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Measurable Bottom Line Objectives for Integrated Catchment Management Plans

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Measurable Bottom Line Objectives for Integrated Catchment Management Plans: Short Version

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1 Executive Summary

This report summarises the tasks carried out to review existing practices for setting objectives in planning documents in the Auckland region with the aim of developing a method of formulating catchment management objectives that are measurable in triple or quadruple bottom line terms.

The findings comprise the three main elements summarised below.

1. Strategic vs operational objectives

The term "objective" is widely used in New Zealand environmental and local government legislation and statutory tools, but in a different way than in business management tools. Business plans often use layers of terms such as vision, goal, objective and target, usually in such a way that only the latter two are intended to be measurable. To retain the statutory terminology, this project distinguished two levels of objectives:

- **Strategic objectives:** these define the high-level outcomes sought by the instruments that influence an Integrated Catchment Management Plan (ICMP), which are not necessarily intended to be measurable.
- **Operational objectives:** these set out the practical tasks that an ICMP recommends, and that are implemented by influencing other instruments. These are intended to be measurable.

2. Multiple bottom lines in multi-criteria analysis of catchment management options

To facilitate the setting of objectives that address the required bottom lines in ICMPs, an approach based on multi-criteria analysis of catchment management options was adopted, using the following multiple bottom lines identified by Kettle (2006):

- Places: natural and built environment.
- People: cultural and social.
- Processes: institutional and economic.

These enable setting of objectives for the range of outcomes under both the Resource Management and Local Government Acts that ICMPs deliver.

3. Measurable objectives

To help catchment managers formulate measurable objectives that define desired Quadruple bottom line QBL outcomes/anticipated environmental results, a checklist was developed based on the following "SMARTER" criteria:

- Specific
- Measurable
- Affordable
- Realistic
- Time-based
- Endorsed (by funders and other key stakeholders)

- Relevant (to strategic objectives).

While this work did not focus on indicators themselves, it introduced the concept of orders of outcomes over different time frames. The results were trialled in two workshops with staff of the Auckland Regional Council and local authorities and participants found the approach workable and useful to their ICMP work. The report concludes with some implications for councils adopting the methods.

2 Introduction

2.1 Project brief and context

This report summarises the findings of the tasks carried out to fulfil the following project brief of the Auckland Regional Council (ARC):

- review existing practices for giving effect to the objectives in relevant documents in the Auckland region to identify how successful they are and if they could be used for ICMP purposes (Section 2);
- break down a variety of general objectives stated in integrated catchment management plans into ones that address the quadruple bottom line (Section 3); and
- develop a method to break down these quadruple bottom line objectives into measurable ones for options for integrated catchment management (Section 4).

The project arose from the ARC's wish for integrated catchment management plans (ICMPs) to spell out their objectives in more detail so as to:

- be measurable;
- address quadruple bottom line outcomes;
- link higher-level objectives with identified catchment management outcomes;
- enable cost-effective monitoring of the achievement of objectives and progress towards outcomes;
- be relevant to the objectives of related requiring and enabling documents; and
- enable co-ordination of related work programmes.

Table A in Schedule 9 of the Auckland Regional Council's Proposed Auckland Regional Plan; Air, Land and Water Plan[1] lists the contents of integrated catchment management plans and applications for network discharge consents. Item B requires:

> "A description of the strategic objectives sought for the stormwater and wastewater discharges, diversions and associated activities and receiving environments, including:
>
> - b (i) The social, ecological, economic, amenity and cultural objectives".

This provides clear direction that ICMPs need to include measurable multiple-bottom line objectives. Such objectives also need to:

- link high-level objectives to catchment management;
- enable monitoring of progress towards outcomes;
- be relevant to the objectives of related documents; and
- assist the co-ordination of related work programmes.

[1] From Decision No. A-059/2007 of the Environment Court, cited in the references as Auckland Regional Council. 12 July 2007. ALW Plan: Chapter 5: Discharges to land and land management, operative stormwater & wastewater discharges issues, objectives, policies and Schedule 9 (corrected).

2.2 ICMPs and the objectives of other instruments

To set the scene, this section describes what an ICMP document contains, before reviewing the role of an ICMP and its relationship to other instruments.

ICMPs are non-statutory documents with no legal force, although compliance with an ICMP may become enforceable where it is included in the conditions of a network discharge or land use consent. Their management recommendations must be consistent with the relevant strategic guiding and requiring instruments but need to be incorporated into a suite of other instruments and processes in order to address the identified catchment and growth management needs. These are discussed below.

An ICMP must be consistent with and help achieve the objectives specified in statutory instruments such as the:

- Local Government (Auckland) Amendment Act (2004) (LGAAA).
- Hauraki Gulf Marine Park Act (2000).
- Resource Management Act (1991) (RMA) and its tools such as:
    - National Coastal Policy Statement and any relevant national standards.
    - Auckland Regional Policy Statement.
    - Auckland Regional Plans: Coastal; Air, land and water; and Sediment control.
    - Relevant district plan.
- Local Government Act (2004) (LGA) and its tools such as:
    - Long-term council community funding and annual plans (LTCCPs).
    - Stormwater and/or wastewater bylaws.
- Building Act and Building Code and other national legislation under the jurisdiction of local authorities (eg, for controlling height of buildings above floodplains).

Where possible in light of the above, ICMPs also need to be consistent with and help achieve the objectives specified in other statutory and non-statutory instruments such as, for example:

- ARC and other regional instruments including the:
    - Regional growth strategy and associated local sector agreements required under the Local Government (Auckland) Amendment Act (2004).
    - Regional land transport strategy required under the Land Transport Act (1998).
    - Regional guidelines eg relating to ICMPs and stormwater/wastewater management.
    - Auckland Sustainability Framework.
- Iwi management plans.
- Local instruments prepared by the relevant city or district council including:
    - Structure plans, which may be required in accordance with Chapter 2.6.2.8 of the Auckland Regional Policy Statement.
    - Water and sanitary services assessments (WASSAs) and asset management plans required under the Local Government Act.

- Management strategies or guidelines, eg for transport, streams, urban design or parks.

Some councils may also undertake to ensure that all their instruments comply with international or other voluntary undertakings such as Agenda 21.

ICMPs influence a range of instruments in order to address the identified resource management issues, including:

- The district plan and any structure plans that help give effect to it.
- Asset management plans.
- LTCCP and long-term funding and annual plans.
- The hazards register.
- Other management strategies eg for transport, streams and urban design or parks.
- Stormwater and/or wastewater bylaws and any connection standards.
- Engineering codes of practice for subdivision.
- Urban design/low impact and other related guidelines.
- Funding and/or cost recovery mechanisms.
- Building permits and subdivision and other resource consents such as those for stormwater diversions and disposal, and wastewater disposal.
- Other methods, including environmental education and community engagement.

It is clear that monitoring of progress towards resolution of identified issues and objectives is important and useful for catchment managers.

2.3 The language of objectives

An ICMP (like any other environmental management tool) must give effect to the relevant objectives of the various instruments that influence it. However, it also sets out management objectives for its catchment, a potentially confusing double up. This section analyses the meaning of the term "objective" with the aim of clarifying its use in ICMPs.

