

Development of indicators for monitoring land use transport integration projects July 2010

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Abbreviations and acronyms

BCR	Benefit-cost ratio
GHG	Greenhouse gases
GPS	Government policy statement on land transport funding 2009/10 – 2018/19 (as amended in May 2009)
LGA	Local Government Act 2002
LoS	Level(s) of service
LTCCP	Long-term council and community plan
LTMA	Land Transport Management Act 2003
MoT	Ministry of Transport
NZTA	NZ Transport Agency
PT	Public transport
RLTS	Regional land transport strategy
RMA	Resource Management Act 1991
SCATS	Sydney Co-ordinated Adaptive Traffic System
SOV	Single occupancy vehicle
TMIF	Transport Monitoring Indicator Framework (Ministry of Transport)
VKT	Vehicle kilometres travelled

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Executive summary

This study has shown that monitoring integrated strategies and projects is crucial for giving objectives their best chance of being realised and to provide accountability for funders. The research showed that no single indicator framework fitted all projects but that an appropriate framework could be determined by following a six-step process, as described below:

- 1 Establish governance structures for building consensus around the project. Such structures should include provision for representing private sector interests, as well as public sector interests from a range of different levels (eg central, regional and local government). Provision should be made for early and ongoing consultation with the community likely to be affected by the proposals.
- 2 Agree guidelines for joint working within the governance group. Such guidelines should include specific arrangements for sharing information and the establishment of appropriate specialist teams.
- 3 Establish a project management structure. The distinction between project governance and project management is significant and reflects the range of skills and tasks assigned to each. The project management group(s) will be responsible for the delivery and monitoring of the project outputs.
- 4 Identify project final outcome objectives within the governance group, taking account of higher order plans and strategies which need to be addressed. Processes for reaching agreement may need special assistance from moderators and mediators and may be addressed either bilaterally or ideally multilaterally through the governance structures.
- 5 Identify and evaluate policy and project design options that may satisfy the outcome objectives. The evaluation process should include both cost benefit analysis and financial analysis to make sure a project will attract the necessary funding from both public and private sources.
- 6 Design a monitoring framework, identifying indicators for outcomes, outputs and inputs. Indicators should be evaluated using the criteria identified in this report.

The institutional context for this report is the encouragement by the NZ Transport Agency (NZTA) for land transport project funding applications under the National Land Transport Programme, to be set within integrated sub-regional strategies. In this context, the encouragement of 'packages' of projects emphasises integrated land use and transport projects. Identifying and monitoring indicators of such projects (and the underlying policies) provides for accountability to the funders (the NZTA), politicians, and the public. In keeping with this accountability requirement, the framework established in this study represents a performance management approach to monitoring, based on monitoring the achievement of specified targets within specified timetables and budgets.

The process for monitoring generally starts with resource inputs, moves through project deliverables, and leads to intermediate and final outcomes. However, the development of *indicators* used in monitoring relates closely to the underlying processes of strategy development and project design and follows a different sequence. The development of indicators should commence with identification of the final outcomes (or objectives) towards which a policy is directed, and work backwards from there to the inputs required.

The methodological framework for developing indicators in this report therefore includes the following components:

- The **process** of integration refers to working together and determining an appropriate method of collaboration (the integrated planning process checklist).

- **Final outcomes:** what are the desired long-term impacts of integrated planning? Through identification of final outcomes the planning process should be related to the goals that gave rise to it in the first instance. What are the higher order outcomes to be pursued?
- **Intermediate outcomes:** what near-term outcomes can be used to measure progress towards final outcomes (reflecting the expected causal chain between outputs and outcomes)? Note that intermediate indicators are only required where the final outcomes are difficult to measure in a timely fashion.
- **Outputs:** what policy measures (including both land use and transport) are needed to achieve these outcomes?
- **Inputs:** what resources need to be provided to achieve these outputs?

The remaining sections of the report contain examples of stages of planning and equivalent indicators. The framework established is a methodological framework. Our approach is therefore 'policy neutral'. It is not intended to advocate any particular strategy for achieving integrated planning outcomes.

The framework includes indicator examples of final outcomes, intermediate outcomes and outputs. A summary of the indicators is provided in the following table:

Table ES1 Example of an indicator framework for integrated planning

Final outcome	Final outcome indicators	Intermediate outcomes	Intermediate outcome indicators	Outputs (policy measures)	Output indicator examples	Inputs
Reduce traffic congestion	Waiting time in congested traffic Reliability of commute travel times Road levels of service	(Same as final outcomes)	(Same as final outcomes)	Road pricing Improve public transport services	Create charging infrastructure Information campaign Commence charging Additional public transport (PT) capacity, enhanced plant, greater frequency	Finance and other resources planned and committed Timetable agreed
Increased accessibility of economic and social centres	Reduced journey times, increased activity around hubs, including increased use of PT	New developments around public transport hubs Increased activity in and around hubs, greater PT use	% of new developments within 400m of public transport hub	Concentrate development around public transport hubs	Transport engineering works Completion of development projects	Finance and other resources planned and committed Timetable agreed.
Reduced greenhouse gas emissions from transport network	CO2 and NO2 levels	Mode shift from SOV to public transport	Increased PT passenger numbers in project area	Personalised journey planning to encourage increased public transport use	Information distributed Marketing activities	Finance and other resources planned and committed Timetable agreed
Improved mobility for transport disadvantaged	Number of users and number of PT trips using concession card	(Same as final outcomes)	(Same as final outcomes)	Concessionary fares	Fare schemes introduced Marketing and information activities	Finance and other resources planned and committed Timetable agreed
Encourage better health outcomes from transport	Air pollution levels Mode share for walking and cycling	Improved perceptions of active modes for convenience and safety Impact of school travel plans on behaviour	Surveyed perceptions of residents regarding active modes Mode of travel to schools surveys	Encourage walking and cycling School travel plans	Length of cycleways constructed Pedestrian infrastructure improvements Number of school travel	Finance and other resources planned and committed Timetable agreed

Development of indicators for monitoring land use transport integration projects

Final outcome	Final outcome indicators	Intermediate outcomes	Intermediate outcome indicators	Outputs (policy measures)	Output indicator examples	Inputs
					plans	
Improve safety of transport network	Number of accidents	(Same as final outcomes)	(Same as final outcomes)	Reduce traffic speeds	New and revised speed controls and road markings Advertising campaigns	Finance and other resources planned and committed Timetable agreed
Improved quality of the built environment as a place to work, live and play	Satisfaction with built environment by different target groups	Positive feedback regarding development proposals from residents and businesses	% of positive ratings from business and residents	Urban design guidelines for transport environments (liveable arterials)	Guidelines prepared and distributed. Information and awareness campaigns Capital works schedule	Finance and other resources planned and committed Timetable agreed
Financial success	Financial feasibility for both private and public sector stakeholders	Keeping to budget	Budget details	Expenditure and resourcing levels	Expenditure and resourcing levels compared with commitments	Finance and other resources planned and committed

Abstract

This report sets out the process needed to develop a monitoring framework for integrated land use and transport projects. The report maintains that each project will need a unique set of indicators that reflect the specific outcome objectives for the project. The monitoring framework is therefore 'policy neutral', interpreting integration as a process rather than an outcome in itself. The process of getting agreement for the project outcomes is the starting point and the basis of integration, defined in this report as *joint working for shared outcomes*. The distinction is made between final outcomes (which may be difficult to measure and subject to influence by significant exogenous variables) and intermediate outcomes which are more readily measurable and logically linked to policy outputs. Input monitoring is also part of the framework, recognising the importance of committed finance and resources being available on time and in full to successful project outcomes. The report uses examples of outcomes, outputs and inputs to demonstrate the framework and suggests evaluation criteria for the selection of indicators.

1 Introduction

1.1 Scope of the research

This report suggests a methodological framework for the development of indicators for integrated land use and transport planning in New Zealand. It is intended as guidance for the development of a set of indicators appropriate for each strategy or project. The approach is largely generic within the field of land use and transport planning, providing for a widely applicable approach.

It is important to note that the framework is 'policy neutral'. The report avoids any suggestion of what the outcomes for integrated planning should be. This is a matter of policy debate for the stakeholders involved with each project. Examples are drawn from traditional transport planning fields but there is no reason why the approach cannot be applied to a more diverse set of outcomes.

The rationale for integrated planning reflects the view that multiple agencies working together towards shared outcome objectives are likely to be more efficient and effective and produce better shared and individual outcomes than the same agencies working independently. The role of indicators is to help manage the policy development, implementation and monitoring process so that integrated planning has the best chance of success and future policy-making can benefit from lessons from the successes and failures of the past.

The context is complex urban development projects (typically involving expenditures of \$20 million plus) which combine transport infrastructure and land use development to achieve the project objectives. The principles of the framework, however, are also applicable to the integrated land use and transport strategy and policy development which gives rise to specific integrated development projects. It is likely, however, that the monitoring framework for strategy and policy will differ from that of an individual project. It is also likely that indicators designed for use by the NZ Transport Agency (NZTA) will differ from those of the local community where different priorities may have emerged.

The rationale for the proposed approach is the encouragement by the NZTA of integrated sub-regional strategies to provide the context for land transport project funding applications through the National Land Transport Programme. The encouragement of 'packages' of projects by the NZTA emphasises the integration of land use and transport outcomes. Identifying and monitoring the right indicators for a project provide for accountability to the funders (eg NZTA), decision-makers and the general public.

Indicators can be classified in several ways. In this report they are divided broadly between:

- checklists: mainly nominal indicators relating to best-practice processes for integrated planning
- quantitative: numeric measures of current states and movements between states, eg levels of congestion or distances travelled. These may be expressed as 'ratios' (eg fuel use per capita), as absolute measures, as proportions or percentages, or relative to another (benchmark) standard
- qualitative: ordinal or discursive indicators, often related to attitudinal changes, and sometimes documenting a precondition to behaviour change (which may eventually be reflected in a shift in quantitative measures).

1.2 Objectives

The objective of the assignment is to develop and demonstrate a framework through examples of indicators that can be used for monitoring progress towards integrated project outcomes.

This project is about accountability, the achievement of the goals and objectives of the Land Transport Management Act 2003 (LTMA) and the impacts of the *Government policy statement on land transport funding 2009/10 – 2018/19* (as amended in May 2009) (GPS). Given a National Land Transport Programme budget of \$2.5 billion, this project contributes to the need to continuously improve effectiveness and accountability. This is especially true in the current economic environment, which calls for a renewed focus on the efficiency of urban development.

This research is timely because of the shift from project-based funding to an emphasis on 'packages'. Packages are assessed in the context of higher order integrated strategies and plans. The effectiveness of expenditure needs to be evaluated at this level.

