 2

Multi-criteria analysis (MCA) can be used to evaluate multiple criteria, both quantitative and qualitative, and to assess different alternatives and options to inform decision making.

The MCA guidance and template is recommended for use in most business case optioneering processes to evaluate alternatives and options at the longlist and shortlist phases.

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More information

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Introduction

Multi-criteria analysis (MCA) is a tool for assessing multiple quantitative and qualitative criteria to refine both the longlist and shortlist of options.

Waka Kotahi NZ Transport Agency recommends MCA during the optioneering (sifting options and choosing the preferred option) phase of investment business case development. In particular, MCA is useful when comparing different alternatives and options, and assisting with conversations between investors and stakeholders to help inform selection of a preferred solution.

Purpose of this guidance

This guidance is to ensure consistency and transparency across the process and methodology used when undertaking an MCA, which in turn will make the MCA process more robust.

This guidance also provides for flexibility in approach to accommodate a project's specific circumstances, recognising that all business cases have their own unique characteristics. If you choose to vary from this guidance or adopt another MCA-type approach, it needs to be robust, transparent and fit for purpose, aligning with the size, complexity and stage of the project. Irrespective of the approach taken, documentation of the process and rationale for decisions made is fundamental to the MCA and business case process.

An MCA template (Excel spreadsheet) and a video on the MCA are available [on our website](#).

This MCA guidance and the MCA template:

- provide a best practice process and approach to ensure robust and holistic assessment when moving from the longlist to shortlist of alternatives and options, and assessing the shortlisted options
- support investment decisions being made consistently and transparently across business cases, while providing flexibility to accommodate a project's specific circumstances
- embed the [intervention hierarchy](#), which ensures that a broad range of alternatives and options have been considered
- seek to create a replicable and consistent approach to scoring for the same investment, such that a different group could apply the same assessment methodology and produce comparable results
- help identify environmental impacts and opportunities, and align investment and Resource Management Act 1991 (RMA) and Public Works Act 1981 (PWA) obligations – in particular, this relates to the need for a robust, transparent and well-documented optioneering process throughout the entire business case development process, from the strategic case through to the implementation of the preferred option.

When to use the MCA

The MCA process and outputs support making trade-off decisions between different alternatives or options. The MCA informs decision-making but should not be used solely to provide definitive answers about the best alternative or option. Critical thinking is important, especially when considering the rightsizing of possible solutions.

We expect that an MCA will be used as part of most business case optioneering processes to help investors and project teams evaluate alternatives and options at the longlist phase and again at the shortlist phase to help identify a preferred solution alongside cost–benefit analysis (CBA). It is not intended to be applied when making detailed design decisions following the identification of the preferred solution.

Key MCA considerations

Key considerations when undertaking MCA include:

- Alternatives and options need to address the root causes of the problems identified in the strategic case, and should be aligned with the investment objectives.
- Only alternatives and options with appropriately defined fatal flaws should be discounted at the MCA stage.
- Only criteria that differentiate between alternatives and options should be used.
- Synergies and conflicts between alternatives and options should be considered if packaged together.
- Double counting of criteria should be avoided.

Before conducting an MCA

To enable MCA to be applied as part of the optioneering process, there are several things that need to be completed first.

The strategic case

The strategic case is the cornerstone for successive business case phases, and it will become the first section of the programme business case (PBC), single-stage business case (SSBC) or indicative business case (IBC) document.¹ The strategic case should clearly articulate the problem or opportunity, identify the benefits sought and set investment objectives.

Generate alternatives and options

After the strategic case has been created, a broad range of alternatives and options are generated using the [intervention hierarchy](#) and systems thinking (which considers how parts of the system relate to each other, for example land use and the transport system).

Do-minimum

A do-minimum provides a baseline or counterfactual to compare options with. It may include maintaining the status quo and should account for committed and funded transport activities.² The 'do-minimum' must be defined before MCA is commenced. Comparing option criteria scores to the do-minimum could be accomplished by assigning a neutral score to a do-minimum and comparing all other option criteria scores against it.

Early Assessment Sifting Tool (EAST)

Before beginning the MCA it may be useful to run the longlist of alternatives/options through the [EAST](#).

The EAST supports an initial 'coarse screening' of alternatives and options. It is designed to quickly and robustly rule out alternatives and options, allowing for a more manageable MCA exercise.

The EAST also assists with documenting the reasons why decisions have been made. It is important that the rationale for discarding an alternative or option is well documented. This includes where an alternative or option does not align with investment objectives or there are fatal flaws.

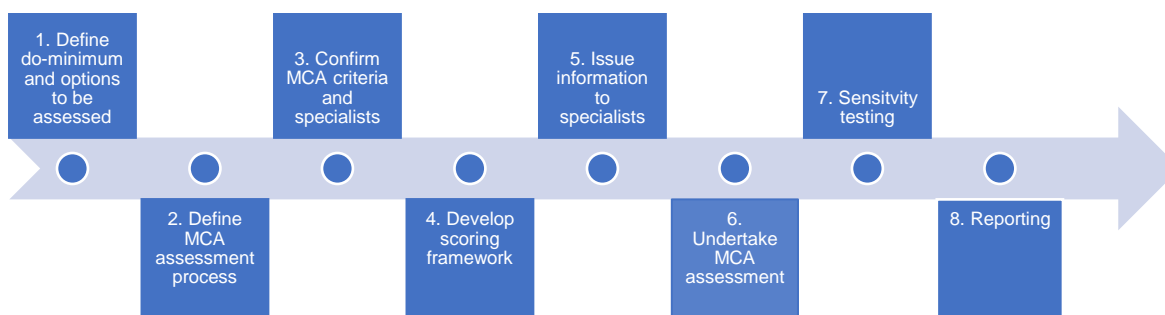
¹ More detail about Business Case Approach phases is available in our [Business Case Approach guidance](#) on our website.