In general usage, an objective is "something worked toward or striven for", "the goal intended to be attained (and which is believed to be attainable); the state of affairs that a plan is intended to achieve and that (when achieved) terminates behaviour intended to achieve it"[2].

The term "objective" is widely used in New Zealand environmental and local government legislation and statutory tools, but in a different way than in business management tools. Business plans often use layers of terms such as vision, goal, objective and target, usually in such a way that only the latter two are intended to be measurable.

While it would create confusion to recommend use of language that is not consistent with tools relevant to ICMPs, we nevertheless need to distinguish between the objectives in the documents that guide an ICMP from the objectives of the ICMP itself.

[2] www.thefreedictionary.com/objective, (accessed 28 August 2009).

For example, Section 6.3.2 of the ARC's' Structure Planning: A Regional Practice and Resource Guide 2005 says that "Integrated catchment management plan objectives need to reflect the identified problems/issues and statutory objectives and in so doing give strategic direction to the Plan" (ARC, 2005, page 49). The same word is thus used for two different sets of objectives, and while the difference is clear in that context, for the purposes of this project, a distinction is required in order to promote the necessary logical rigour to make an ICMP useful.

Therefore two levels of objectives are distinguished:

- **strategic objectives:** these define the high-level outcomes sought by the instruments that influence an ICMP; and
- **operational objectives:** these are the objectives that contribute towards achieving strategic objectives. They set out the practical tasks that an ICMP recommends, and that are implemented by influencing other instruments.

2.4 Logical and legislative requirements for objectives and monitoring

A considerable body of theory and research into programme logic and policy effectiveness is available to inform the development of objectives and outcomes capable of being monitored and evaluated. Some is briefly overviewed in this section in the context of the requirements of the Resource Management and Local Government Acts.

2.4.1 Legislative requirements for objectives and monitoring

Under the Resource Management Act (1991) (RMA), policy statements and regional and district plans must or may state, among other things, some or all of the following:

- issues that the plan seeks to address;
- objectives for the region or district;
- policies to implement the objectives;
- rules (if any) and other methods to implement the policies;
- principal reasons for adopting the policies and methods;
- environmental results expected from the policies and methods; and
- procedures for monitoring the efficiency and effectiveness of the policies and methods.

This logical flow is aimed to ensure internal consistency of plans (objectives clearly linked to issues; polices to objectives; methods to policies; anticipated results, rules and indicators to all the above). Section 35 sets out the requirements for monitoring anticipated environmental results, and Sections 35, 62, 67 and 75 set out the need to monitor the effectiveness of plans, objectives and policies.

Under the LGA, the accountability in Section 93 (6) (e) together with the monitoring and reporting provisions of Section 92 clearly indicate a requirement to monitor QBL outcomes (in terms of the four well-beings set out in the Act) and the effectiveness of the policies, rules and other methods set out in the plan to achieve them.

2.4.2 Quality of plans and their monitoring under the RMA and LGA

The research programme PUCM (Planning under Co-operative Mandates) has examined the quality of the preparation and implementation of plans produced under the RMA and LTCCPs produced under the LGA. Its main aim to date has been to better understand the links between environmental policy and outcomes by studying the quality of the preparation and implementation of plans produced under the RMA (and more recently, the LGA) and influencing factors. This leading edge research links the assessment of plan quality (PQ) to implementation quality (IQ) and, finally, to environmental quality (EQ).

The PCUM team has identified eight ingredients of a good plan (Ericksen et al, 2003b) that apply equally well to ICMPs as to regional and district plans and LTCCPs.

As well as being well-organised and presented for ease of use by lay and professional alike, a good plan demonstrates:

- Appropriate interpretation of the legal mandate for the local area.
- Clearly stated purpose and outcomes.
- Clear identification of issues.
- Well-developed fact base.
- Internal consistency (objectives clearly linked to issues; polices to objectives; methods to policies; anticipated results, rules and indicators to all the above).
- Integration with other plans and policy instruments.
- Monitoring.

Most plans evaluated against these criteria performed poorly (Ericksen et al., 2003b).

2.4.3 Programme logic and policy effectiveness of Auckland ICMPs

Four ICMPs from the Auckland region were overviewed to assess the clarity and explicitness of their programme logic and how well their objectives could be measured to enable the effectiveness of their policies to be monitored. The plans were selected because they included references to the relevant (strategic) objectives that ICMPs must meet (some other plans examined did not). They were at varying stages of completion but all generally followed the structure of the ARC's ICMP funding eligibility guideline, namely:

- Policy and strategy documents that influence the ICMP.
- Catchment delineation, characterisation and land use.
- Receiving environments.
- Hydrological/hydraulic requirements.
- Contaminant management.
- Best practicable options analysis.
- Management recommendations/works programmes.
- Consultation.

- Institutional capacity.
- Monitoring.

In terms of programme logic and the ability to generate measurable objectives for the purposes of policy effectiveness monitoring, the ICMPs overviewed displayed:

- Generally good reviews of the guiding policy and strategy documents that influence the ICMP, including some good lists of strategic objectives from the relevant documents.
- Variability in the clarity with which catchment issues were identified, both current issues and those posed by future growth and other pressures.
- Absence of linkages between strategic objectives, issues identified and the recommendations for actions (methods/operational objectives), except where actions were based on the ARC's Category 1 and 2 watercourse classification.
- General lack of descriptive summary of how the recommended actions would contribute to achieving the strategic objectives.
- Absence of or only very generally stated undertakings about indicator selection and monitoring of outcomes of the recommended actions.

These findings mirror those found by the PUCM research, and validate the ARC's initiation of this project. Reasons are likely to reflect a number of factors, including:

- Those identified by the PUCM programme, reflecting a lack of resourcing, support, capacity and partnership for regional and local councils preparing plans.
- The overly wide scope of the term "objective" in the relevant legislation, which allows strategic objectives (goals) to be conflated with operational (measurable) objectives.
- A relative lack of involvement of planners who are likely to be more familiar with the programme logic set out in the RMA.
- The likelihood that detailed task implementation plans where monitoring would logically fit are likely to be prepared separately from the ICMP and by different parts of the council, for example policy, planning, consents or compliance, rather than the utility engineering sections usually responsible for preparing ICMPs for the purposes of obtaining consents for discharges of wastewater and stormwater.

2.5 Formulating measurable objectives

To help catchment managers formulate measurable objectives, a two-pronged process was developed drawing on the essential elements of the research summarised above that are relevant to ICMPs, including:

- the principles of programme logic and policy effectiveness monitoring to ensure measurability;
- the principles of multi-criteria analysis of MBL catchment management options; and

- use of SMARTER[3] criteria for objectives (specific, measurable, affordable, realistic, time-based, endorsed and relevant) that define desired QBL outcomes/anticipated environmental results in a way that enables measurement of progress towards achieving them.

The two methods were trialled in workshops with staff of the ARC and local authorities (Appendix 1 is an attendance list). The amended methods are summarised in Section 3 for use by council staff and consultants working with ICMPs.

[3] The earliest use of the "SMART" acronym for objectives seems to have first been outlined by Peter Drucker in his 1954 book "Management by Objectives". The final "ER" has been adopted for the purposes of this project.