A further need is for a systematic and consistent approach to monitoring that clarifies and leads to consensus about the definitions of terms in widespread use, such as 'integrated land use transport planning' and 'sustainable urban development'. Often, it is not until we consider or see how such goals are to be measured that we can really understand how the concepts are being applied.

There is a significant body of work from Europe on the subject of indicators for integrated planning and development which has been used in the development of this framework for New Zealand. The literature review (see appendix B) addressed in particular the European and Australian experience.

1.3 Contribution to the LTMA and GPS

Ideally, there will be a clear connection between the objectives of land use and transport integration projects, the GPS impacts and LTMA objectives. This connection is largely achieved through the requirement for regional land transport strategies (RLTSs) to be consistent with the LTMA. The RLTS contributes to the higher order context for integrated projects. The GPS guides the allocation of funding under the National Land Transport Programme which provides a strong incentive for project objectives to be consistent with the programme.

1.4 Future value of the study

The projects we are establishing indicators for are primarily based on long-term strategies, with 10- to 30-year planning horizons, usually involving substantial investment in infrastructure and bringing about changes in land use activities. In this context, a systematic and coherent platform for the application of indicators provides a basis for policy development and monitoring adoption and implementation. Consideration of the role of indicators in the policy development process, implementation and monitoring should, however, also have applicability to more tactical policies, for example, those aimed at relatively short-term changes in transport behaviour and land uses.

1.5 Application of findings

The projects most relevant to the framework developed in this research are more often found in the larger urban areas or rapidly growing smaller districts. This report demonstrates the importance of good monitoring of these projects. It is possible that the NZTA will make monitoring a requirement of future funding at the project level, instead of the regional monitoring of RLTS outcomes which is the current focus.

The research recommends separating responsibility for monitoring between the project management structure (incorporating those who should monitor the implementation outputs of the project) and the more permanent strategic or governance planning structures (involving those who should be monitoring inputs and outcomes). This division recognises that the likelihood that certain outcomes will take longer

to achieve than the project implementation stage and therefore need to be the responsibility of a more permanent entity. This will also facilitate learning and shared expertise between projects. Project implementation, however, is best monitored by those closest to it in a more traditional project management framework.

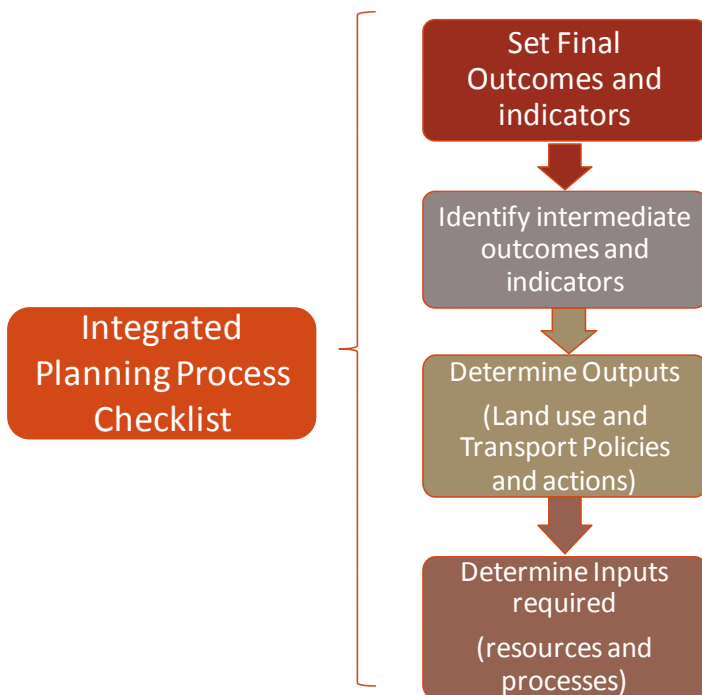
Accountability and reporting of monitoring results may be assigned to local or regional governance structures and to the NZTA, as appropriate.

1.6 Indicator framework overview

It is useful to make the distinction and connections between the two processes of project design and project implementation. Project implementation uses outputs (policy measures) to achieve outcomes (objectives) while the project design process starts with objectives (desired outcomes) and determines which inputs and outputs are required to bring them about. The two processes effectively mirror each other. The indicators for monitoring implementation should reflect the logic of the project design and will therefore be different for every project, reflecting the differences in outcomes and policy methods selected to achieve them. This has led us to develop a methodological framework using examples instead of presenting a comprehensive set of indicators. The only generic aspects of integrated planning relate to the processes of working together towards shared outcomes.

The proposed indicator framework relates closely to a process of strategy development and project design, starting with the identification of final outputs (or objectives) and working backwards to the inputs required (figure 1.1). The second stage, arguably the most important for monitoring, is the identification of 'near term' or intermediate outcomes which can be used as proxy measures for final outcomes. Final outcomes often relate to long-term targets (up to 30 years in the case of the RLTS) and can be influenced by a range of events and trends outside the control of the project itself. Monitoring intermediate outcomes provides a way of keeping the focus on the likelihood of achieving final outcomes and meeting the underlying objectives throughout and beyond the implementation stages. In strategic planning terms it may provide for policy feedback, whereby inputs and outputs may be modified when intermediate outcomes are not being achieved in the manner expected.

Figure 1.1 Process for selecting indicators



The diagram implies the following process for integrated planning:

- The **process** of integration refers to working together and determining jointly what methods of collaboration are appropriate (the integrated planning process checklist).
- **Final outcomes**: what are the desired long-term impacts of integrated planning? Through identification of final outcomes the planning process should be related to the goals that gave rise to it in the first instance. What are the higher order outcomes to be pursued?
- **Intermediate outcomes**: what near-term outcomes can be used to measure progress towards final outcomes (reflecting the expected causal chain between outputs and outcomes)?
- **Outputs**: what policy measures (including both land use and transport) are needed to achieve these outcomes?
- **Inputs**: what resources are required to achieve these outputs?

These stages are outlined in more detail in the following sections.

2 Developing a monitoring framework

Process indicators take the form of a checklist and guidelines for different stages of the policy development and implementation process.

2.1 Performance management

The indicator framework can be set in the context of a performance management process which evaluates progress against specific targets (figure 2.1) throughout the process.

Figure 2.1 Performance management cycle



Source: CIMA (2000) *Performance management for best value provision of central support services*. Chartered Institute of Management Accountants.

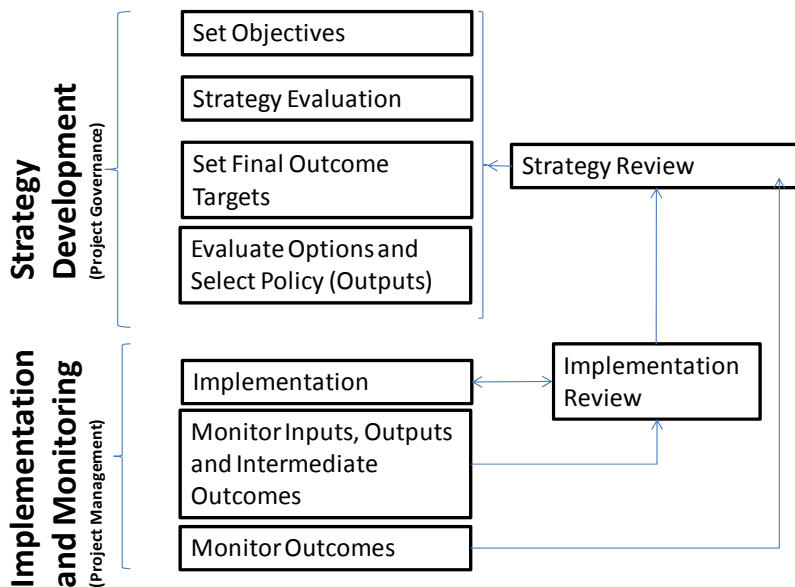
For this process to be effective the objectives should ideally be interpreted in part, at least, as quantifiable targets with indicators developed to measure progress towards them.

The context for integrated planning is more complex than that shown in figure 2.1 because processes of strategy development and interim stages of monitoring between determining objectives and monitoring outcomes need to be accommodated (figure 2.2). Even this process is a simplification of reality. Provision needs to be made for feedback processes as policy development and implementation may lead to modification of objectives and outcome targets.

The process is further complicated by the fact that objectives may be set on the one hand by professional officers on technical and managerial grounds for endorsement by politicians. They are likely to reflect perceived capacity to deliver - or current constraints on action - rather than necessarily the most appropriate outcomes. On the other hand, objectives may derive directly from political input with minimal technical or management advice or an appreciation of the capacity to deliver.

The fragmented and complex character of many projects also complicates the process. The division of projects into several stages for example, can mean that components of the project will be at different stages at any one time and require carefully coordinated monitoring.

Figure 2.2 Integrated planning process and review



The complexities outlined above illustrate the importance of establishing a strong governance structure for integrated working at an early stage (strategy development) and maintaining it through to completion (strategy review). It is through the reviews of strategies and their successes that progressive improvements to policy formulation can be achieved, based on proven links between policies and outcomes.

2.2 Project implementation

Processes for maintaining integration at the implementation stage will be assisted by arrangements that ensure that agencies work together effectively and provide for the use of indicators in the performance management structures. It is important that a project has established robust governance structures at an early stage to facilitate stakeholder engagement and build consensus around the aims and objectives.

The guidance given here does not provide for specific structures but is intended to ensure that governance structures appropriate to an integrated project are established at an early stage of a project (the planning stage) and that they act as inclusive agencies for stakeholder engagement.

The governance structure for a project should be distinguished from project management structure (figure 2.2). The former is concerned with building consensus among stakeholders to set the parameters of the project; the latter is concerned with financing and carrying a project that has been agreed on through to completion. There may be circumstances where special powers provide for the two roles to sit within the one organisation (eg urban development agencies and possibly the Auckland Waterfront Development Agency), but usually these will be separate. The grounds for separation are the different skills required, different communications requirements and protocols, and improved accountability. We also suggest that there are different responsibilities with regard to different components of the monitoring task.

Governance structures may be permanent structures that oversee a range of different projects (eg Smart Growth Bay of Plenty) or set up specifically for a single project (eg Auckland Manukau Eastern Transport Initiative). The structures should be supported by documented agreements which might define roles,

powers and inter-institutional relationships, set out, for example, in memoranda of understanding or contracts. They may involve a range of stakeholders from different levels and specialisations of government as well as private sector interests. Despite different backgrounds, motivations and skills, however, their mandates in the governance setting will relate to oversight and higher order decisions rather than implementation and operational decision-making.