² More information about do-minimum is available in the [Monetised benefits and costs manual](#).

Overview of MCA process steps

The MCA process involves the steps shown below; however, these steps can be iterative and may not occur in a sequential order.

Figure 1: MCA process steps



Step 1: Define do-minimum and options to be assessed

- Define the do-minimum, consistent with its definition at the early stage of optioneering.
- Clearly define the generated options that have passed the coarse screening (potentially using EAST) to be assessed, including what is in scope, the key differences between options and what each option will deliver beyond the do-minimum.

Step 2: Define MCA assessment process

- Gain agreement between the project sponsor and project partners as to who should be involved in the MCA process for example, investor, partners, iwi partners, stakeholders and subject-matter experts.
- Define how the assessment will be run, whether in person or virtual/online workshop (or combination of both, although this is not recommended) See [MCA group assessment techniques](#).

Step 3: Confirm MCA criteria and specialists

- Identify criteria to be used for the MCA (investment objectives, other critical success factors and assessment of impacts criteria).
- Identify people (ideally specialists) who will undertake an independent evaluation of evidence and assessment of specific criteria (aligned with their subject matter expertise).
- In collaboration with the specialists, develop a well-defined description for each criterion that includes what needs to be considered during the assessment and the methodology/measure used for the assessment.
- Collect the data to assist with measurement against the criteria.

Step 4: Develop scoring framework

- Agree on scoring scale.
- With specialists, define parameters for scoring each assessment criterion.

Step 5: Issue information to specialists

- Complete and issue option information, assessment framework and specialist reporting templates to the project team, specialists and stakeholders to guide them when participating in MCA assessment

Step 6: Undertake MCA assessment

- Hold a workshop where each specialist briefly presents their methodology, scores and rationale for their criterion. The group will debate and agree the scores for the do-minimum and each option.
- Confirm the sensitivity tests that will be used. After the workshop, run the scores through these tests to determine the best performing option under each of the different weighting systems.
- There may be a need for follow up work for specialists after the workshop, but this should be avoided where possible, as it draws out the process.

Step 7: Sensitivity testing

- Develop and apply weightings to sensitivity test the assessments that were agreed in the workshop. Ideally this is done before the workshop but can be undertaken as part of it.
- Identify scenarios to test with project sponsor/project partners. Examples include:
 - criteria that are uncertain or where assumptions have been made (for example scale of growth)
 - areas where there may be stakeholder concerns or disagreement (for example importance of environmental effects)
 - testing how including or excluding affordability or value for money changes assessment ranking.

Step 8: Reporting

- Complete the overarching reporting (either a standalone report or a chapter of the business case) that outlines the MCA process, the rationale for decisions and scoring, any key assumptions made and the outcome (such as a best-performing option or a shortlist of options).

More detail on these steps is provided in this guide.

Roles and responsibilities in the MCA process

It is important to have the right stakeholders involved when developing and assessing alternatives and options. A typical MCA assessment will include a range of different groups whose involvement will evolve over time.

Involvement of investment decision-makers will ensure alignment to desired investment objectives. The involvement of investment partners, iwi and relevant stakeholders is strongly encouraged at appropriate times in MCA processes, since it creates a stronger business case and ensures that issues to be addressed reflect different perspectives, which will in turn drive more robust outcomes.

In all cases the MCA process will be led by the project team, who may be advised by a relevant specialist or specialists. There may be instances where other parties complete specific assessments.

Subject matter experts (SMEs) may be used to provide specialist input on their topic to the assessment of options.

Depending on the scale and complexity of the activity, legal advice may be sought at different points in the process. [Appendix 1](#) provides further guidance on the roles and responsibilities when undertaking MCA.

Te ao Māori

Iwi have a special relationship with the Crown as Treaty of Waitangi partners and therefore have a partnership role with Waka Kotahi across the business case phases and project life cycle.

The project team should consider the timing, nature and extent of iwi involvement in the optioneering process. Relevant iwi should be consulted regarding their participation in the optioneering processes. This may include identification or preparation of cultural impact assessment(s) and/or taking a more holistic perspective on activity impacts through their participation at optioneering workshops. The timing, nature and extent of iwi input will depend on the specific circumstances, but as a rule the earlier the better to ensure both positive and negative te ao Māori impacts can be scoped.

It should be noted that multiple iwi and hapū groups may be affected by a project and may wish to contribute their own assessments separately from one another.

Different iwi groups may have different perspectives on optioneering processes. Practitioners should be aware that iwi may not wish to be involved in optioneering processes that could be perceived to not adequately represent iwi interests. Early engagement with iwi before starting an optioneering process, and a flexible approach, are encouraged to determine how iwi may wish to be involved. See [Te Ara Kotahi – Our Māori Strategy](#) and [Hononga ki te iwi – Our Māori Engagement Framework](#) for further guidance.

MCA group assessment techniques

MCA is often a group-based assessment activity, since it typically requires input from a range of different specialists. Although a single, informed participant could complete low-complexity and low-risk MCA assessments, for the majority of activities it is anticipated that multiple participants will be involved in the MCA process.