3 Multi-criteria MBL Analysis

The methods in this section describe how to break down the high-level ("strategic") objectives referred to in ICMPs in a way that enables catchment managers to consider multiple bottom lines and (as outlined in Section 4) set up measurable operational objectives.

Catchment managers routinely consider multiple bottom lines when assessing various management options in terms of their environmental and economic performance as well as their social and cultural acceptability. However their balancing of these considerations is not always documented, so the decisions and any trade-offs made in arriving at them are not always transparent or contestable, and with turnover of staff and service providers, much valuable information is lost. Moreover, this information is also needed for setting objectives that are measurable across all bottom lines.

This section summarises a process for multi-bottom line (MBL) multi-criteria analysis (MCA) that council staff and their consultants can use as part of their integrated catchment management planning. It assumes some familiarity with MBLs and ICMPs as envisioned in the Auckland region.

We have adopted the following multiple bottom lines identified by Kettle (2006) for use in the MCA and for formulating measurable objectives:

- Places: natural and built environment.
- People: cultural and social.
- Processes: institutional and economic.

3.1 When to use the multi-criteria analysis

While a full MCA will only be needed to help decision-making in situations where trade-offs among catchment management options are complex and difficult to identify. These six bottom lines can still be used to help formulate measurable objectives for straightforward management decisions, as shown in Figure 1.

Figure 1
When to use the multi-criteria analysis.

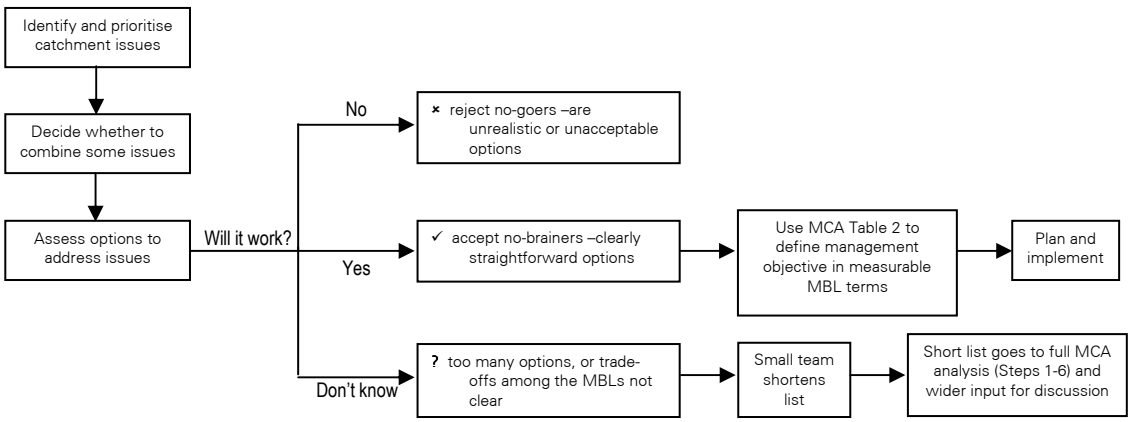


Figure 1 shows that catchment management options are assessed after initial data about a catchment have been collected, catchment issues have been clearly identified and visions, objectives, indicators and benchmarks (see Step 3 in the MCA) have been defined. Issues in target areas can then be prioritised for work and a pool of options developed for solving them. A quick assessment can then be made to eliminate "no-goers", identify "no-brainers" and decide if a full MCA is needed.

For options that will proceed to implementation, a partial or full application of the MCA will help managers formulate measurable objectives that address all the bottom lines:

- Straightforward management decisions that do not need an MCA can proceed to a short analysis using MCA Table 2 in order to set a measurable objective that explicitly addresses all bottom lines, before being planned and implemented.
- Where issues, options or trade-offs amongst MBLs are complex, use of the full MCA can help with the selection of a preferred catchment management option or options. For example, options to resolve the flooding of one house would not necessarily need a full multi-criteria analysis, whereas understanding the different trade-offs within and between options to resolve flooding and stormwater contamination would be likely to need explicit evaluation by an MCA.

Multi-stakeholder dialogue can help catchment managers to identify and prioritise catchment issues, management options and community outcomes in multiple bottom line terms. Council asset managers and engineers have knowledge about many diverse issues but when they make decisions they have an understandable tendency to focus on their primary sphere of responsibility. Other stakeholders, such as local residents and business owners or policy analysts and planners, can be encouraged to provide their experiences and knowledge of other bottom lines and community outcomes. The decision when to engage with the community is not a straightforward one, and will vary from issue to issue and place to place. However, where community engagement on significant options may eventually need to be facilitated as part of the LTCCP process, earlier engagement may be desirable.

Before explaining the MCA analysis, the discussion below briefly outlines some further considerations for:

(i) Identifying and prioritising the important issues in a catchment.

(ii) Deciding whether to analyse each issue individually or whether to combine some.

(iii) Identifying all the options that could be employed to manage the issue.

(iv) Screening the issues to identify those that need MCA and those that don't.

(v) Short-listing the number of options for each issue submitted for detailed consideration by way of the full multi-criteria analysis.

(i) Identifying and prioritising the important issues in a catchment

When identifying and prioritising the important issues in a catchment, many assumptions will be made during the discussion or assessment process. It is important to document the assumptions behind the decisions made, for example in an appendix or supporting resources to the ICMP.

Discussing and documenting the geographical, economic and social scale of each issue across each of the MBLs enables issues in target areas to be prioritised in terms of options analysis (in Figure 1) and work programmes.

(ii) Deciding whether to analyse each issue individually or whether to combine some

Some issues may be able to be considered together in a combined MCA analysis, depending on their scale and optimum level of analysis. For example, flooding of a single property during only very large storm events could be considered together with the flooding of a road in the same area for events of the same size.

(iii) Identifying all the options that could be employed to manage the issue

All the different ways of managing each issue or set of combined issues should be identified by way of a multi-disciplinary group process. The issues should be clearly defined and ranked in order of importance, as this stage determines options for managing the issues. For each issue, all the ways that it could be managed are considered: as well as the best options available, consideration should be given to the "doing nothing" and "maintain current level of service".

As this is a critical part of sustainable integrated catchment management planning, it should be done as a multi-disciplinary group process in which people from different disciplines (eg ecologists, town planners, architects, roading and stormwater/wastewater engineers and academics) come together to communicate their views about the catchment issues and management alternatives. Brainstorming is a good way to generate and capture the information needed. Again, it is important to document the resulting material, for example in an appendix or supporting resources to the ICMP.

(iv) Screening the issues to identify those that need MCA and those that don't

A full MCA can be very demanding on the limited time and other resources available to councils, so following the process generally indicated in Figure 1 will help identify those catchment management options that need MCA and those that don't.

(v) Short-listing the number of options for each issue submitted for detailed consideration by way of the full multi-criteria analysis

Taylor (2004) suggests that 15 or fewer options are manageable in an MCA – but even four to six can be demanding. Therefore short-listing those options for full MCA will reduce the time needed for the detailed analysis to a manageable level.