The governance group will also have responsibility for developing a community engagement strategy to make sure that community concerns are identified and considered earlier rather than later.

The project management entities may also be based on any one or a combination of several different structures ranging from single private developers, through public private partnerships, state or community owned organisations, to government agencies or departments. Experience has shown the need for written understandings between private and public sectors working together to provide the basis for resolving any disputes.

The presumption of a significant (if not dominating) role for the public sector comes from the requirement for public funding of transport and other infrastructure and the responsibilities of councils for land use and transport planning. It is possible, however, that some projects will be initiated by private developers and retro-fitted to the existing planning framework. In these circumstances, the public agencies may play a lesser role, although the differentiation of governance and project management structures is still important to integrating public infrastructure and private investments.

International experience also suggests that these structures should make provision for the process of monitoring and evaluation of the projects. It has been found that the establishment of specialist groups for this purpose ensures the appropriate emphasis is placed on performance management and accountability.

2.3 Outputs and policy development processes

The field covering policy development practices is beyond the scope of the current research. However, the central importance of the policy development stage for successful integrated planning requires that some key issues are addressed.

Earlier comments regarding 'vertical integration' (between different levels of government) were reflected in the literature review's emphasis on addressing the context for projects in higher order plans and strategies (METREX 2007). The NZTA encouragement for funding proposals to be set in the context of integrated sub-regional strategies (or plans) provides one such example. The expectation that these strategies will refer to the RLTS is another. However, the RLTS is unlikely to provide the land use context for the sub-regional strategy, so reference will need to be made to other plans and strategies. Relevant land use plans may include the regional policy statement and district plans prepared under the Resource Management Act 1991 (RMA) and non-statutory plans prepared under the powers and responsibilities contained in the Local Government Act 2002 (LGA). The relationship between the proposed developments and community outcomes and the council's long-term council and community plan (LTCCP) will also need to be considered.

The development of policy requires consideration of options and will often call for a comparative cost benefit evaluation. These processes are required for the NZTA funding processes under the RLTP and are provided for as an important component of policy evaluation under s32 of the RMA. Procedures for conducting these studies in relation to projects are set out in the NZTA *Economic evaluation manual* although the methods are far from simple and constantly under review. The GPS indicates a renewed emphasis on benefit-cost ratios (BCR) as an indicator of efficiency for project assessment.

The difficulty of defining policy options for evaluation has been seen as a barrier to integrated planning overseas and this may also apply to some areas in New Zealand. In some cases policies become driven by political agenda and are not necessarily the best options to achieve the desired outcomes. This problem has been explicitly addressed in Kelly C et al (2008) and an interactive online tool (the Konsult website) has been developed for (at least a preliminary) assessment of options to suit particular circumstances. See www.konsult.leeds.ac.uk/private/level2/I2_sele.htm

The Konsult website is an interactive tool for developing policy options to fit specified problems or outcome objectives. The aim is to provide a broad suite of policy areas from which individual measures might be selected, potentially confining the scope of politically motivated initiatives to those known to be effective on technical grounds. Conversely, it might be expected that technical fixes would be selected or fine tuned in response to political expectations.

The policy measures put forward for consideration are covered under six headings, although the same measures may overlap some of these headings:

- **Land use measures:** regulating densities and mix, aligning development contributions with desired land use outcomes, setting parking standards for areas, influencing development patterns through prioritising public investment in infrastructure and amenity
- **Attitudinal and behavioural measures:** individualised marketing and public education programmes to reduce car use, encourage ride sharing, work and school travel plans, and foster home and neighbourhood based work
- **Infrastructure measures:** new roads, railway lines, stations, park and ride facilities, cycle routes, walkways, truck parks
- **Management of infrastructure:** traffic management, parking controls, public transport service levels, high-occupancy vehicle lanes, bus lanes, cycle lanes.
- **Information provision:** real-time passenger information, parking guidance information systems, trip planning systems, conventional signage
- **Pricing:** parking charges, fuel taxes, vehicle taxes, fare levels, road user charges.

The authors of the Konsult website refer to the need to consider carefully how these measures are combined either to complement each other for effectiveness (eg parking charges and road pricing) or else for tactical reasons, such as helping to mitigate the perceived adverse effects of the measures (eg improved public transport can be used to mitigate the social equity concerns associated with road pricing).

The indicator frameworks developed for each project should trace the linkages between the various aspects of policies and projects. This can be demonstrated by grouping policy measures under different outcomes (and intermediate outcomes) and including both complementary and mitigating policies. Use of the Konsult website can assist with this process.

2.4 Implementation plans

Earlier work on integrated planning (Dunbar et al 2009, pp56-57) highlighted the importance of project implementation plans built on both financial analysis and economic evaluations. Financial analysis is needed to establish that the proposed changes are likely to be implemented. Where the financial analysis fails to show an adequate return but economic evaluation shows significant net public benefits, indicating market failure, then public subsidies or incentives for a project may be justified. This may happen, for

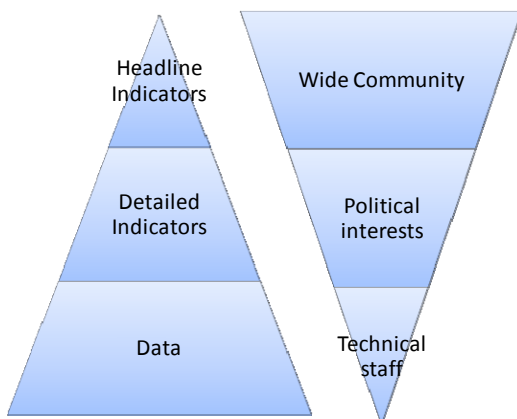
example, where the proposed developments offer substantial travel time savings as a result of intensive mixed use development around transport hubs. In these circumstances a public subsidy or incentive may advance land use changes ahead of what may have occurred if the market had been left to follow its course.

The issue of time lags is another concern which needs to be considered. For example, infrastructure may be built in advance of private investment in land use changes as part of the incentive for private development to occur. The time lag, however, may be considerable and should be considered in the option evaluation stage. Sometimes delaying infrastructure investment can improve the economic evaluation but may unnecessarily delay any perceived wider or external benefits of the development. Using public subsidies to bring forward the private investment is an alternative that should also be considered.

2.5 Communicating the monitoring results

The setting of targets and the measurement of indicators provides the basis for a performance management approach. Among the criteria for evaluation of indicators is a requirement that they be easily understood by politicians and the community as well as by technical staff. The level of detail required and the need for a set of indicators that is easy to understand is inversely proportional to the size of the audience (figure 2.3):

Figure 2.3 Adjusting indicators to suit the audience



Source: Adapted from a presentation by Peter Meadows, Statistics New Zealand 2005

The implication is that indicators are required at different levels of detail to assist with communicating progress to a wider audience, to facilitate project review, and thereby increase accountability.

2.6 Community engagement

A key component of implementation is the community engagement strategy. Early consultation and the incorporation of community concerns in the project specifications and good two-way communications with the community can provide for a smooth passage through statutory planning consent processes at a later stage. The overall net benefit of the project may also be enhanced by a thorough understanding of community needs and concerns.

The literature review highlighted three main components of community engagement which need to be considered as part of the strategy:

- 1 The day-to-day communications mechanism between citizens and the local authorities
- 2 The need to establish forums at the local or neighbourhood level to discuss project plans for the local areas (a similar approach can be applied to special interest groups) with the emphasis on local relevance
- 3 The need to establish forums at the city-wide or regional level where groups of citizens and other stakeholders have a chance to contribute to the wider vision. In this area too, targeting the consultation to issues of relevance to the different groups is recommended.

Finally, the literature emphasises the need to adequately resource the consultation project and deliver a clear statement of how the results of the consultation will be incorporated in the decision-making.

2.7 Integrated working

All stages of integrated planning require multiple agencies - people - working together towards shared outcomes. This requires an understanding of who should be involved and how the teams should be organised. The literature review identified the importance of human interaction as well as technical processes. The success of the integrated planning process depends upon the sharing of information and expertise in formal and informal work settings. The following actions have been identified as important for successful joint working (Hull et al 2007):

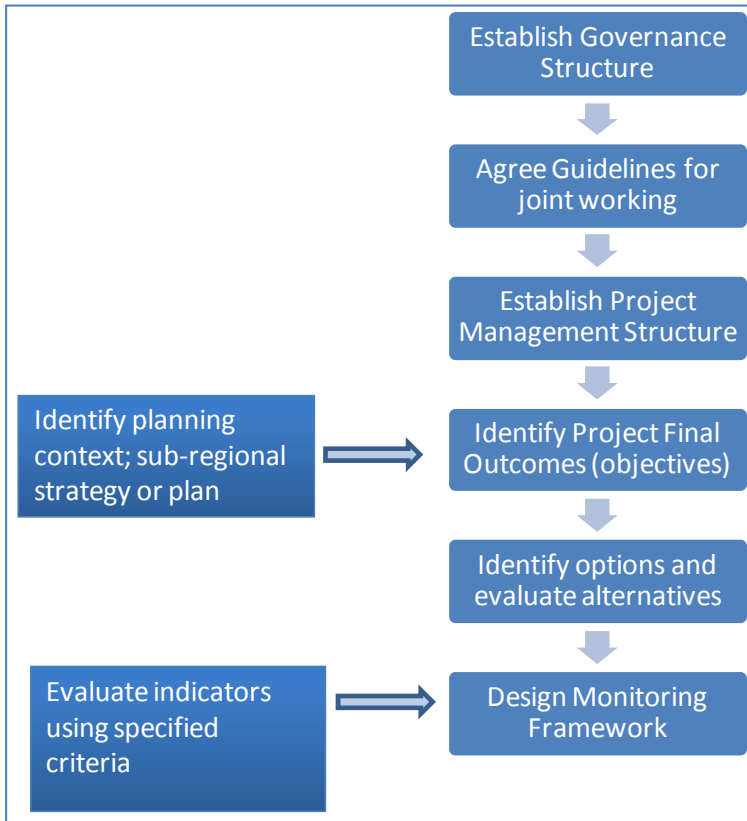
- Establish the necessary working groups (teams).
- Establish a formal mechanism through which the need to share information is discussed.
- Identify the problems to be addressed.
- Develop a method for analysing the problem.
- Have a process for selecting options (possible solutions).
- Check for potential 'barriers', eg political or public opposition.
- Examine the context of the decision-making process (political, economic, social, technological or environmental).
- Establish common goals with partners.
- Ensure top-level support for the process.
- Encourage close and frequent contact between participants.
- Equal status of representatives from different areas
- Work to develop informal mechanisms to support progress between formal meetings.