There are two main group decision-making techniques used for MCA scoring and selecting shortlists/preferred options. These can be broadly defined as:

- decision conferencing, a structured format among individuals in a meeting
- the Delphi method, where participants are physically remote and identify and evaluate ideas/scores independently.

Where practicable, it is recommended that a decision conferencing workshop method is used when undertaking MCA.

Decision conferencing

Decision conferencing provides for a structured format among individuals in a facilitated workshop, or across several workshops. A fundamental requirement is a comprehensive understanding of the activity or project involved. The exercise should be undertaken on the basis of agreed criteria and scoring approach.

SMEs may first independently establish provisional scores based on known evidence. This step may be completed prior to the meeting. At the workshop, each SME presents their own ideas and scores. SMEs should have been provided with supporting materials such as a scoring framework and template for recording their methodology, scores and reasoning to provide consistency. These scores are then discussed, challenged and moderated to reach a consensus during the workshop.

The key features required for a decision conference are a neutral facilitator, the attendance of key stakeholders and an interactive and iterative group process.

Tools and guidelines

There are a number of tools and guidelines that could be used in the MCA including:

- The Waka Kotahi [environmental screen](#) is designed to identify significant environmental and/or sustainability risks and to capture opportunities that require further evaluation, and it provides guidance on the scope of additional assessments at the IBC, DBC (detailed business case) or SSBC phases. The environmental screen is a deliverable of [Z/19 Taumata Taiao – Environmental and Sustainability Standard](#) and a contract requirement for professional services contracts.
- Waka Kotahi's [Te Ara Kotahi – Our Māori Strategy](#) and [Hononga ki te iwi – Our Māori Engagement Framework](#) provide guidance on how Waka Kotahi works with and responds to Māori as the Crown's treaty partner.
- The One Network Framework (ONF) provides land transport future network classification, and replaces the One Network Road Classification (ONRC) from the 2024–27 NLTP. It is important to double check its use in articulating problems and benefits and also development of options prior to undertaking MCA.

Selecting MCA criteria

The project team should select appropriate criteria that is relevant for the project type, scale and stage, and that provides differentiation between alternatives or options. Investment objectives (not optional), critical success factors and effects criteria need to be considered for all assessments. The reasoning for selection should be discussed and documented in the MCA report. If appropriate, [Taumata Taiao](#) and the [environmental screen](#) can be used to guide environmental and sustainability criteria in the longlisting and shortlisting process.

When choosing selection criteria, it is important to consider:

- whether the criterion is significant in terms of its benefits, impacts or effects
- whether the criterion will differentiate between options, and
- whether the criterion appropriately reflects the main objectives of the project that are considered important by decision makers, partners and key stakeholders.

The rationale for the selection, and potentially the exclusion, of key criteria, should be documented within the MCA report.

Below are a range of qualities that should be considered when confirming MCA criteria:

- **Completeness:** cross-check that all important criteria are included.
- **Functionality:** judge whether each option can be assessed against each criterion.
- **Mutual independence:** establish whether preferences associated with the consequences of options are independent of each other, and from one criterion to the next. For example, cost and affordability have interdependency and only one of them should be included.
- **Double counting:** ensure that impacts and outcomes are not recorded more than once in an appraisal or evaluation exercise. The project team, stakeholders and SMEs should discuss and agree the scope of the criteria and the boundaries of their assessment to avoid double counting. For example, there is the potential for double counting of impact on climate change mitigation if including this impact as a criterion when mode shift is an investment objective.
- **Size:** avoid using an excessive number of criteria, as this could skew the results of the MCA. The number of criteria should generally reflect the risk, opportunity, complexity, and variety of the options assessed. As a rule, aim for about 8 to 15 criteria. Including too many criteria can increase the risk of double counting, result in criteria scoring 'balancing out', or key criteria being outweighed by multiple other criteria. Some MCAs will require fewer criteria than others; for example, a simple MCA process may use only four or five criteria, while a complex MCA could have significantly more.
- **Impacts occurring over time:** make sure attention is drawn to when an impact occurs over the project's life.

For activities likely to require approvals under the RMA, part 2 of the RMA is relevant. Part 2 outlines the RMA’s purpose and principles. In identifying appropriate criteria for consideration, practitioners should ensure that relevant part 2 matters are addressed through the specialist criteria selected. Advice should be sought from RMA planning specialists and/or legal counsel.

Potential assessment criteria

Table 1 provides a list of possible MCA criteria, though is not exhaustive. Not all the criteria will be relevant to every activity or at every stage of business case development.

A number of tools, such as the [environmental screen](#), constraints mapping or a project design philosophy statement, may assist in defining criteria. It may also be relevant to include specific issues of interest to stakeholders (for example road safety or visual impacts).

Stakeholders/customer perspectives should not be a criterion in and of themselves, but the root causes of objections or support should be captured within the relevant criteria.

The generic criteria listed in table 1 are categorised as critical success factors (including investment objectives) and impacts. They provide a starting point for identifying and agreeing the criteria to be included in the MCA. In this list there are some criteria that are unlikely to be used for all business case stages (for example the critical success factor of supplier capability is most relevant at the PBC stage).

Critical success factors

Critical success factors (CSFs) are attributes essential to successful delivery of the proposal. The project team should define an initial set of critical success factors for further discussion and agreement with key stakeholders. Most of the generic CSFs included in table 1 provide a starting point for identifying and agreeing the CSFs, based on the five-case model of developing business cases:

- investment objectives (strategic case)
- potential achievability (management case)
- potential affordability (financial case)
- potential value for money (economic case)
- supplier capacity and capability (commercial case).