Management options should have a reasonable chance of promoting progress towards the ICMP's strategic vision. The vision can thus help short-list the management options by eliminating those whose contribution to the various bottom lines is less beneficial or clear than that of others. Short-listing criteria might include environmental aims, society's wants and, importantly, the project budget. Short-listing may be done by an assessment manager or representative panel of key stakeholders from across the council and consultancy. It may also be decided to involve community representatives as discussed above. The assumptions behind the decisions made during the short-listing process should be captured and communicated in a concise and easily understood way and should be included in the appendices of the ICMP report.

This process should yield a group of issues, each with a short list of management options, which can then by analysed by the MCA process, which is described next.

3.2 How to use the multi-criteria analysis

The steps in the MCA process itself (described in more detail below) are:

1. Identify multi-bottom line impacts of each option.
2. Develop an options analysis matrix using Table 1.
3. Predict the likely performance of each option for each impact using Table 2.
4. Assess the impacts against the benchmark.
5. Weight each impact based on the likelihood of its occurrence using Table 3.
6. Determine the likely performance score and compare options to select a preferred option or options.

1. Identify multi-bottom line impacts of each option

Compare the advantages and disadvantages of each option by identifying those MBL impacts that allow significant benefits and drawbacks of each option to be assessed. Consider positive and negative, direct and indirect effects and where possible frame them in measurable terms. Work with stakeholders to rank the impacts in order of importance.

The advantages and disadvantages of each management option are compared by defining the MBL impacts. These are impacts that allow the significant benefits and drawbacks to be assessed. Clearly there are numerous impacts (reactions) of any option (action). Some impacts will have a direct effect on the issue being managed. But many of the impacts will be indirect. For example, flooding is a typical issue that requires catchment management. One option to manage flooding is to provide storage in a constructed basin. While the basin may manage flooding, it clearly has many other important impacts. For example, a parks manager may have concerns about the safety of staff maintaining it. For this scenario the assessment impacts might include "safety of maintenance staff". Another familiar example is the relationship between capital and operational expenditure: while the stormwater engineers may find it relatively easy to obtain capital funding to build the basin, the parks manager may be more concerned about the "annual maintenance cost".

It is pertinent to consider as many MBL impacts as the team can think of and particularly those that reflect stakeholders' ambitions and concerns, as captured in the initial stages of the project. It is also sensible to choose impacts that can be quantified or measured in some way. Defining measurable impacts will help in the later stages of the project.

Once all the important impacts have been defined, the impacts can be ranked in an order of importance. Iterative discourse with the stakeholder groups will help determine the rankings. Rankings are used as a guide to help weight the importance of the impacts. The ranking of the impacts is made clear under each MBL heading in Table 1, described next. Differences of opinion may emerge at this stage, leading to the need to compromise on rankings or perhaps to run a sensitivity analysis (see Section 3.3) to compare the results of using different rankings. Extreme differences may need to be debated in a wider forum.

2. **Build an options analysis matrix using Table 1**

   Summarise the MBL impacts of the management options into Table 1 to start building an options analysis matrix. The matrix will help examine the merits of each option against the MBL assessment impacts.

By now catchment issues, options for their management and their impacts will be clearly defined. This stage now considers the "likely performance" of each impact. This is done by producing a matrix that summarises how each option will most likely perform against each impact. The matrix takes the form of the multi-criteria analysis (Table 1). The matrix has columns representing the management options and rows representing impacts. The issue should be written as a title for the table. A new table should be developed for each issue. The management options are listed as column headings beneath the issue title. (In the example in Appendices 2 and 3 there are three options, but as many columns as necessary can be inserted.)

The rows on the left-hand side of the table have been divided into the multi-bottom lines: Places (natural and built environment); People (cultural and social); Processes (institutional and economic) – after experience applying similar MBL to catchment management in Auckland (Kettle, 2006 and NAMS, 2004). Under each bottom line there is space to write the impacts that have been defined and ranked.

3. **Describe the predicted performance of each option for each impact using Table 2**

   Use the best available measurement of each impact to predict the likely performance of each option compared with a defined benchmark.

Use the best available measurement of each impact to predict the likely performance of each option. For example, an impact defined as "sediment quality/primary contaminants/zinc" is measured in mg/kg (ARC, 2002). Define the performance of each option based on data obtained in Step 1 from models, measurements or estimates. Benchmark the performance against values in the relevant literature, for example the ANZECC (Australian and New Zealand Environment and Conservation Council) ERL (effects low range concentration) of >150 mg/kg (ibid) and list the source of the information if possible in the spreadsheet itself so the information is retained. However, some impacts may not be easily measurable, for example "aesthetic value". In these cases a subjective measure may be defined, again with the information sources and assumptions clearly and safely documented. Also note the parties concerned, for example to whom benefits will accrue or on whom costs will fall.

4. **Assess the impacts against the benchmark using Table 2**

   Convert the descriptions of the predicted performance of each option for each impact into performance scores using Table 2.

Change the descriptions of predicted performance into performance scores using Table 2. The table heading is the same as in Table 1, because it is the same issue that is being considered. Likewise, the tables have similar impacts, written as row headings on the left hand side of the table. But this time the "performance" of the impacts is converted into a scale from 1 to 5, with 1 being a poor performance and 5 being the best performance. The scores are listed as column headings. These "performance" scores are subjective and require justification in the ICMP documentation.

It is important that each scoring system is structured so that a desirable result scores highly (ie 5). By transferring the "performance score" into the relevant box in Table 1, the scores allow the simple comparison of the options.

5. **Weight each impact based on the likelihood of its occurrence using Table 3**

   Weight each impact based on the likelihood of its occurrence by referring to Table 3 to assign a likelihood score from a range in which a high number reflects a desirable level of likelihood.

Similar to the performance score, a likelihood score can now be determined using Table 3. The likelihood score indicates how likely it is that the performance score will be achieved. Thus likelihood is used a measure of certainty. The likelihood score can also be used to gauge confidence in the modelled, measured or estimated performance, for example where likelihood does not easily apply to the impact.

It is very important to write the likelihood score as a positive statement or desired outcome. For example, the "likelihood of drowning" may be an impact of adopting a management option. But drowning is not desirable. In this case the likelihood should be restated as the "likelihood of not drowning". If the likelihood of not drowning is "almost certain" this would score highly (ie 5), because it is desirable.

Another example might include the likelihood that a model prediction is correct. The performance score may be based on a predicted annual load of TSS. The certainty in the prediction could be scored using the likelihood, where 1 is very uncertain and 5 is almost certain. Other examples are provided in Appendices 2 and 3. The likelihood score should be transposed from Table 3 into the relevant boxes in Table 1.

6. **Determine the total performance score and compare options to decide on a preferred option**

   Multiply the performance and likelihood scores to determine a total score for each cell in Table 1.

The performance and likelihood scores can be multiplied together to determine a total score for each box in Table 1. The total score provides an indication of the relative impact of each option considered. A high number scores better than a low number. Scores should only be used to compare each individual impact for the options considered, so the table is read from left to right, considering each row individually.

The completed matrix in Table 1 can now be used to help determine preferred options for catchment management. It summarises much of the information required to justify decisions including assumptions, indicators, impacts and their likely performance.

An example of a completed matrix for a stormwater project is included in Appendices 2 and 3. The options are by no means exhaustive and would need to be expanded upon for a real life issue.