The literature also emphasises the importance of both vertical integration (between different levels of government and, if appropriate, business) and horizontal integration (between different disciplines and specialisations). Implicit in this is the need to ensure that relevant higher order plans and policies from both land use and transport areas are considered at the policy or project development and implementation stages.

2.8 Integrated planning process checklist

The following diagram and discussion summarise the process of integrated planning outlined in this section:

Figure 2.4 Summary of process guidelines



The six steps illustrated can be described as follows:

- 1 Establish governance structures for building consensus around the project. Such structures should include provision for representing private sector interests, as well as public sector interests from a range of different levels (eg central, regional and local government). Provision should be made for early and ongoing consultation with the community likely to be affected by the proposals.
- 2 Agree guidelines for joint working within the governance group. Such guidelines should include specific arrangements for sharing information and the establishment of appropriate specialist teams.
- 3 Establish a project management structure. The distinction between project governance and project management is significant and reflects the range of skills and tasks assigned to each. The project management group will be responsible for the delivery and monitoring of the project outputs.
- 4 Identify final outcome objectives within the governance group, taking account of higher order plans and strategies which need to be addressed. Processes for reaching agreement may need special assistance from moderators and mediators and may be addressed either bilaterally or ideally multilaterally through the governance structures.

- 5 Identify and evaluate policy and project design options that may satisfy the outcome objectives. This evaluation process should include both economic and financial analysis to make sure the projects will attract the necessary funding from both public and private sources.
- 6 Design a monitoring framework, identifying indicators for outcomes, outputs and inputs. Indicators should be evaluated using the criteria identified in this report.

2.9 Case studies

As part of the methodology for this project (see appendix B for more details), the conceptual framework was tested on three New Zealand case studies. Recently funded NZTA projects were redesigned, using the framework, to describe how they might have been managed differently using the recommendations arising from this research. Written case studies were then sent to planners in the three areas as well as one developer, and follow-up meetings were held to discuss their value.

While there was general agreement with the principles of the process outlined above, concerns and barriers were also identified. The comprehensive (inclusive) nature of the proposed governance structures was seen as problematical in several respects: obtaining agreement among so many stakeholders might be difficult; the implied sharing of power that comes from 'joint working towards shared objectives' might prove difficult; and the number of people involved might prove difficult to manage.

One issue raised was the need to accept 'adequate profitability' as a final outcome of critical importance for private sector developers. It was felt that having this as an open objective allowed the negotiation of the project to become more realistic. This issue corresponds with the recommendation that financial analysis should be included in the broader integrated project assessment. This will include financial requirements of the public sector as well as private developers.

Finding means to overcome these difficulties is beyond the scope of this paper but we emphasise the critical importance of doing so. For example, it may be more practical to develop a series of bilateral agreements rather than trying for a single multilateral agreement; or it may be necessary to look for compromise solutions based on enlightened self-interest where consensus is impossible.

The process is a recognised departure from traditional regulatory planning processes where the planning input stops at providing the context for private investments. Instead, the process encourages local government to take an active interest in implementation in partnership with the private sector as appropriate, and in doing so recognise and accommodate as far as reasonable the drivers of private sector commitment. Consideration of how this can occur at an early stage is seen as crucial for successful realisation of outcomes and objectives.

The barriers identified in the case studies are likely to be encountered in any event. What the governance structure does is to bring forward the identification of problems associated with the integration of higher order decision-making and provide a forum for resolving difficulties at an early stage and outside of the adversarial processes of the Environment Court. One case study participant welcomed the potential for smoother resource consent processes following a broader agreement on outcome objectives and the specification of outputs required among the main stakeholders.

The complexities of the proposed processes (however justified) require some consideration of whether or not they are justified in any given instance. The need is likely to be greatest in the case of the implementation of projects that require both land use and transport investments to achieve the outcome objectives. As integrated planning becomes more standard, more projects will have both land use and transport impacts analysed together. Even projects where the emphasis is on long-term and lead

transport infrastructure (such as an additional Waitemata Harbour crossing), anticipating the potential land use implications in advance and including these in project evaluations would seem to be advisable. Small-scale projects or those with little need for public infrastructure provision may be the least affected by these proposals.

The suggestions that project implementation plans should include both economic cost-benefit studies and financial analysis is intended to bring forward the evaluation that will eventually be required by the NZTA. Uncertainty around the project timing can be tested in a sensitivity analysis based on the BCR calculations. Where there is a wide difference between the financial analysis (negative) and the BCR (positive), opportunities to incentivise the private sector may be found. These might include early provision of transport infrastructure, concessions on development contributions, rates relief etc.

As the BCR becomes a more significant aspect of the NZTA assessment process, there may be efforts to add a wide range of benefits into the calculations. The NZTA process is quite flexible in this regard with wider economic benefits arising from agglomeration now included in the economic evaluation as well as health impacts of active modes. There are also provisions for 'context specific' BCR calculations where traditional transport benefits and costs are not applicable, such as in the case of traffic calming measures where the objective is to slow rather than speed up travel.

3 Final outcomes

Final outcomes are the medium- to long-term goals of integrated land use and transport policies and projects. They relate to the rationale for the policy intervention in the first place.

Final outcomes cover issues of concern such as traffic congestion, road safety, accessibility and vehicle emissions. These in turn relate to higher order objectives of, for example, sustainable development and efficient urban form, the local or regional quality of life, social equity, or environmental quality. The suggested framework acknowledges these higher order drivers, but is focused on more tangible land use and transport outcomes.

The determination of final outcome indicators appropriate for the policy or project in hand sets the context for determining other indicators including distinguishing between final and intermediate outcomes. In effect, the final outcomes relate to long-term strategy or policy objectives, while intermediate outcomes relate to the more immediate effect of the policies on the investment and behavioural or other changes required to achieve the final outcomes.

The distinction between intermediate and final outcomes is not fixed, however, and may vary according to where we enter the policy-making process. For example, reducing traffic congestion may be the long-term or final outcome of a strategy intended to reduce private vehicle use, lower average trip length, increase vehicle occupancy and boost public transport patronage. On the other hand, the reduction of traffic congestion may be a short- to medium-term intermediate outcome of a policy to improve the economic efficiency of the road network.

Related to this, the literature review identified the importance of tracing the logical linkages between different levels of indicators. Final outcomes are the start of the process. Other indicators should relate to measures or policies put in place to deliver these outcomes. Ideally, all indicators will be specified as targets with SMART characteristics: specific, measurable, achievable, realistic and time-bound.

The process of selecting final outcomes and targets for policy development will be driven partly by analysis of local issues and partly by the political response, as illustrated by a range of examples (table 3.1). This process will strongly influence which policies are chosen for implementation and how urban development projects are designed. It is unlikely that targets will be specified at the start of the process because of the need to know the costs, resource requirements and availability (including funding). It is more likely that the targets will follow detailed investigations of the issues and possible policy options, their costs and feasibility.

The types of final outcome referred to here are similar to those found in a number of RLTSs and other less-integrated land use or transport strategies. The distinction between these strategies and what is proposed here is the process of working together between different agencies and specialisations to achieve greater integration of policy measures at the implementation stage.

Table 3.1 Examples of final outcome indicators and targets

Final outcomes	Final outcome indicators	Examples of targets
Reduce traffic congestion	Waiting time in congestion Reliability of commute travel times Road levels of service (LoS)	Reduce average time spent waiting by x% by yyyy(year) Reduce the variability of commute travel times to no more than X% over a week by yyyy (year). Maintain specified roads LoS X% > level C by yyyy.
Increased accessibility of economic and social centres	Reduced journey times	Average journey times for specified trip purposes to reduce by X% by yyyy.
Reduced greenhouse gas emissions from transport network	CO2 and NO2 levels	Reduce to levels recorded in 1990 or less by yyyy.
Improved mobility for transport disadvantaged	Number of concession card users and number of trips per card.	X% of those eligible and usage per card increasing year on year.
Better health outcomes from transport	Mode share for walking and cycling Air pollution levels	Active mode shares for primary school children to be X% or more by yyyy. Less than 10 recorded incidences of pollution levels above specified health standards.
Improve safety of transport network	Number of accidents	Reduce road deaths and serious injury from road crashes by X% by yyyy.
Improved quality of the built environment as a place to work, live and play.	Satisfaction with built environment by different target groups	X% 'very satisfied' by yyyy.
Financial feasibility: for both private and public sector investors	Progress against budget	Budget parameters

4 Intermediate outcomes

Final outcomes may be influenced by a range of different factors, many of which will lie outside the immediate policy domain. For example high oil prices might lead to lower traffic congestion independently of, say, a project promoting public transport around a major transport-oriented development. As a result, the measures chosen may not be good indicators of the success of the project. We therefore suggest care in selecting intermediate indicators to ensure that they are closely related to the specifics of the project (outputs) and reflect as far as possible the causal mechanisms underlying the chosen strategy.

Table 4.1 suggests suitable intermediate outcomes and indicators that fit within the framework developed for final outcomes, taking into account the hypothetical policies (outputs) planned.

In some cases the intermediate outcomes may be tracked using similar indicators to the final outcomes but with different targets. The **road safety target**, for example, of X% reduction in accidents by yyyy (year), may be converted to a smaller change over a shorter time period. In these cases no intermediate indicators are suggested. Similar conclusions were reached for the **road congestion** and **mobility** outcomes where final outcome indicators are relatively easy to measure and therefore separate intermediate indicators are not required.

In other cases, proxy measures will be needed that suggest the direction and broad magnitude of movement toward the final outcome targets, reflecting the strategy in place. For example, a **health-**related final outcome may be monitored through evidence of behaviour change arising from, for example, school travel plans or through public perceptions and acceptance of more active transport modes.

Enhanced accessibility as a final outcome provides an example using a proxy measure as an intermediate outcome indicator. The final outcome goal of increased accessibility of economic and social centres can be addressed by, among other measures, land use policies that encourage new developments around public transport hubs. The rationale may be that this will make public transport more convenient both for trip origins and destinations. The proposed measure of accessibility is average journey time for different journey purposes. The cost of measuring travel time reliably and on a regular basis suggests that we may need to find another measure that is more readily available. Since the policy is designed to attract development in certain locations we might consider a land use based indicator, demonstrating how the indicators may be related to the policy measures proposed. It is possible that developments will be attracted to public transport hubs as planned, but that average journey times do not fall. If this is the case, future strategies may need to consider alternative approaches to improved accessibility.