Impacts

In addition to critical success factors, MCA provides a way of analysing options against impacts that are important to decision-makers.

Table 1: Generic list of MCA criteria

Criteria type	Potential criteria	Description	Additional guidance
Critical success factors	Investment objectives	<p>How well does the alternative or option achieve investment objectives?</p> <p>Alternatives and options need to be assessed for their ability to deliver against investment objectives.</p> <p>Investment objectives are derived from problem statements and benefit maps as part of investment logic map (ILM) sessions, and are determined by a project team, based on stakeholder workshops.</p>	<p>This is the main critical success factor for any investment proposal assessed using MCA.</p>

Criteria type	Potential criteria	Description	Additional guidance
Critical success factors	Potential achievability	<p>What is the potential achievability of the alternative or option?</p> <p><i>Technical</i></p> <p>What are the technical or practical considerations that may prevent an option from achieving investment objectives, for example local site geography or existing contracts? What are the technical risks involved in developing or implementing this option?</p> <p><i>Safety and design</i></p> <p>Are there significant health and/or safety risks associated with the option in its design, implementation, operation or maintenance? Does this option comply with the safe system approach? Can the risks be addressed in the design process to control it?</p> <p><i>Consentability</i></p> <p>What is the level of consenting complexity and/or difficulty? Are there risks of this adversely impacting on required project timeframes or other aspects of delivery?</p>	Note that consentability does not include assessment of environmental effects, which should be covered in the 'environment' criteria below. Care needs to be taken not to double count. If consenting has environmental considerations, best practice is to exclude and ensure those key considerations are covered by environmental effects criteria.
	Potential affordability	Does the cost (capital, operational or maintenance) of this option fit within the likely funding available? What factors might affect the ability of the project owner to afford the cost to operate and maintain the option over its projected life?	See below more guidance on the assessment of affordability.
	Potential value for money	Consideration of the balance between costs and benefits, usually through cost-benefit analysis.	See below for more guidance on the assessment of value for money.
	Supplier capacity and capability	Any external resourcing challenges, for example dependency on local construction firms or IT skills, including interdependencies across projects.	
	Scheduling/programming	When the alternative/option could be delivered and other timing requirements.	

Criteria type	Potential criteria	Description	Additional guidance
Impacts and opportunities	Environmental effects	<p>What environmental effects are associated with this option?</p> <p>There are a variety of environmental criteria that may be relevant, depending on the project. Environmental effects could include those related to ecology, water quality, stormwater, noise and vibration, visual impact, urban design, natural hazards, contaminated land, landscape, heritage (including archaeology), biodiversity, resource efficiency and air quality. The environmental screen should be used to inform responses to these questions.</p> <p>In some cases, there may be opportunities to improve environmental outcomes as a result of a project.</p>	<p>Where an effect is likely to be significant, it should have its own line within the MCA. Impact on climate change mitigation and adaptation are separate criteria.</p>
	Social and cultural impacts	<p>What social or cultural impacts are associated with this option?</p> <p>Social or cultural impacts may include, for example, human health, impacts on community in relation to jobs, recreation, services and severance, impacts on farming and business operations. The environmental screen should be used to inform responses to some of these questions.</p>	<p>There are a variety of criteria that may be relevant, depending on the project. Where an effect is likely to be significant, it should have its own line within the MCA.</p>
	Climate change mitigation	<p>What is the impact of the alternative or option on climate change?</p> <p>What is the long-term carbon emissions impact of the alternative or option?</p> <p>How does the option's impact on light VKT compare with any sub-national light VKT targets (once available)?</p> <p>The environmental screen should be used to inform responses to some of these questions.</p>	<p>Care needs to be taken not to double count climate change mitigation and mode choice if included as an investment objective.</p> <p>See below for more guidance on the assessment of climate change mitigation.</p>
	Climate change adaptation	<p>What is the impact of climate change on the alternative or option?</p> <p>Is the alternative or option exposed to physical climate change risk or other natural hazards over time?</p> <p>How effective is the option at reducing/mitigating the exposure to physical risks?</p> <p>The environmental screen should be used to inform responses to these questions.</p>	<p>If resilience is an investment objective and climate change adaptation is covered as part of this objective, adaptation should not be included as an impact criterion to avoid double counting.</p>

Criteria type	Potential criteria	Description	Additional guidance
Impacts and opportunities	Environmental effects	<p>What cumulative impacts are there, if any, associated with the option?</p> <p>Cumulative effects may be insignificant on their own, but may accumulate over time or space with other effects to become significant.</p>	<p>Consider implementation, operation and maintenance phases. For example, air pollution accumulating from increasing use of diesel engines in built up urban environments.</p> <p>A cumulative impact includes the total effect on a natural resource, ecosystem or human community due to past, present and future activities or actions. Cumulative impacts may also include the effects of natural processes and events, depending on the specific resource in question. Cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and will likely occur as a result of an action or influence, including the direct and reasonably foreseeable indirect impacts of the project being evaluated.</p>
	Impacts on te ao Māori	<p>What, if any, impacts are there on te ao Māori? This includes areas of significance for Māori, Māori land and kaitiakitanga (recognition that the environment is a taonga).</p>	<p>Te ao Māori criteria must be assessed by iwi</p>
	Property impacts	<p><i>Impact on property</i></p> <p>How does the option impact on property? Can the necessary property rights be obtained? For example, injurious effects on a business, such as changes to property access and loss of parking.</p> <p><i>Property acquisition</i></p> <p>Difficulty in obtaining the land.</p>	<p>Care needs to be taken not to double count property impacts and environmental effects and social and cultural impacts.</p> <p>Property impacts are often available at later project and business case phases.</p>

Costs

The whole-of-life cost of an activity should be included in an MCA process, but should not be included as an MCA criteria or scored. Costs and fundability require a robust assessment separate to the MCA process.