3.3 Interpreting and documenting MCA processes and results

The MCA matrix highlights the internal trade-offs that are necessary between multiple bottom lines. For this reason, it is important to document the extent to which consensus was reached during group discussions when presenting the preferred options to decision makers. This might be included in an ICMP appendix or accompanying report.

If there is lack of agreement, it may pay to run a sensitivity analysis by changing critical values in Tables 2 and 3 to see what effect this has on the overall outcomes in the matrix (Table 1). A sensitivity analysis can provide valuable insight into the subjective

decision-making process. A sensitivity analysis is a generally good idea in any case, and an example is provided in Kettle (2006). Again, this should be documented in a separate report (if warranted by the significance of the issue) or in supporting materials to the ICMP.

Aggregating or averaging the scores for each bottom line or the project as a whole is not promoted using the method described above, as it can result in important issues being forgotten or misrepresented. However, some authors, notably Taylor (2004) and Kettle (2006), provide methods to aggregate scores which can, given the right circumstances, provide a synthesised comparison of options. This has value where the MCA process has generated a large amount of raw data that managers will not have time to fully digest. In such cases, summary information can be provided by the technical and policy/planning staff involved, and the managers can always provided with the matrices, assumptions and other supporting material if they want to examine the scores for a particular issues or locations in more detail.

To ease readability and promote quick comparison of options, the scores can be colour-coded using a spectrum of shades, for example with red representing the low (undesirable) score, yellow a medium score and green the high (desirable) score.

Another method to aid comparison of a large number of options is to assign an elimination threshold that reduces the number of options by excluding unsuitable candidates. There is no final evaluation, but a stepwise threshold setting of particular criteria to eliminate undesired options and reach a common decision could be to:

- set a threshold value above or below which each impact could be eliminated;
- eliminate or retain the option based on the elimination threshold for each impact;
- repeat the process for a number of impacts to narrow the choice of options; and
- document the thought process.

The MCA process is recommended as an aid to decision-making, not a decision-making tool: it is a process for analysing – not selecting – management options. It is therefore quite legitimate to select an option that has not been ranked the highest. Points of view often change while thinking about the management options, while the importance of issues can also change quickly.

The utility of the matrix lies in its ability to enable users to revisit the issues, their ranking and weightings. Revisiting the matrix is encouraged. Any altering of the options analysis matrix should be clearly documented.

The thinking behind the options selected and their ranking by the MCA process should be summarised in the ICMP with a full reference to the file name and location of additional more detailed information such as the working tables, minutes of meetings, separate options analysis reports and any other relevant information, for future use.

Such summaries can also be used for resource consenting showing that alternative options were considered before selecting a best practical option or options.

Table 1

Multi-criteria analysis matrix (MCA Table 1).

ISSUE ⇨			
OPTIONS ⇨	Option A	Option B	Option C
IMPACTS ⇩			
Places (natural and built environments)			
	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___
	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___
People (cultural and social)			
	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___
	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___
Processes (institutional and economic)			
	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___
	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___	Likely performance: Performance score: ___ Likelihood score: ___ Total: ___

Table 2

Option performance scoring (MCA Table 2).

ISSUE ⇨					
IMPACTS ⇩	 1	2	3	4	5 
Places (natural and built environment) Example impact range: (1) Little benefit (2) Minor benefit (3) Moderate benefit (4) Major benefit (5) Outstanding benefit					
People (cultural and social) Example impact range: (1) Socially undesirable (2) Socially annoying (3) Socially acceptable (4) Socially pleasing (5) Socially desirable					
Processes (institutional and economic) Example impact range: (1) Extremely high cost (2) High cost (3) Moderate cost (4) Minor cost (5) Little cost					

Table 3

Option likelihood scoring (MCA Table 3)

1	2	3	4	5
Rare	Unlikely	Possible	Likely	Almost certain
				

The indicator must be desirable for example, the likelihood of "not drowning". The likelihood score can also reflect the certainty – or level of confidence – in a result:

1	2	3	4	5
Uncertain ◄				► Certain

4 Setting Measurable Objectives

In this section, a simple methodology for setting measurable objectives is overviewed. While this report does not go into detail about indicator selection (an essential consideration for objective-setting) it does provide a useful framework for considering the different time frames and nature of indicators in a way that is highly relevant to some of the complex natural systems that ICMPs manage. There is a worked example in Appendix 4.

4.1 SMARTER objectives

There is a vast literature on setting objectives and management by objectives. Fortunately much of it is focused on simple formulae and checklists that are readily applicable to development of measurable operational objectives for typical catchment management issues and options.

An objective may be defined as the state of affairs that a plan is intended to achieve, or a personal or organisational desired end point, that is reached by a definite time via tasks and deadlines.

Objectives should be framed in positive terms in order to facilitate the development of indicators to monitor progress towards achieving them. To take the example of flooding, it is better to frame the objective around protecting homes than reducing flood damage.

In the context of ICMPs, operational objectives need to reflect and relate to the flow of programme logic throughout the:

- high-level policy requirements (strategic objectives);
- local catchment issues and management option/s;
- management option/s;
- institutional capacity (internal and inter-agency);
- desired MBL outcomes/anticipated environmental results; and
- best practical options for achieving these.

To accommodate all of these factors, the simplest and most comprehensive set of criteria for measurable objectives was deemed to be the "SMARTER" set:

- Specific
- Measurable
- Affordable
- Realistic
- Time-based
- Endorsed
- Relevant.

The earliest use of the "SMART" acronym for objectives seems to have first been outlined by Peter Drucker in his 1954 book "Management by objectives". The final terms for "E" and "R" have been adapted by the authors for the purposes of this project. The terms are explained further in Table 4.

Table 4

SMARTER objectives checklist.

Specific	❒ Outcomes and methods are precisely defined. ❒ Key responsibilities for action are stated clearly in positive terms. ❒ Stated in concrete terms using active verbs.
Measurable	❒ Achievement of the objective can be unambiguously measured. ❒ Indicator/s of achievement relate to issues, outcomes and methods. ❒ Indicators may be qualitative or quantitative (numeric or descriptive) and may include cost.
Affordable	❒ Able to be done with the budget available to both internal and external parties in the required timeframes.
Realistic	❒ Appropriately limited in scope. ❒ Achievable in the time, at the cost and with the resources available.
Time-bound	❒ Set an agreed time/deadline for completion . ❒ May include interim milestone dates towards completion.
Endorsed	❒ Internal and external parties involved in identifying and managing the issue, signing off on relevant authorisations and helping to meet the objective agree to their respective roles.
Relevant	❒ Clearly within the duties and powers of those responsible for action. ❒ Set out sensible and defensible things to do. ❒ Clearly relate to the identified strategic objectives, issues, options and outcomes.

Tip – think about:

❒ What ❒ How ❒ Why ❒ Who ❒ When ❒ Where ❒ Multiple bottom lines

❒ First-order outcomes ❒ Second-order outcomes ❒ Third-order outcomes

❒ Indicator selection and integrated monitoring between regional and district level to meet the requirements of both the Resource Management and Local Government Acts

4.2 Orders of outcomes

Sustainability is the stated goal of many integrated natural resource management initiatives. While it is widely acknowledged that such projects will only yield results in the long-term, typically very little is said about how progress towards this long-term objective is to be achieved. Equally little is said about how progress towards increasingly sustainable forms of development will be monitored and evaluated (Will Allen, pers. comm., 3 May 2007).