Reducing greenhouse gas (GHG) emissions may be addressed by encouraging a shift from single occupancy vehicles to multiple occupancy vehicles, especially though increased use of public transport. Observed changes in GHG levels may take time to take effect, however, and therefore difficult to monitor on a regular basis. However, the presumed means by which the reductions occur (increased public transport (PT) patronage) can be readily measured via intermediate outcome indicators.

Table 4.1 Intermediate outcomes, indicators and targets

Final outcome	Intermediate outcomes	Intermediate outcome indicators	Intermediate outcome targets	Final outcome indicators
Reduce traffic congestion	(Same as final outcomes)	(Same as final outcomes)	(Same as final outcomes)	Waiting time in congested traffic Reliability of commute travel times Road levels of service
Increased accessibility of economic and social centres	New developments around public transport hubs.	% of new developments within 400m of public transport hub	X % of new developments each year within 400m of public transport hub	Reduced journey times
Reduced greenhouse gas emissions from transport network	Mode shift from SOV to public transport	Increased PT passenger numbers in project area	Growth of X% per year for next 5 years	CO2 and NO2 levels
Improved mobility for transport disadvantaged	(Same as final outcomes)	(Same as final outcomes)	(Same as final outcomes)	Number of concession card users and number of trips per card.
Better health outcomes from transport Improved perceptions of active modes for convenience and safety.	Impact of school travel plans on behaviour Surveyed perceptions of residents regarding active modes	Mode of travel to schools surveys X% positive ratings	Consistent trend towards active modes	Air pollution levels Mode share for walking and cycling
Improve safety of transport network	(Same as final outcomes)	(Same as final outcomes)	(Same as final outcomes)	Number of accidents
Improved quality of the built environment as a place to work, live and play.	Positive feedback regarding development proposals from residents and businesses.	% of positive ratings from business and residents	X% positive rating	Satisfaction with built environment by different target groups

Similar arguments apply to **better health outcomes** (where attitudes towards active modes are measured alongside the number of travel plans). Both of these examples show how the policies designed as the levers of change can become the short-term proxy measures (intermediate outcomes) for monitoring movement towards final outcomes.

The remaining final outcome in our example refers to **urban design** issues and the quality of the built environment. The final outcome may be monitored by overall satisfaction with the built environment. Like an improvement in GHG emissions, this may change only slowly. Individual development proposals however, can be assessed at the design stage and individually for their contribution to urban design improvements. While there are undoubted cumulative effects from a number of progressive developments, not all of them related, we can still get some indications of appropriate directional movements by seeking feedback from both business and residents affected by the proposals.

In doing so we might also address an emerging high-level goal behind the promotion of enhanced urban design, in part through mediation of transport impacts: a growing commitment to place making. An area may, for example, score well on quantitative indicators relating to public transport use, active modes and single occupancy vehicle use, while scoring poorly on other more subjective indicators relating to the quality of local life. The incorporation of survey based measures of satisfaction with a location, or with indicators of social instability (graffiti, the incidence of street crime, transience, for example) may be necessary to ensure that the multiple objectives and indirect effects associated with integrated land use and transport programmes are fully accounted.

Some participants in our review of past projects suggested the use of land values to measure urban design benefits. While there may be circumstances where this is appropriate, there are also limitations. Where affordable housing is a goal (for example), increased land values as a measure of success will not be consistent. Land prices may also rise from speculation or from discrepancies in supply and demand which is not necessarily an indicator of favourable urban design outcomes.

While there may be circumstances where land values are appropriate indicators, some caution is warranted. Further research is currently in progress by the NZTA studying the relationship between a range of urban design issues and land values, which may contribute further to this debate.

As data availability improves, the nature of the indicators may also change. For example, developments in software for measurement of accessibility will make a range of indicators available that are currently difficult or expensive to measure. Table 4.2 shows examples from applying bespoke software developed by Abley Transportation Consultants for Greater Christchurch.

Table 4.2 Public transport accessibility indicators

Final outcome	Indicators	Target
Improved household accessibility	% of households who can get to 2 or more activity centres by PT within 30 minutes	Increases over time from a base of 43% in 2008/09
	% of households within 500m walk of a bus stop	95%

Source: Adapted from Abley Transportation Consultants Limited

5 Outcomes indicator evaluation

5.1 Evaluation criteria

The indicators developed for final and intermediate outcomes have been derived from the hypothetical strategies developed in the examples and from knowledge about data availability in New Zealand. They have been used to illustrate the monitoring process developed in this study. The process is continued in this section by assessing candidate indicators for the outcomes outlined against the following criteria:

- **Validity:** Is the indicator a true reflection of the issue under investigation? Is it defensible?
- **Relevance:** Does the indicator measure trends and patterns in our target areas? Does the indicator measure what we may consider to be a priority issue?
- **Is the indicator measurable?** This refers to the availability of information, the form measurement might take, and the capacity to interpret it in an unambiguous manner (or the capacity for reasonable interpretation).
- **Are there data sets available to measure it?** This relates to accessibility issues and cost as well as the presence or otherwise of measurable data, and may underpin decisions to undertake direct measurement for the policy or project in hand.
- **Time related and repeatability:** Are there time series or records available that provide a historical perspective against which to assess future changes? And will there be future data available, or will it be practical to maintain future series?
- **Understandability:** Is the indicator meaningful; is it influenced by the preceding considerations, and communicable, ie can the indicator and interpretation be presented in an easily understandable way?

In this identification and assessment of intermediate indicators, the practicality of direct collection – by measurement, observation, or survey – has not been assessed. In practice, developing and collecting indicators directly is an important option, especially for substantial projects. More commonly, deriving indicators from sources developed for other purposes will be the most cost-effective basis for assessing project outcomes.

5.2 Validity and relevance

The indicators have been selected for the hypothetical examples to be both valid and relevant. Table 5.1 describes how these criteria apply to the suggested indicators.

Table 5.1 Validity and relevance evaluation

Final outcome	Final/intermediate outcomes	Final/intermediate outcome indicators	Explanation
Reduce traffic congestion	Reliability of commute travel times Road levels of service	Variability of commute travel times Levels of service on main roads affected by the project	The economic and social costs associated with congestion arise partly from the longer journey times and partly from the uncertainty of journey times. Journey times become affected when road traffic volumes exceed design capacity resulting in a lower level of service.
Increased accessibility of economic and social centres	New developments around public transport hubs.	% of new developments within 400m of public transport hub.	This example strategy for addressing accessibility is a land use policy. Its success will depend on the attraction of developments in selected areas and the indicator reflects this.
Reduced greenhouse gas emissions from transport network	Mode shift from SOV to public transport	Increased PT passenger numbers in project area.	Mode shifts away from single occupancy vehicles in favour of PT will reduce GHG emissions. Evidence of increased PT usage in the study area will indicate such a shift and will be more easily available than mode shift data that will require expensive household surveys.
Improved mobility for transport disadvantaged	Increased travel by transport disadvantaged on PT	Number of users and number of PT trips using concession card	Mobility is a less direct measure of transport social equity than accessibility, but is also easier to measure. The use of PT concession cards to increase the mobility of lower income groups is the example chosen and the uptake of these cards and the use made is a good indicator of their success.
Encourage better health outcomes from transport	Improved perceptions of active modes for convenience and safety. Impact of school travel plans on behaviour.	Surveyed perceptions of residents regarding active modes. Mode of travel to schools surveys.	Encouragement for walking and cycling are among methods used for increasing health outcomes from transport. Direct measurement of times and distance spent walking and cycling is potentially expensive. Surveys about perceived convenience and safety of these modes are likely to reflect actual usage. Monitoring of school travel plans is a special case where data is often easily available and can be used.
Improve safety of transport network	Number of accidents	Reduced numbers of deaths and serious injuries within the area.	These data are expected to be available at local area levels and directly measure the final outcomes.
Improved quality of the built environment as a place to work, live and play.	Positive feedback regarding development proposals from residents and businesses.	% of positive ratings from business and residents	Urban design is encouraged by use of design guidelines for developers. These may be either site specific or generic. The test of their success however is in the public's reaction to developments that take place, both before and after they are built.

5.3 Measurability and data sources

Table 5.2 summarises our preliminary assessment of the availability of data for various indicators. The main sources reviewed for this project were the Ministry of Transport's Transport Monitoring Indicator Framework (TMIF) and the 'MARCO' indicators (monitoring and reporting community outcomes) from Environment Waikato. The latter is based on a review of most other sources of data at the regional level and below.

In most cases councils will need to develop their own data bases and collect data suitable for monitoring. The data available from regional and national monitoring is likely only to be applicable in a few cases and then will be unlikely to have sufficient sample sizes. Some sources of local data will already be available from traffic surveys, fare-box data and data from traffic signal computers (SCATS).

Table 5.2 Measurability evaluation

Final outcome	Intermediate outcome indicators	Comments
Reduce traffic congestion	Variability of commute travel times. Levels of service (LoS) on main roads affected by the project	% variability by time of day is available at the regional level from the MOT TMIF (Indicator reference NR003). Traffic survey data from local authorities may provide the LoS data.
Increased accessibility of economic and social centres	% of new developments within 400m of public transport hub.	GIS-based building completions data should provide this information.
Reduced greenhouse gas emissions from transport network	Increased PT passenger numbers in project area.	Passenger data is collected from ticket machines and should be available for stops within the study areas.
Improved mobility for transport disadvantaged	Number of users and number of PT trips using concession card	Concession card usage should be available from ticket machines as special ticket types. Some places may have electronic measures available.
Encourage better health outcomes from transport	Surveyed perceptions of residents regarding active modes. Mode of travel to schools surveys.	Regional data available for Auckland and Wellington only from MOT TMIF (Ref. AM010 and AM011). Similar survey questions could be easily administered in local areas. Monitoring school travel plans already happens so data should be readily available.
Improve safety of transport network	Reduced numbers of deaths and serious injuries within the area.	Data available from MoT TMIF (Ref. SS004 and SS005) for regions. Source data from local police reports.
Improved quality of the built environment as a place to work, live and play.	% of positive ratings from business and residents	Special surveys required, could be combined with active mode perceptions survey.

In terms of secondary sources the five-yearly census contains the most comprehensive spatial information on households, their travel, employment and consumption behaviour relevant to integrated land use and transport outcomes. Because of its wide-ranging nature and the fact that it is published only once every five years, census data is likely to be most useful for looking at intermediate outcomes defined in terms of shifts in individual and household behaviour and final outcomes in terms of land use.

Other local data can be developed into indicators. This includes monthly building consents which are provided at census area unit level covering new buildings, as well as the number and value of consents issued. Annual employment and unit counts are also provided at local area level for each February based on the Statistics New Zealand business database. Again, these are indirect measures that might be used as intermediate indicators for land use analysis. Quotable Value New Zealand can also provide localised land use data, generally updated annually and covering land uses, values and transactions.