Costs are included as part of value for money; however, project teams may wish to record the cost of each option. Costs need to be assessed in different granularity levels depending on the business case phase.

Costs are meaningful criteria when they are compared with the available funds (assessment of affordability) or benefits (assessment of value for money).

Affordability

Affordability constraints can include funding availability or limits on the amount of either operating or capital costs that can be incurred. Affordability should be either assessed as part of the MCA or be included in the MCA as a criterion. The decision about inclusion of affordability as a criterion, and undertaking its assessment, should include the following elements in addition to the general considerations for selecting criteria listed earlier in this guidance:

- Who is it affordable for and over what period? Identify the sources of funding and consider any affordability gaps over the appraisal period – that is, the difference between the funding required in any year and funding available from all sources.
- Future versus current affordability.
- Multi-party versus single-party funding.
- Government Policy Statement on Land Transport (GPS) funding over 10 years.
- Funding available for the related activity class and the amount that has been allocated.
- Programmes across the region and country – National Land Transport Programme and regional land transport programmes (RLTPs).
- Risks and uncertainties that could affect the affordability of the project, and factors that might affect the ability of the project owner to afford the cost to operate and maintain the option over its projected life
- Whether there are mechanisms in place so that funding may become available through other sources, and whether there are interim solutions.

Value for money

Value for money (VfM) here refers to the efficiency element, using cost–benefit analysis (CBA), through economic appraisal and not the wider elements of value for money.³ It could be done using economic appraisal to measure the net value to society through CBA, depending on the stage and scale of the project, through:

- quantitative costs and benefits analysis, that is a benefit–cost ratio (BCR) and/or
- qualitative analysis of benefits and costs.

Fit for purpose considerations for option assessments

The assessment of an option’s effectiveness using MCA should be fit for purpose, taking into account the scale and complexity of the project or programme and its stage of development.

The PBC phase is often used by councils to identify an optimum and integrated programme of work to inform a long-term plan (LTP) or regional land transport plan (RLTP). In this phase there may only be signals of the scale of costs and affordability, rather than available budgets and anticipated project costs.⁴

At later business case phases – IBC, DBC and SSBC – usually more refined information related to engineering complexity, geotechnical factors and property impacts is available, and provides more certainty around potential project costs and therefore affordability and value for money.

Climate change

There are two criteria related to climate change impact included in table 1, climate change mitigation and climate change adaptation.

³ Based on the latest update of the definition by the Ministry of Transport.

⁴ Except if the PBC supports a three-year programme of standard activities for funding approval.

Climate change mitigation

Climate change mitigation is about reducing our impact on climate and includes:

- **Vehicle emissions:** the impact of changes in the number of greenhouse-gas emitting vehicles or the emissions avoided through mode shift or other means. Reducing emissions is the end goal of the VKT reduction targets in the transport chapter of the ERP and therefore the consistency obligation under the GPS. Ideally combine quantitative measures, for example using tonnes of CO₂-equivalent, vehicle kilometres travelled (VKT) and fleet composition information with qualitative descriptions about expected changes in travel behaviours/journey patterns. Extra care is needed to avoid double counting of this impact and mode shift as an investment objective. With the current vehicle fleet, significant mode shift would result in a reduction in enabled carbon emissions, so this benefit would be counted twice, but a mode shift investment objective would generally have wider impacts than solely reducing enabled carbon emissions, such as health, liveability and accessibility outcomes.
- **Whole-of-life emissions:** embodied carbon and energy use, such as types of materials, the energy used on the network, and their carbon footprints. It could be measured using assumptions about construction materials and the potential whole-of-life emissions.

The Waka Kotahi [Project Emissions Estimation Tool](#) can be used to support quantitative assessment throughout the business case phases.

Climate change adaptation

Climate change adaptation is about adjusting our infrastructure and systems to better cope with the impacts of climate change. Land transport infrastructure can be exposed to the effects of climate change, including sea-level rise, inundation and temperature changes affecting pavement surfaces. Extra care is needed to avoid double counting this impact and network resilience (natural hazards) when it is an investment objective.

This impact could be qualitatively described or measured quantitatively using the following approaches:

- maps, such as those within the National Resilience Programme Business Case and resilience maps
- for projects in the later stages, geotechnical or stormwater subject matter experts will be able to assist with better understanding more fine-grained natural hazard risks
- using the [environmental screen](#).

MCA scoring: purpose and method

Scoring systems

Scoring allows for differentiation between options. The scoring system used needs to have enough range to sufficiently discern the benefits, disbenefits and/or effects of the various options.

There are a variety of scoring systems available. A 7-point scoring system, as detailed in table 2 below, will be appropriate for many activities. It can be used to rate quantitative and qualitative measures within the MCA template. The rating scale comprises a 7-point scale from -3 to +3. A summary of option performance can be obtained by adding these scores together. If desired, the total score or relative ranking of each option can be reported as part of the MCA table.

While Waka Kotahi recommends a 7-point scale as the standard approach, use of another scoring system (such as an 11- or 5-point scale) may be more appropriate where more or less granularity in scoring would better represent the evidence available.