One approach which is making progress in this direction is the "order of outcomes" framework (Olsen et al., 1999, 2003; UNEP/GPA 2006). This offers a sequence of tangible outcomes which, if pursued successfully over long-term time periods, can indeed move us towards increasingly sustainable positions. These outcomes frameworks have adopted the term "orders" to classify indicators into the readily distinguishable groups shown in Figure 2.

First-order outcomes are the societal conditions that must be present when a programme embarks upon a plan of action designed to modify the course of events in an ecosystem. Together they form the enabling conditions that are required if management policies, plans and actions are to be successfully implemented. First-order outcomes require:

- A core constituency of well informed private and government stakeholders who actively support the programme.
- Government commitment to the policies in the form of delegated authorities and economic and other resources that make it feasible to implement policies and actions at the necessary ecosystem scale and over the long-term.
- Sufficient capacity in the institutions responsible to implement the agreed integrated plan of action.
- Unambiguous goals to measure programme efforts and progress.
- Second-order outcomes are evidence of the successful implementation of an environmental management programme and are markers of change in observable practices, including:
- Evidence of successful plan implementation.
- Monitoring and documentation of:
    - new forms of collaborative action among institutions;
    - changes in patterns of investment in infrastructure; and
    - changes in practices of resource users in response to regulations and by voluntary actions.

Third-order outcomes are the socio-economic and environmental results that define the ultimate success or failure of the programme. They must be defined in unambiguous terms early on: vague or conflicting goals produce inefficiency and ineffectiveness – hence the usefulness of measurable objectives and outcomes staged in MBL terms. Third-order outcomes are measured by indicators of the achievement of identified goals and may be termed the "reward" for or "harvest" of sustained behavioural change in

the targeted institutions and groups. Third-order outcomes fall into two categories of ecosystem management goals:

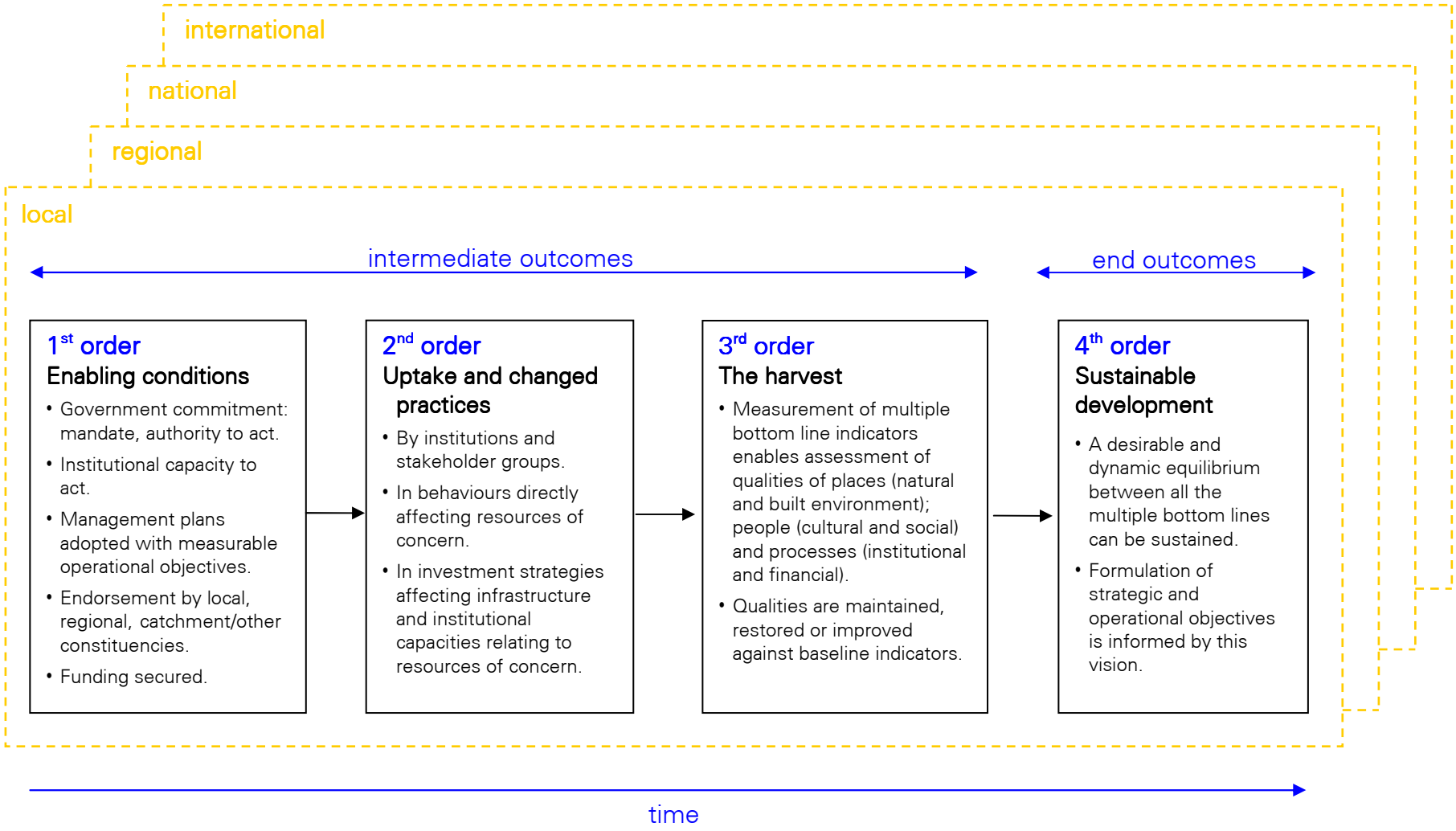
- People: greater equity and diversified livelihoods.
- Ecosystems: sustained or restored qualities and functioning of the biophysical environment.

The ultimate goal of sustainability (fourth-order outcomes) is so far an undefined ideal. It embodies the concepts of balance between competing needs and the moral imperative of not taking actions today that will reduce the ability of future generations to meet their needs. Fourth-order outcomes may:

- Describe a dynamic equilibrium between people and the environment.
- Enable a critique of third-order outcomes to see if the state achieved is sufficient to sustain a healthy, just and equitable human society that is sustaining the qualities of the ecosystem of which it is a part.
- Be used to help develop a vision that is framed in positive terms.

Figure 2

Four orders of outcomes in integrated development initiatives. (Source: After Olsen, 2003; UNEP/GPA, 2006; and Kettle, 2006.)



5 Conclusions and Implications for Councils Preparing ICMPs

The methods detailed in Sections 3 and 4 were favourably received by those attending the workshops in which they were trialled. Nevertheless, their uptake has several implications for councils wanting to adopt them for wider use in preparation, implementing and monitoring the progress of ICMPs.