Increasingly local data is represented spatially via GIS, with local councils developing sophisticated databases. This opens up the prospect of indicators tailored to local policies and shaped to the expected geographic scope of those policies.

Data availability is largely dependent on the policies and requirements of local council areas. Wherever possible, we suggest an alignment between the data used for monitoring integrated projects and that collected at the regional level by the Ministry of Transport (MoT). A full list of MoT indicators available at the regional level is presented in appendix A to this report.

5.4 Time related and repeatability

The frequency and timeliness of collection or publication of indicators will influence their usefulness and, where purpose-designed repeat surveys are called for, their cost (table 5.3).

Table 5.3 Frequency evaluation

Final outcome	Intermediate outcome indicators	Data availability	Time series
Reduce traffic congestion	Variability of commute travel times. Levels of service on main roads affected by the project	% variability by time of day is available at the regional level from the MoT TMIF (indicator reference NRO03). Likely need to establish local equivalent measurement. Traffic counts by local authorities may provide the LOS data?	Regional time series data available. Local area data unlikely. Traffic count data may be available but likely to need supplementing.
Increased accessibility of economic and social centres	% of new developments within 400m of public transport hub.	GIS-based building completions data should provide this information.	Not all areas have GIS-coded data building completions data.
Reduced greenhouse gas emissions from transport network	Increased PT passenger numbers in project area.	Passenger data is collected from ticket machines and should be available for stops within the study areas.	Time series data should be available for all areas based on operational reporting requirements.
Improved mobility for transport disadvantaged	Number of users and number of PT trips using concession card	Concession card usage should be available from ticket machines as special ticket types. Some places may have electronic measures available.	Time series data should be available for all areas based on operational reporting requirement.

Final outcome	Intermediate outcome indicators	Data availability	Time series
Encourage better health outcomes from transport	Surveyed perceptions of residents regarding active modes. Mode of travel to schools surveys.	Regional data available for Auckland And Wellington only from MoT TMIF (Ref. AM010 and AM011). Similar survey questions could be easily administered in local areas. Monitoring school travel plans already happens so data should be easily available?	Regional time series available for Auckland and Wellington regions. Other areas and sub area not available.
Improve safety of transport network	Reduced numbers of deaths and serious injuries within the area.	Data available from MoT TMIF (Ref. SS004 and SS005) for regions. Source data from local police reports.	Regional time series available. Most likely local area data also available.
Improved quality of the built environment as a place to work, live and play.	% of positive ratings from business and residents	Special surveys requires, could be combined with active mode perceptions survey?	No data available. Need to establish survey system.

5.5 Understandability

The indicators suggested are relatively easily understood but the total set may prove challenging because of the amount of information. Our limited example may represent a minimum number of indicators for any project which makes comprehension a challenge. In particular, multiple indicators may be out of alignment in terms of timing and spatial coverage and they may, on occasion, convey inconsistent information.

Headline indicators (figure 5.1) provide a way for interested but not intimately involved people (local media etc) to keep track, and will ideally be among the more readily accessible and frequently available information. We suggest two approaches to headline indicators:

5.5.1 Critical path monitoring

This involves an assessment of how far ahead or behind target the project timetable and budget is.

5.5.2 Headlines

This involves summarising the main trends for each indicator and a brief description of the good and bad results.

Table 5.4 gives an example of how the headline results can be presented.

Table 5.4 Possible scale for use in presenting headline results

Score	Outcome indicators	Output indicators	Input indicators
+1	Above target	Above target	\$ and resources devoted above planned
0	On target	On target	\$ and resources as planned
-1	Below target	Below target	\$ and resources below planned
-2	Well below target	Well below target	\$ and resources well below planned

Figure 5.1 Headline indicators: reporting example

Final Outcome	Outcome Indicators	Output Indicators	Input Indicators	Overall
Congestion	0	+1	0	Good
Accessibility	+1	+1	+1	Very Good
GHG Emissions	-1	+1	+1	Poor
Mobility	-2	+2	+1	Very Poor
Health	-2	+2	+2	Very Poor
Safety	-1	-2	-2	Very poor

The following interpretation is derived from the example above:

- **Congestion:** budgeted resources are on target, outputs are slightly ahead of target, implying some efficiency in project management although this is not achieving above-target outcomes. Need to ask why the outcomes are not responding to the higher levels of output.
- **Accessibility:** all indicators are progressing ahead of target and consistently
- **GHG emissions:** despite above-target resources and commensurate outputs, the outcomes are not tracking as might be expected. This could indicate a lagged response to watch out for or a problem with the strategy in place. It could also indicate some intervening forces counteracting the strategy impacts. All of this suggests a need for a review.
- **Mobility:** despite some indications of efficiency in project management, the outcomes are not responding. As for GHG emissions, a review is called for.
- **Safety:** this outcome appears to be suffering because of a failure to devote the targeted resources to the issues. This suggests a 'please explain' response to the project sponsors is required.

6 Outputs

6.1 Complex linkages between outputs

The relationship between outputs and outcomes is complex in that any single policy measure (output) can support one or several outcomes, while potentially contrary to others. It therefore becomes a balancing process to get the right mix of policies for any particular mix of outcomes. One example concerns the overall structure of urban form. Accessibility outcomes may be best met through a polycentric city with a range of sub-regional centres, easily accessible from local suburbs. However, if another objective favours a strong CBD (a mono-centric city), with public transport designed to sustain the accessibility of the centre, then support for sub-regional centres may conflict with both urban design and public transport objectives.

The potential for conflict emphasises the need for careful design and staging of policy implementation so that multiple objectives can be managed effectively. For example, maintaining the attractiveness of the CBD for offices, retail and tourism uses may be balanced with sub-regional centres for lower order retail and commercial and industrial uses, and as centres of local employment. Such a strategy would have different implications for transport capacity than one driven entirely by undifferentiated accessibility objectives. Similarly, the timing and design of a road pricing policy may need to reflect progress on the development of public transport services to areas of transport dependent populations. By considering the relevant outcome indicators throughout the policy development process, such conflicts may be highlighted and the importance of refining expectations illustrated.

The examples in the preceding paragraph also highlight the need to include critical path timetables as part of the output monitoring framework. The process guidelines emphasise the need to make logical linkages between the outcomes and the policies put in place to achieve them. The encouragement by the NZTA for sub-regional strategies to frame project funding applications requires this quality assurance process; making sure that the funding applications fit within an integrated land use and transport strategy where the interactions between policy outputs, outcomes and tradeoffs are evaluated to determine the best overall approach. The logical linkages between outcomes and policies via policy outputs may not always be simple but these links need to be explored to identify possible contradictory effects.

The overlap between outputs and final outcomes can be shown as a matrix (table 6.1), distinguishing between primary (+ +), secondary (+) and negative outcomes (-). The broad range of output applications is significant, as is the potential uncertainty around some possible outcomes. The range suggests a need for ranking different policy measures according to their likely effectiveness across multiple outcomes.

Table 6.1 Examples of multiple applicability of outputs

	Final outcomes						
	Congestion	Accessibility	GHG	Mobility	Health	Safety	Built Environment
Outputs (policies)							
Road pricing	++	+	+	-	+	+	+
Public transport services to disadvantaged groups	++	+	+	+	+	+	+
Concentrate development around public transport hubs.	-	++	+	+	+	+	?
Personalised journey planning to encourage increased public transport use	+	+	++	?	+	?	++
Concessionary fares	+	+	+	++	+	?	+
Encourage walking and cycling	+	+	+	+	++	-	+
Reduce traffic speeds	?	?	+	?	+	++	+
Urban design guidelines for transport environments (liveable arterials)	-	?	?	?	+	+	++

The table is illustrative only. Actual interactions between outputs and outcomes will be determined by the detail of the policies, local circumstances, and how well other compensating or reinforcing policies work together. For example, the possible negative impacts of road pricing on mobility and of liveable arterials on congestion may perhaps be mitigated through other policies.

6.2 Integrated strategies

The case study work indicated a low level of awareness regarding the support for and the role of sub-regional strategies. In some cases, transport plans for a specific area were submitted as the strategy. In others, the strategy might have been submitted late in the process as part of the project funding application. The NZTA intends, however, that strategy preparation should be a separate stage of the process which precedes the funding application. Ideally, the sub-regional strategy will consider the wide range of issues for a local area and how these are to be achieved. Transport will usually be a part of the solution and the projects developed for NZTA funding should show the context for transport projects alongside other aspects of the solution (eg land use changes). The NZTA is able to consider a wide range of policy outputs and actions as part of their project assessment process and these will often help to justify the transport expenditure. In the calculation of the BCR, all benefits will need to be expressed in economic terms, but there is some flexibility here. Also, the NZTA still applies a multiple criteria analysis which includes strategic fit (with government policy), effectiveness (in achieving the goals of the sub-regional strategy) and efficiency (the BCR).

Although the NZTA is required to give effect to the GPS with its emphasis on economic growth and productivity, there are a number of ways in which this can be achieved. It is likely that local authorities will

treat growth initiatives as higher order goals informing sub-regional strategies and, consequently, project and programme development.

For many regional or local authorities, structure plans or plan changes provide an ideal context for integrated sub-regional strategies. These have the advantage of integrating the process and analysis requirements of the RMA, the LGA and the LTMA, and can provide the momentum for implementation from the outset.

It is in this area of integrated sub-regional strategy that the process of integrated planning outlined at the start of this report begins. Efforts put into this strategy stage will facilitate subsequent rounds of implementation and the achievement of outcomes and objectives.

6.3 Output context

There is a wide range of potential policy measures which, when combined with timelines, can lead to a long and complex list of monitoring indicators. The scale of the monitoring task should be related to the overall context of the policies. The higher order plans and strategies may have specified outputs (policies etc) but are pitched at a scale where comprehensive monitoring is challenging. The Auckland RLTS for example, contains over 120 policies including the requirement to prepare further strategies for individual modes. As these policies become ever more detailed and specific, the opportunities for integration with land use are reduced.

Breaking down the process into sub-regional strategies and projects, incorporating both land use and transport issues, provides a spatial context for monitoring more conducive to the process of integrated planning.

6.4 Output indicators

As with final outcomes, we distinguish between outputs and the indicators. Table 6.2 provides examples of possible outputs (policy measures) which may address different final outcomes, together with examples of output indicators and targets that may be used. Note that the principle of SMART indicators still applies.