Scoring systems should be used consistently through the MCA and the activity lifecycle to enable fair comparison between options. Hence, if a new option is introduced or a reassessment is required, the same scoring system should be used.

Table 2 below provides a basic example of a 7-point scoring system; however, it is recommended that an assessment framework is developed, with definitions for scores for each criteria used to provide a consistent, replicable and transparent process.

Table 2: 7-point scoring system

Magnitude	Definition	Score
Large positive (+ve)	Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment.	3
Moderate positive (+ve)	Moderate positive impact, possibly of short-, medium- or long-term duration. Positive impacts may be in terms of new opportunities and outcomes of enhancement or improvement.	2
Slight positive (+ve)	Minimal positive impact, possibly only lasting over the short term. May be confined to a limited area.	1
Neutral	Neutral – no discernible or predicted positive or negative impact. Counterfactual could be the do-minimum or do-nothing,	0
Slight negative (-ve)	Minimal negative impact, possibly only lasting over the short term, and definitely able to be managed or mitigated. May be confined to a small area.	-1
Moderate negative (-ve)	Moderate negative impact. Impacts may be short-, medium- or long-term and are highly likely to respond to management actions.	-2
Large negative (-ve)	Impacts with serious, long-term and possibly irreversible effect leading to serious damage, degradation or deterioration of the physical, economic, cultural or social environment. Required major rescope of concept, design, location and justification, or requires major commitment to extensive management strategies to mitigate the effect.	-3

Do-minimum and do-nothing

The scoring should be done relative to a baseline or counterfactual – a future in which a proposed activity does not occur – that is known as do-minimum or do-nothing. For many transport activities, it is often not practical to do nothing. A certain minimum level of expenditure or activity may be required to maintain a minimum level of service. This minimum level of expenditure or activity and the resultant performance is known as the do-minimum, and should be used as the basis for evaluation using MCA, rather than the do-nothing. It is important not to overstate the scope of the do-minimum.⁵

Scoring and measures

Each criterion should be underpinned by one or more measures that provide the evidence base for scoring the criterion. These measures could be quantitative or qualitative of how well options address aspects of the criteria. A list of measures are available in Waka Kotahi's [Land Transport Benefits Framework](#), with more detail in the related [Non-monetised benefits manual](#).

While the scores provide a useful tool to assess the combined outcomes of qualitative and quantitative criteria, the scores should not be added up. Using colour, as shown in the table above, can provide a useful visual assessment to sense check options and identify issues or areas of concern, but the results should not solely be relied on for decision-making. In addition to relative scores, the narrative that develops through scoring is also important, as it provides insight into key issues facing the project and challenges that may have informed the MCA process.

⁵ See the [Monetised benefits and costs manual](#) for more information about the do-minimum and do-nothing.

Fatal flaws

It may be beneficial to include a fatal flaw score in an MCA. A fatal flaw is a condition or circumstance that means the option will not be achieved or that a risk cannot be adequately mitigated, or it would be too detrimental to other outcomes to do so. Options that are highly difficult but not fatally flawed should remain in the mix and be scored accordingly.

If the EAST tool has been used, some fatal flaws should have already been identified and filtered.

Many fatal flaws relate to aspects which are not consentable under the RMA, where property cannot be acquired, or where unresolvable legal challenges may arise. Engineering complexity is rarely a fatal flaw, although natural hazard exposure may be. Financially expensive options in and of themselves should not be considered fatally flawed.

Sensitivity analysis

The key purpose of the sensitivity analysis is to determine how the scoring (which uses equal weighting for the criteria) of the options is impacted or changed by using weighted scores.

Weights represent beliefs about how important a particular criterion is compared to other criteria. Some criteria are often considered more significant/material to an activity than others, particularly when viewed through certain lenses.

To ensure transparency and recognise the significance/materiality of different criterion, the following steps should be followed:

1. Undertake scoring with all criteria equally weighted.
2. Undertake sensitivity analysis. This enables the robust examination of the results by exploring their sensitivity to weighted changes to different criteria. For example, investment objectives could be weighted using the percentage assigned to them in the strategic case. All changes to weighting/data should be done systematically to assess their effect on results.
3. Document the results and the reasoning applied.

While weighting can be used as part of sensitivity analysis, it should not be applied unilaterally to criteria to identify a 'preferred option' based on the scoring.

Considering mitigation in an MCA

As part of option development and refinement, alternatives for avoiding significant adverse effects should be considered. If avoidance is not practicable then the reasons for this should be documented.

Individual specialists should first undertake an MCA assessment including standard 'best practice' mitigations (for example, in a stormwater context, using erosion and sediment control measures to mitigate sediment run-off effects). Once completed, specialists must consider whether additional mitigation is required. The environmental screen may have identified opportunities for mitigation.

If additional practicable mitigation is identified, specialists should revisit their assessment and indicative scores to reflect this. This information should be recorded in the reporting materials, along with a description of the process by which agreement on mitigation was reached.

Mitigation for one criterion may result in changes to another. For example, adding a bridge to avoid an ecologically sensitive area may change whole-of-life costs and visual impacts.

If there is doubt about whether the additional mitigation or its flow-on impacts on other criteria is practicable and/or fundable, this should be discussed with the project team.

While the identification and assessment of effects, and measures to avoid, remedy or mitigate them, may be relevant at various stages of the optioneering process, it is more likely to be relevant later in the process (such as during shortlist assessment) when more detailed information on the options is available.