These include the possible need to:

- Form a team that links to other parts of council and other relevant agencies, including the regional council.
- Prepare tender briefs that:
    - spell out the requirement for measurable QBL objectives;
    - give adequate guidance for consultants tendering for the work; and
    - involve other professionals in the preparation of ICMPs, especially those familiar with the wide range of internal and external statutory instruments under the relevant acts
- Identify resourcing and capacity needs and solutions and be prepared to justify these to senior managers and elected representatives in order to do the job properly.

Once the tenders have been let, council staff may also need to consider the need to:

- Work closely and collaboratively with consultants preparing ICMPs so the key ingredients of a good plan outlined in Ericksen et al. (2003 a and b)are present:
    - appropriate interpretation of the legal mandate for the local area;
    - clearly stated purpose and outcomes;
    - clear identification of issues;
    - well-developed fact base;
    - internal consistency (programme logic: objectives clearly linked to issues; polices to objectives; methods to policies; anticipated results, rules and indicators to all the above);
    - integration with other plans and policy instruments; and
    - monitoring.
- Take a community development approach to identifying issues and solutions (as implied in the Proposed Auckland Regional Plan: Air, Land and Water) as well as monitoring MBL outcomes and plan effectiveness.
- Be prepared to apply more stringent tests to each stage of the process, especially framing catchment management objectives and selecting indicators.

This will almost certainly require more time to be invested in the preparation of new ICMPs, but it could also prove helpful with the detailed action planning needed to implement completed plans, especially where only first-order outcomes were able to be defined.

6 Abbreviations

ARC	Auckland Regional Council
FRST	Foundation for Research, Science and Technology
ICMP	Integrated catchment management plan (for the purposes of this report, the term also encompasses network management plans)
LTCCP	Long term council community plan
MBL	Multiple bottom lines
MCA	Multi-criteria analysis
MCI	Macroinvertebrate community index
PUCM	Planning under co-operative mandates, a FRST-funded programme researching the quality of preparation and implementation of plans prepared under the Resource Management and Local Government Acts
QBL	Quadruple bottom line (economic plus environmental, social and cultural)
WASSA	Water and sanitary services assessment

7 Definitions

To promote consistent understanding of terms, below is a glossary of key terms as they are used in this report.

Bottom lines	Triple bottom line is a management framework that allows an organisation to explicitly assess its economic, ecological and social performance. Quadruple bottom line assessments include cultural performance. The terminology of "multiple bottom lines" has been adopted for this report to avoid the debate that sometimes takes place about the respective merits of triple versus quadruple frameworks.
Strategic objectives	Strategic objectives define the high-level outcomes sought by the national, regional and local legislative, planning and other instruments that influence an ICMP as it is being prepared. These strategic objectives are not necessarily intended to be measurable.
Operational objectives	Operational objectives set out the practical tasks that an ICMP recommends, and that are implemented by influencing other instruments. For the purposes of this project, these are intended to be measurable.
Programme logic	A body of academic and applied theory that explains how programme activities lead to a programme's desired outcomes by conceptualising and testing the causal linkages in a programme.

8 Acknowledgments

The two methods set out in the report for multi-criteria analysis and setting measurable objectives were trialled in workshops with staff of the ARC and local authorities. Their attendance, provision of workshop space and practical feedback is gratefully acknowledged.

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10 Appendix 1: Workshop Attendance

Internal Auckland Regional Council workshop 25 May 2007 at ARC

Claudia Hellberg

Carolyn Blackford

Christine Mitchell

Hayden Easton

Judy-Ann Ansen

Matthew Richards

Consultancy team: Clare Feeney, Nigel Mark-Brown, Conway Stewart, Sam Trowsdale

External Auckland Regional Council workshop 11 June 2007 at WCC

Name	Position	Organisation
Claudia Hellberg	Stormwater technical officer	Auckland Regional Council
Hayden Easton	Stormwater technical officer	Auckland Regional Council
Matthew Davis	Team Leader, Stormwater Action Team	Auckland Regional Council
Godfrey White	Asset Manager, Stormwater	Franklin District Council
Mohammed Hassan	Manager, Stormwater	Manukau City Council
Barry Carter	Stormwater engineer	North Shore City Council
Ragu Ragunathan	Manager, Stormwater	Papakura District Council
Helen Chin	Stormwater engineer	Waitakere City Council
Lawrence Butcher	Project Twin Streams	Waitakere City Council
Anil Karan	Project Twin Streams	Waitakere City Council
Clare Feeney	Consultancy team	Environment and Business Group
Nigel Mark-Brown	Consultancy team	Environment and Business Group
Conway Stewart	Consultancy team	Conway Stewart Planning
Sam Trowsdale	Consultancy team	Landcare Research

11 Appendix 2

Example of a completed MCA matrix (Table 1) for flooding

ISSUE ⇨	Widespread flooding in 5 ha residential area during 1:100 yr storm		
OPTIONS ⇨	A	B	C
IMPACTS ⇩	Refit 30% of pipes with 1100mm concrete pipes	Construct fenced, offline-detention-pond in local park	Distributed storage: 8 bioretention units, 5 rain gardens and 30 rain tanks
Places (natural and built environment)			
Annual load of TSS	Likely Performance: Similar to current load with some increased channel erosion. Estimated 620 kg/ha/yr Performance Score: 2 Likelihood Score: 3 **Total: 6**	Likely Performance: Estimated to remove 60% TSS resulting in load of 280 kg/ha/yr Performance Score: 3 Likelihood Score: 3 **Total: 9**	Likely Performance: Expected to remove most TSS resulting in load of 90 kg/ha/yr Performance Score: 5 Likelihood Score: 3 **Total: 15**
Ecological health in local stream measured using MCI	Likely Performance: Slight decrease in MCI (60-85) due to larger flows in stream Performance Score: 2 Likelihood Score: 3 **Total: 6**	Likely Performance: Slight increase in MCI (85-95) due to reduced peak flows Performance Score: 3 Likelihood Score: 3 **Total: 9**	Likely Performance: Increase MCI (110) due to reduced peak, effective imperv. & baseflow Performance Score: 4 Likelihood Score: 3 **Total: 12**
People (cultural and social)			
Number of habitable floors affected during 1:100 yr event	Likely Performance: 1 - 5 floors affected Performance Score: 4 Likelihood Score: 5 **Total: 20**	Likely Performance: 1 - 5 floors affected Performance Score: 4 Likelihood Score: 5 **Total: 20**	Likely Performance: 5 - 10 floors affected Performance Score: 3 Likelihood Score: 4 **Total: 12**
Safety in terms of drowning	Likely Performance: Risk lower than existing stormwater mgt. (that flooded) Performance Score: 4 Likelihood Score: 4 **Total: 16**	Likely Performance: Risk much higher than existing stormwater mgt. Performance Score: 1 Likelihood Score: 4 **Total: 4**	Likely Performance: Risk similar to existing stormwater mgt. Performance Score: 3 Likelihood Score: 4 **Total: 12**
Processes (institutional and economic)			
Life cycle cost to council (including externalities)	Likely Performance: Estimated cost of $620k Performance Score: 1 Likelihood Score: 4 **Total: 4**	Likely Performance: Estimated cost $380k Performance Score: 4 Likelihood Score: 4 **Total: 16**	Likely Performance: Some cost met by HNZ. Cost to council $550k Performance Score: 2 Likelihood Score: 2 **Total: 4**
Alignment with current district plan	Likely Performance: Achievable with no change to current planning Performance Score: 5 Likelihood Score: 5 **Total: 25**	Likely Performance: Achievable with no change to current planning Performance Score: 5 Likelihood Score: 5 **Total: 25**	Likely Performance: Requires some plan changes Performance Score: 3 Likelihood Score: 3 **Total: 9**