Table 6.2 Example outputs and output indicators

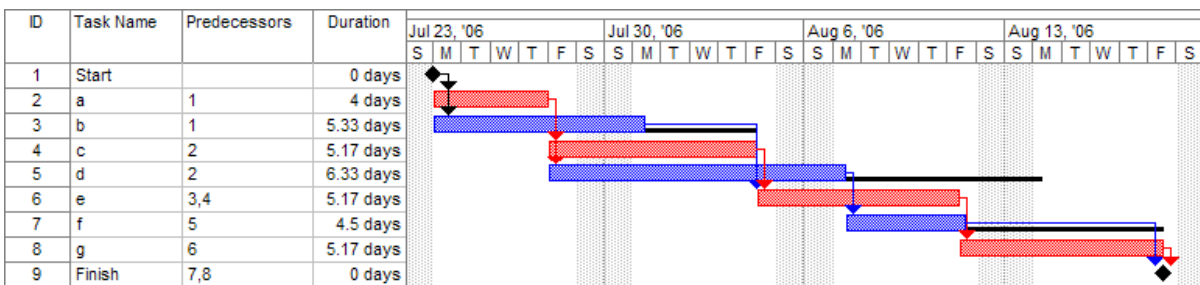
Final outcome	Outputs (policy measures)	Output indicator examples
Lower traffic congestion	Road pricing Public transport services to disadvantaged groups	Build infrastructure Information campaign Commence charging Bus services commenced
Increased accessibility of economic and social centres	Concentrate development around public transport hubs.	Transport engineering works Development projects underway
Reduced greenhouse gas emissions from transport network	Personalised journey planning to encourage increased public transport use	Information distributed Marketing activities
Improved mobility for transport disadvantaged	Concessionary fares	Fare schemes introduced Marketing and information activities
Better health outcomes from transport	Encourage walking and cycling School travel plans	Length of cycleways constructed Pedestrian infrastructure improvements Number of school travel plans

Final outcome	Outputs (policy measures)	Output indicator examples
Improve safety of transport network	Reduce traffic speeds	New and revised speed controls and road markings Advertising campaigns
Improved quality of the built environment as a place to work, live and play.	Urban design guidelines for transport environments (liveable arterials)	Guidelines prepared and distributed Information and awareness campaigns Capital works schedule

6.5 Critical path monitoring

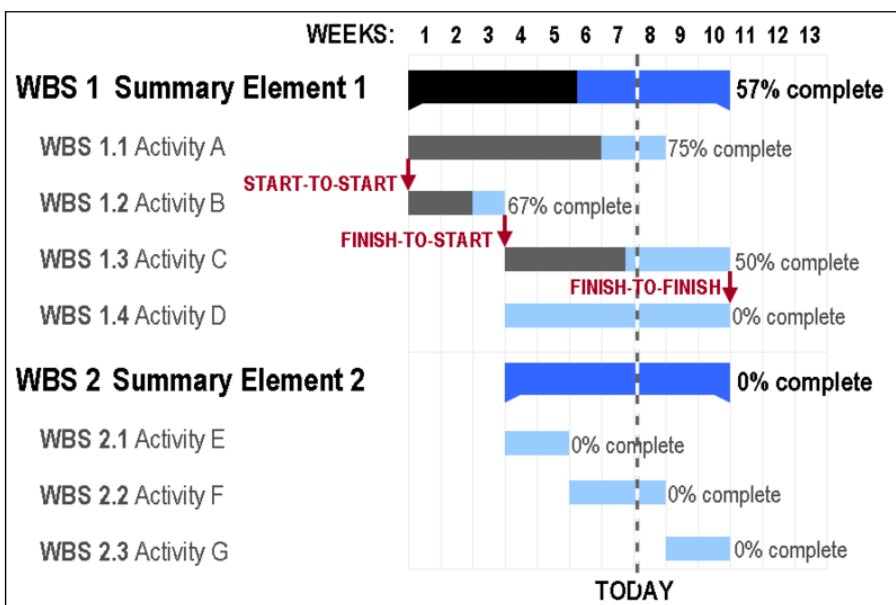
Examples of targets are not shown in table 6.2 but are equally important here (following the SMART criteria) and in all cases refer to *specified budgets and critical path timetables*. Budgets are discussed in section 7 on input monitoring but an example of critical path monitoring is shown below using traditional Gantt charts available from easily available software products such as Microsoft Project.

Figure 6.1` Example of Microsoft Project Gantt chart



Another version of the Gantt chart focuses more fully on the progress achieved to date:

Figure 6.2` Alternative Gantt chart



The process can be relatively straightforward in principle but requires coordination across all the different agencies involved with the project. The literature review identified efforts in Europe to establish independent monitoring units with responsibility for collation and reporting on progress. There is a concern that if each partner is left to monitor its own contributions then the monitoring process will become more difficult, slippage will go un-noticed and project success will be threatened.

The analysis completed for this report supported the establishment of a separate monitoring unit to oversee the monitoring process. This might initially be established by the project governance group but should also have direct linkages back to higher order plan monitoring groups established for statutory monitoring (eg RMA, LGA and LTMA). In this way, the monitoring process can continue to focus on outcomes and project evaluation, well after the construction process is complete and the governance group disbanded. This monitoring unit should take responsibility for monitoring on inputs and outcomes. The detail of monitoring day-to-day construction work would be better managed by the project managers themselves but with accountability and reporting lines back to the monitoring unit.

This analysis highlights the overlap between the project management function and the overall monitoring function. Those responsible for monitoring may be the coordinators of the individual project managers who will be tracking progress of each element of the project. They will be able to keep progress on individual elements of the package or plan within the context of overall objectives. It is often the case that once funding is obtained, the overall outcomes and objectives are left in the background as the detail of day-to-day project management takes over.

7 Input monitoring

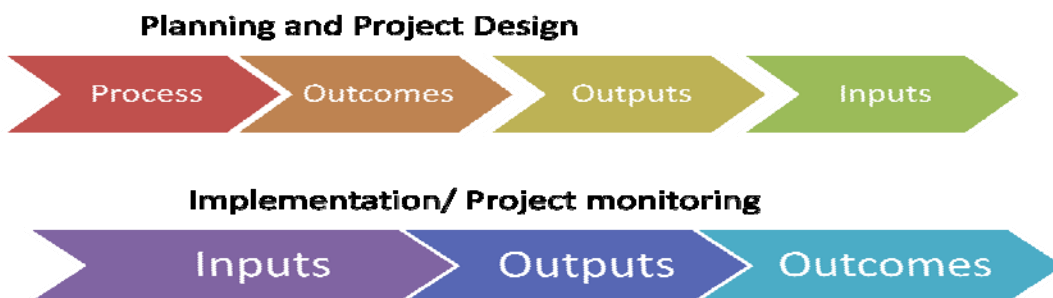
Before the project can be commenced, the resources required for implementation need to be identified and provision made for personnel appointments and appropriate budgets.

As with outputs, the monitoring requirement here is mainly one of coordination, in this case of the funding commitments made by the project partners. This will include the specification of project components in the local authority LTCCPs, the National Land Transport Programme, possibly other sources related to other modes (eg urban rail) and evidence of some commitment from private sector developers. This may be a complex process incorporating trigger clauses and conditions which will affect the rate at which funding is forthcoming. There may also be some pressures for change (political or economic) which will affect the prospects and progress of the project. The monitoring team needs to be aware of these changes and report back to the governance group on the implications for the project outcome goals.

Equally important is the role of budget monitoring in assessing the financial viability of the project. The achievement of financial targets will often determine whether the project is completed or not and some assessment for the progress against budget should include the implications for financial viability for the different partners.

It is logical to treat the process of setting up the indicator framework (chapter 2) as an input to the project, the rationale being that monitoring processes need to be determined at the start of the project. Inputs would therefore include both resources and processes. Our approach is to show processes at the start of the project but other resource provisions at the end because the required resources will not be known until the policy measures have been determined and the net value of the overall project determined. The suggested sequence reflects the mirror image relationship between the planning process and implementation:

Figure 7.1 Order of stages for project planning and design compared with implementation



In practice of course, the process of planning and implementation are interactive and represent several loops rather than being linear and sequential.

8 Conclusions and recommendations

8.1 Formalising an approach to integrated planning

The indicator framework developed in this research is based around an approach to planning that calls for integration in the course of the planning or policy-making process as a precondition to achieving integrated land use and transport outcomes. The processes for achieving integration through working jointly are likely to be generic, covering most circumstances in which potentially diverse stakeholders need to work together towards shared outcomes.

If the framework outlined in this report is applied to projects which, among other things, aim at or rely on the integration of transport and land use planning there is a possibility that it will highlight deficiencies in existing practice. In this respect, the framework and underlying procedures represent something of an audit framework for policy making. Like integrated policy itself, the indicator framework requires that a series of integrated planning teams involving land use and transport planners and other stakeholders work together on implementation of sub-regional strategies by identifying and implementing appropriate policies and projects.

Where, in the past, independent transport projects might have loosely linked to higher order strategies as a means of achieving integrated planning outcomes, this framework suggests much closer alignment of land use and transport within sub-regional strategies, plans and urban development projects. The process also encourages a move from providing the regulatory framework for development to taking an active role in implementation. Within the context of NZTA definitions, integrated urban development projects are packages of projects which include transport and land use components. Although the NZTA does not currently fund land use elements they are considered, at the assessment stage, as part of the multi-criteria analysis of the proposal and should be subjected to closer integration at all stages of planning and implementation.

Time lags between land use and transport elements of a plan are a reality and can affect the economic and financial viability of projects. Currently, different construction timeframes are built into the economic appraisal of projects by the NZTA but consideration is rarely given to the financial viability or potential timeframes of achieving the land use components. The proposed approach would see a more explicit recognition of these development risks and an assessment of how they may be managed.

While the specific indicators used in this report are illustrative only, the processes recommended to be followed are generic and of general applicability to all integrated planning processes.

8.2 The purpose of monitoring

Finally we revisit the first principles of monitoring and suggest how the process may be implemented.

Monitoring integrated development projects delivers several benefits:

- It acts as an audit on the planning process to ensure the best prospects for integrated planning outcomes.
- It provides clear benchmarks on which to assess progress.
- It provides for a better understanding of the effectiveness of different strategies and policies for the achievements of outcome objectives.

- It provides for a process of review and modification of projects as they progress and need to respond to changes in the operating environment.
- It provides a system of accountability for the expenditure of public funds.
- It improves the chances that outcome objectives will be achieved through the processes of joint working and shared outcome objectives.