Social and distributional effects

If an alternative or option has negative effects on particular vulnerable social groups (for example older people, people on low incomes or people with disability), the project team should identify these and consider whether additional measures can be introduced to avoid, remedy or mitigate these effects.

Critical statutory requirements for the optioneering process

There are a number of legislative requirements to consider during all business case optioneering and decision-making processes. In particular, robust, transparent and well-documented optioneering and decision-making processes are critical to meet statutory requirements under the Land Transport Management Act 2003 (LTMA), Resource Management Act 1991 (RMA) and Public Works Act 1981 (PWA). Rather than adding unnecessary layers of complexity, these legislative obligations generally reflect best practice and are likely to enhance business case processes and outcomes.

Land Transport Management Act 2003

The LTMA sets out the legislative requirements that govern Waka Kotahi investment from the National Land Transport Fund (NLTF). When Waka Kotahi is approving proposed activities or a combination of activities, it must be satisfied that key legislative requirements under section 20 have been met, including that an activity or combination of activities:

- is consistent with the Government Policy Statement on Land Transport (GPS)
- is efficient and effective
- contributes to Waka Kotahi objectives
- has, to the extent practicable, been assessed against other land transport options and alternatives.

In addition, the LTMA places a number of obligations on the way Waka Kotahi undertakes its functions. In particular it requires Waka Kotahi to:

- exhibit a sense of environmental and social responsibility
- facilitate participation by Māori in land transport decision-making
- ensure transparency in decision-making, use of revenue and expenditure.

Resource Management Act 1991 and Public Works Act 1981 considerations

Investment proposals requiring approvals under the RMA, and/or requiring compulsory acquisition of land under the PWA, may be required to meet certain tests associated with optioneering and decision-making processes. This influences processes and decisions across the entire business case development process – a thread that runs from the strategic case through to the implementation of a preferred solution.

These RMA and/or PWA requirements mean Waka Kotahi and its investment partners must clearly demonstrate:

- adequate consideration of alternatives throughout the entire optioneering process, from longlisting onwards. It is not necessary to consider all possible alternatives and options or evidentially eliminate alternatives that are clearly speculative or suppositious. In terms of the requirements under the RMA, an organisation is also not required to select the 'best' option. What is necessary is to demonstrate that an appropriate broad range of alternatives has been adequately considered
- systematic and transparent optioneering and decision-making processes.
- a sound argument for why any proposed physical works are 'reasonably necessary' (under the RMA) including the ability to demonstrate 'reasonable need' for any land required (PWA).

- appropriate recognition and provision for the principles of Te Tiriti o Waitangi in relation to managing the use, development, and protection of natural and physical resources and the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga.
- consideration of a proposal's social, cultural, environmental and economic effects and appropriate action considered to avoid, remedy or mitigate any adverse effects.

While the specific RMA and/or PWA requirements associated with a particular project are not known until at least the IBC phase, it is necessary to ensure that all optioneering and decision-making processes meet these requirements from the outset, to ensure they are sufficiently robust to support any subsequent RMA approval or PWA requirements.

Seeking early input from Waka Kotahi property, RMA planning, technical and legal specialists into the business case process (particularly from longlisting onwards) will help support integrated decision-making and ensure these processes meet the necessary legislative requirements.

The process of refining alternatives and options from a longlist to a shortlist, and then to a preferred solution, involves an increasingly refined sifting process with progressively more detailed and focused investigations and information filtering. The inclusion of environmental criteria, supported by the environmental screen, in optioneering processes will almost always be appropriate from the longlist stage onwards, with increased granularity required at the shortlist stage.

It is likely that specific environmental criteria will be required to assess different physical options (for example, different greenfield transport corridors). Identification of appropriate environmental criteria should be based on an assessment of constraints, opportunities and risks applicable to the area in question.

Replicability and transparency

The MCA assessment process used should be both transparent and replicable so that a different specialist would be able to follow the logic and methodology set out in the supporting documentation and replicate the result. Well-documented MCA processes mean that decision-makers will be readily able to determine whether legal requirements (such as under the RMA and PWA) have been met.

Where specialists have been involved, their background notes or reports presented at a decision conference should be included.

New options and changed circumstances

If a viable and substantive new option arises after an MCA has been completed, specialists should be asked to complete a review of the new option using the same methodology used for the prior MCA, and fully document the outcomes. To the extent practicable, the same specialists who completed the original MCA should be involved.

Changed circumstances after an MCA has been completed should be addressed through a review of the prior MCA processes and a documented assessment of any changes necessary. For example, if, after an MCA process has been completed, a significant earthquake altered a coastline on which an MCA process was premised, a review of the MCA assessment would be required.

All specialists involved in assessment processes would also need to review and revise their assessments if necessary.

Documentation and MCA outputs

As highlighted previously, the purpose of the MCA is to compare alternatives and options to inform decision-makers. MCA outputs should not be solely relied on for decision-making.

The MCA process and rationale for scores should be documented. For large or complex activities with complex MCA processes, we recommend you undertake a peer review of the MCA process.

The documentation of the MCA process may contain the following elements:

- Summary of prior business case development (updated if the EAST has been used):
 - overview of project
 - how previous spatial planning and strategic assessment outputs have been considered
 - past optioneering work, including EAST outputs
 - discussion on the do-minimum
 - discussion of investment objectives.
- Methodology and approach:
 - description of agreed process for undertaking MCA, including stakeholder input
 - description of methodology, including scoring (identifying departures from previous methodology, if relevant)
 - description of assumptions
 - identification and description of criteria.
- MCA outputs:
 - assessment of criteria for each alternative or option (using MCA template)
 - mitigation discussion
 - sensitivity analysis
 - appended reports
 - decisions/discussions, including synergies and conflicts between alternatives and/or options if packaged together.
 - next steps and recommendations.