12 Appendix 3

Example of completed MCA Table 1 for stream bank erosion - multi-criteria analysis

ISSUE ⇨	Current channel erosion in a significant stream with proposed future development within the catchment		
OPTIONS ⇨ **IMPACTS** ⇩	**OPTION A** Use LID throughout catchment, including minimising imperviousness, rain gardens, rain tanks, revegetation and retrofit	**Option B** Allow conventional development and provide several large extended detention ponds	**Option C** Provide stream channel erosion protection for new development only
Places (natural and built environments)			
Stream health measured using SEV	Likely performance: increase in SEV due to decreased peak flows Performance score: 5 Likelihood score: 4 **Total: 20**	Likely performance: slight to moderate decrease in SEV due to flows and temperature Performance score: 3 Likelihood score: 4 **Total: 12**	Likely performance: decline in SEV over time due to large peak flows Performance score: 1 Likelihood score: 5 **Total: 5**
Downstream sedimentation	Likely performance: high-level of TSS prevention Performance score: 4 Likelihood score: 3 **Total: 12**	Likely performance: medium- level of TSS prevention Performance score: 3 Likelihood score: 3 **Total: 9**	Likely performance: very low level of TSS prevention and continued stream erosion Performance score: 1 Likelihood score: 3 **Total: 3**
People (cultural and social)			
Kaitiakitanga	Likely performance: good stream protection/guardianship Performance score: 4 Likelihood score: 5 **Total: 20**	Likely performance: some stream protection/guardianship but careful management of ponds required Performance score: 2 Likelihood score: 4 **Total: 8**	Likely performance: poor protection of stream/guardianship Performance score: 1 Likelihood score: 1 **Total: 1**
Impact on amenity/aesthetic value of stream	Likely performance: stream condition improved Performance score: 4 Likelihood score: 5 **Total: 20**	Likely performance: stream condition may be improved Performance score: 3 Likelihood score: 4 **Total: 12**	Likely performance: stream condition maintained Performance score: 2 Likelihood score: 1 **Total: 2**
Processes (institutional and economic)			
Life cycle cost to TA (excluding externalities)	Likely performance: modelled at $900,000 Performance score: 2 Likelihood score: 3 (model certainty) **Total: 6**	Likely performance: modelled $150,000 Performance score: 5 Likelihood score: 4 **Total: 20**	Likely performance: modelled at $15,000 Performance score: 2 Likelihood score: 5 **Total: 10**
Council structure for enforcement and compliance	Likely performance: expected difficulties in enforcing and monitoring to ensure compliance with current council structure Performance score: 2 Likelihood score: 3 **Total: 6**	Likely performance: implementation and compliance in theory is easy as is done by TA Performance score: 4 Likelihood score: 4 **Total: 16**	Likely performance: uncertainty in team responsible for deciding when and what type of channel erosion protection Performance score: 3 Likelihood score: 2 **Total: 6**

MCA Table 2 for stream bank erosion - performance score

ISSUE ⇨	Current channel erosion in a significant stream with proposed future development within the catchment				
IMPACTS ⇩	 1	2	3	4	5 
Places (natural and built environment) Example impact range: (1) Little benefit (2) Minor benefit (3) Moderate benefit (4) Major benefit (5) Outstanding benefit					
Stream health measured using SEV	Stream health very poor eg MCI<60	Stream health poor eg MCI 80-65	Stream health ok eg MCI 85-95	Stream health good eg MCI 95-110	Stream health very good eg MCI> 110
Downstream sedimentation	Very low TSS prevention	low TSS	medium TSS prevention	high TSS prevention	Very high TSS
People (cultural and social)					
Kaitiakitanga	Poor guardianship	Some guardianship	Good guardianship	Great guardianship	Excellent guardianship
Impact on amenity/aesthetic value of stream	Stream condition worsening	Stream condition maintained	Stream condition only slightly	Stream condition improved	Stream condition greatly improved
Processes (institutional and economic)					
Life cycle cost to TA (excluding externalities) Council budget = $150k	Cost above $1M or below $10k	Cost $1M to 500k or $15k to 30k	Cost $500k to 250k or $30k to 80k	Cost $250k to 170k or $80k to 130k	Cost $130k-$170k
Council structure for enforcement and compliance	Very difficult to implement and ensure compliance with current structure	Reasonably difficult to implement and ensure compliance with current structure	Moderately difficult to implement and ensure compliance with current structure	Reasonably easy to implement and ensure compliance with current structure	Very easy to implement and ensure compliance with current structure

13 Appendix 4

Example of a SMARTER MBL objective for managing stream bank erosion and stream health

Below is an example of an objective phrased in a way that allows progress towards the objective to be measured against multiple (TBL/QBL) bottom lines.

By 2008 to initiate a change to district plan and consenting provisions in order to manage development in the catchment with a mix of low impact approaches with extended detention mitigation where practicable, so as to ensure that:

- active channel bank or bed erosion occurs on less than 5 per cent of the length of the channel; and
- MCI does not drop more than 10 per cent below pre-development value or is maintained to at least MCI 95 at a representative location near the outlet to the catchment.

By 2008 to resource the preparation and implementation of a monitoring plan that includes appropriate responses to problems identified, such as increased channel erosion.

By 2008 to resource the promotion of the exercise of kaitiakitanga by supporting tangata whenua to monitor stream condition using appropriate indices.

By 2008 to resource the promotion of local community and other care groups to monitor stream condition using appropriate indices.

By 2008 to prepare a planting plan for the "Significant Stream" catchment by engaging with relevant iwi and community groups

By 2009 to resource one iwi and one community group to carry out voluntary riparian planting and enhancement projects in accordance with the plan.

Checklist

Specific	❒ Outcomes and methods are precisely defined. ❒ Key responsibilities for action are stated clearly in positive terms. ❒ Stated in concrete terms using active verbs.
Measurable	❒ Achievement of the objective can be unambiguously measured. ❒ Indicator/s of achievement relate to issues, outcomes and methods. ❒ Indicators may be qualitative or quantitative (numeric or descriptive) and may include cost.
Affordable	❒ Able to be done with the budget available to both internal and external parties in the required timeframes.
Realistic	❒ Appropriately limited in scope. ❒ Achievable in the time, at the cost and with the resources available.
Time-bound	❒ Set an agreed time/deadline for completion. ❒ May include interim milestone dates towards completion.
Endorsed	❒ Internal and external parties involved in identifying and managing the issue, signing off on relevant authorisations and helping to meet the objective agree to their respective roles.
Relevant	❒ Clearly within the duties and powers of those responsible for action. ❒ Set out sensible and defensible things to do. ❒ Clearly relate to the identified strategic objectives, issues, options and outcomes.