Definitions

Alternatives

An alternative is a strategic way of responding to a problem or opportunity applying a whole-of system approach (which can include corridor or network planning), such as exploring the potential for different land-use arrangements or encouraging greater use of other modes to address projected growth in network demand. Alternatives may have been identified as part of development strategies and spatial plans, but may also be developed as part of business case development. In addition, the assessment of alternatives needs to meet RMA and PWA requirements as described above. In developing alternatives, it is important to consider the [intervention hierarchy](#), which addresses:

- **demand** – for example, ways in which the need for travel can be reduced
- **productivity** – for example, by making sure the current system is optimised as far as reasonably practicable
- **supply** – for example, provision of new services or infrastructure.

Options

Options represent different ways to achieve an outcome or objective. For example, if it was decided that the best way to address a particular problem was to improve an intersection for safety or efficiency reasons, options could include building a roundabout, installing traffic signals, or introducing grade separation. The assessment of options needs to meet RMA and PWA requirements as described above.

Investment objectives

The investment objectives specify the strategic outcomes for the proposed investment. Investment objectives are easily derived from information gathered during conversations in the development of the strategic assessment, around the identified problem/opportunity and the benefits associated with solving the problem. This information is entered into a 'formula' as follows:

[The effect of the problem] + [the selected benefit] + [the baseline and forecast impact on the benefit measure] = SMART (specific, measurable, achievable, relevant and time-bound) investment objective.

Project objectives

Project objectives are those objectives specific to the preferred solution. These are important from an RMA perspective as they will be required to support the designation and consenting phase, and are the objectives against which a consent application or notice of requirement is evaluated. The project objectives will be strongly informed by the investment objectives and, while the purpose, framing and focus of investment and project objectives are different, they should not significantly diverge. Planning and legal input on project objectives should be sought to ensure they are pitched correctly and reflect relevant case law.

Appendix 1: Roles and responsibilities in the MCA process

Role	Investment objectives	Project objectives	MCA options	Responsibility
Investor/project team	Develop investment objectives	Develop project objectives	Input into MCA process	<p>Investor may provide background and investor context to support expert evidence on alternatives.</p> <p>Project team has an ongoing role in MCA processes as activity is developed and refined prior to lodging of a notice of requirement (NOR) and/or consent applications.</p> <p>Activity planner or MCA expert adviser may give evidence on alternatives assessment process.</p>
Stakeholder	May provide input to development of investment objectives	May provide input to development of project objectives	May provide input to MCA process	May have an ongoing role in MCA processes as activity is developed and refined prior to lodgement of NOR and/or consent applications.
Iwi/Māori	May provide input to development of investment objectives	May provide input to development of project objectives	<p>May provide input to MCA process</p> <p>Input to assessment of cultural impacts</p> <p>Complete cultural impact assessment if required</p>	May have ongoing role in MCA processes as activity is developed and refined prior to lodgement of NOR and/or consent applications.
Subject matter expert (SME)		May provide input to project objectives	<p>Undertake provisional scores</p> <p>Input into MCA process</p>	<p>Ongoing role in MCA processes as activity is developed and refined prior to lodgement of NOR and/or consent applications.</p> <p>Specialists may be used to provide specialist input on their topic to the assessment of options. If the process involves decision conferencing, they must be properly briefed, given time to undertake relevant investigations and to present and discuss their findings in the decision conference.</p>

Role	Investment objectives	Project objectives	MCA options	Responsibility
Legal advisor		May provide input into project objectives and should review consenting objectives	May advise on MCA process	<p>Depending on the scale and complexity of the activity, legal advice may be sought at different points in the process. It may be desirable to seek high-level legal advice or review when the methodology for the MCA process is being developed for an activity, and also when the consenting strategy is being prepared. For large or complex activities, it may be helpful to engage more specific legal advice early in the process, for example, to assist in defining activity objectives against which an MCA process can be completed. The Waka Kotahi Planning team should be contacted (consents@nzta.govt.nz) to work through the activity-specific requirements in this regard.</p> <p>May have ongoing role in review of MCA processes as activity is developed and refined prior to lodgement of NOR and/or consent applications.</p>
SMEs within Waka Kotahi	May provide input to development of investment objectives	May provide input to project objectives	<p>May advise on and provide specific input to MCA process.</p> <p>Input into MCA process</p>	Ongoing role in MCA processes as activity is developed and refined prior to lodgement of NOR and/or consent applications.
Consenting specialists within Waka Kotahi		May provide input to project objectives and/or help project team to develop/review NOR objectives	Advise on and provide specific input to MCA process	Ongoing role in MCA processes as activity is developed and refined prior to lodgement of NOR and/or consent applications.
Alternatives for MCA specialist		Input to development of project objectives	Advise on MCA process	<p>Depending on the scale and complexity of the activity, it may be advisable to appoint an alternatives specialist. This role runs the alternatives assessment process, including coordinating the specialist inputs, facilitating workshops, undertaking subsequent analysis and ultimately preparing an overarching report on the process. They may also be required to give evidence at a hearing on the process followed.</p> <p>A vital role of this specialist, if appointed, will be to ensure consistency of approach both between specialists and throughout MCA processes at different stages of the activity.</p>