This paper focuses on the development of an indicator framework for monitoring integrated urban development projects. It is possible that alternative monitoring frameworks will be developed by the NZTA, reflecting their priorities for economic growth and productivity outlined in the GPS, but as far as possible these should be aligned with the project sponsors' monitoring framework. The process of joint working should encourage and facilitate this alignment. The private sector with its greater emphasis on financial viability nevertheless shares these concerns with the public sector which is, today, increasingly preoccupied with fiscal impacts and funding arrangements for transport and land use programmes.

The research has shown the range of aspects that need to be covered by the monitoring team, from high-level issues of sustainable development, through policy analysis of different project design configurations, to coordinating and monitoring construction timetables and budgets. This amounts to a significant data management project requiring a range of skills and resources. It was suggested in the case studies that funding for monitoring may have to come from members of the governance group. This would help to maintain high-level interest in the work of the monitoring group.

The literature review demonstrated the difficulty of finding examples of good practice in monitoring integrated urban development projects. Complexity is presumably one reason for this. However, it was not difficult to find audits of plans that identified the shortcomings of monitoring as one reason for underachievement.

The monitoring function needs to be designed to span the time from project initiation at the planning stage, through to long-term impacts of outcomes, which may take many years from physical construction to eventuate. During the implementation stage the monitoring function will be closely linked to the project management team (output monitoring), but before and after it will be more closely related to strategic planning and governance (inputs and outcomes). It is therefore suggested that the function of monitoring is managed by the governance group in conjunction with the strategic planning function, but that day-to-day monitoring of project implementation is managed within the project management functions, which may span several sub-projects. Coordination and accountability of these project managers should be to the main monitoring unit.

9 Suggestions for further research

9.1 Exemplars

This research identified an urgent need for change in the way major integrated projects are designed and monitored in New Zealand. There was strong support for the framework developed in the research and a desire to see the ideas followed through into action. The case studies developed for this research could only test the practicality of the recommendations retrospectively. While this was helpful they lacked the credibility of real-life examples. This leads us to suggest that further work in this area could be to develop 'exemplars' which apply the process outlined in this report to real projects. This would demonstrate the practical difficulties as well as the real benefits of the approach. The exemplars may be drawn from a range of project types such as town centre regeneration through to major infrastructure projects involving roads of national significance or public transport investment. Other options would include major land use plans with significant transport implications such as the development of Sylvia Park as a new town centre or Stevenson's Quarry in Drury as a major industrial location.

The ideal would be to work alongside the land use and transport planners as they design the outcome objectives, develop policies and measures to achieve their targets and set up the monitoring framework for long-term evaluation.

The process should be written up and presented on a regular basis to guide other projects and as a forum for discussion.

9.2 Urban design

There is an increasing emphasis on urban design and 'place making' in urban planning. The NZTA has commissioned other research into the value of urban design and this is starting to have an impact on the way projects are submitted to the NZTA for assessment. Examples encountered in the research were all related to the calculation of the BCR by extension of the benefit considerations allowed for. Quantitatively, these tend to be relatively minor variations from the traditional benefits of improved safety and travel time savings. The long-term, cumulative effects of urban design, however, can be significant influences on business success (eg tourism, attractive retail environments and the ability to attract and retain skilled workers) and on the day-to-day enjoyment of local residents.

The literature review for this project did not specifically find many examples of how urban design benefits were measured, either qualitatively or quantitatively. This is seen as a key gap in our understanding. The monitoring framework must be able to include measures for all outcome objectives if it is to provide a balanced measurement.

Further research into the measurement of urban design benefits is therefore required, covering both qualitative and quantitative measures.

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Appendix A: Methodology

The following stages describe the research approach to the assignment (see figure A.1):

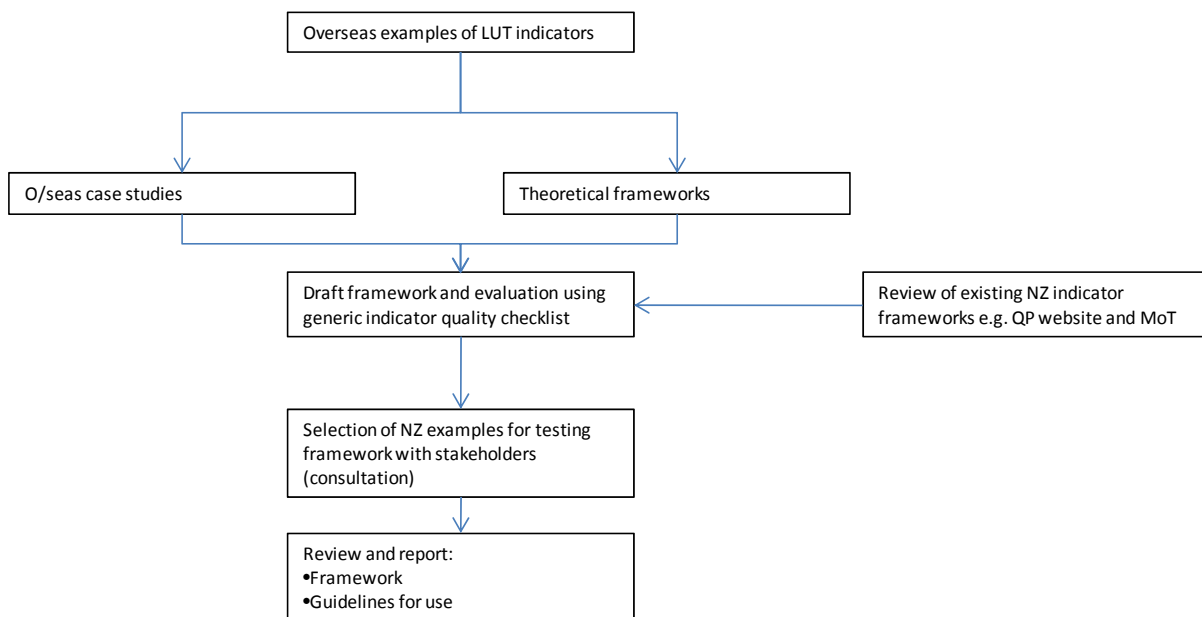
Literature review: (Working paper one, September 2009) This considered indicator frameworks developed overseas for integrated land use and transport planning, including case studies from published sources.

Concept development: (Working paper two, December 2009) Based on overseas and New Zealand experience (including research undertaken for *NZTA research report no.379* 'Organising integrated urban development projects' (Dunbar et al 2009)), this presented a methodological framework for testing indicators in New Zealand. It covered the role of indicators in the framing and monitoring of integrated planning plans and projects, and the evaluation of indicators against a range of criteria.

Case studies: The framework and indicators selected were tested with stakeholders from specific projects and with steering group members. A summary of how the approach might be applied to recent projects was prepared and face-to-face meetings held with project representatives to discuss.

Final report: This includes insights into the process of developing and implementing integrated transport and land use frameworks emerging from the study, and an outline of an integrated land use and transport indicator framework for New Zealand, including recommendations for selection and interpretation of indicators.

Figure A.1 Summary of methodology



Appendix B: Summary of literature review

This section summarises the main findings of the literature review as they have influenced our final report.

Integration as a process

UK literature, eg from the DISTILLATE project, identifies integration as a process and defines its characteristics as fundamentally policy neutral (May et al 2006). Other European work suggested integration as a third stage along from cooperation and coordination. This included the useful definition of 'joint working for shared objectives' which we have adopted for this report (Stead and Meijers 2004). Recent work in the DISTILLATE project (Hull et al 2007) provides some guidance on how to make joint working feasible, which has assisted the guidelines developed for the current project.

Work by Vande Walle et al (2004) distinguished between 'current state indicators' (eg % of new developments within x m of a public transport interchange) and 'process indicators' (eg number of meetings between planning and transport departments). This reinforced the need to provide guidelines on process as well as on tangible output and outcome measures. Indeed, by this definition, an integrated urban development project is defined by the process and not the outcomes.

Previous research (Dunbar et al 2009) demonstrated how governance structures could assist with the anticipation and resolution of barriers to implementation of projects. This fits well with the need for a preliminary forum for deciding on shared objectives and thus serves two critical purposes. The current research has taken this a stage further and suggested the resulting governance structure may also be the place to rest responsibility for the monitoring process. One of the case studies reviewed referred to legislation in France that requires the establishment of monitoring 'observatories' as part of planning processes in all cities of populations 100,000 or more. After reviewing some Australian experiences in South East Queensland and Melbourne, we believe such independent agencies taking responsibility for monitoring are one way of making sure the task is not lost amid the day-to-day practice of policy making and regulation.

On the other hand, the use of such agencies removes the monitoring responsibility from the integrated project structure and may be viewed more as an audit than as governance and management role.

The European Commission (2004) produced advice on stakeholder engagement and project management which provided the basic structure for our definition of inputs, outputs and outcomes. This structure was developed further by Marsden (2005) to incorporate intermediate outcomes as a useful interim step. Final outcomes were recognised as having too many outside influences and their direction of change may have little to do with the project itself. Intermediate outcomes were closer to the specifics of the project and can be used as proxies for the final outcome.

A central platform of Marsden's work was the establishment of 'logical linkages' between the different stages of the project, ie there should be logical reasons why specified outputs are needed to deliver the outcomes. This makes the indicator framework a dynamic instrument that emphasises movement between stages rather than being a static or one moment in time measure of performance. It also introduces the notion of causal connection and calls for some rigour in defining the anticipated link between policy measures (inputs and outputs) and anticipated final outcomes. The use of intermediate outcomes provides the basis for assessing that connection in practice.

This dynamic approach also fits with the goals of performance management and the need to constantly review project specifications according to changing circumstances.

Work undertaken at the University of Leeds (KONSULT 2009) was helpful in understanding some of the barriers to integrated planning and how these can be addressed through careful project design. The importance of mixing outputs to overcome barriers is emphasised and will most likely be useful in getting some agreement among stakeholders.

Data

The emphasis on the process in the definition of integration demands flexibility in definition of project outcomes. Similarly, variation in project outcomes leads to a variation in specification of integrated projects. No two projects will be alike. Nor will they have the same set of monitoring indicators. In these circumstances, determining what data sources will be useful or applicable is difficult.

The literature review included a set of indicators from TRANSPLUS (EC 2000). These were divided between strategy and project indicators and provided a useful reference set. However, these were not divided between the categories we used for our framework.

We also reviewed data available from the Ministry of Transport as part of its transport monitoring indicator framework (TMIF) and have included this as an appendix to this report. Only data available at the regional level is shown and our recommendation is that where possible, project monitoring is aligned to the measures use in the TMIF. We recognise, however, that this will only cover a limited range of indicators.

Data from the Environment Waikato MARCO project (monitoring and reporting community outcomes) was also reviewed as was the Statistics New Zealand sustainable development framework. These were good sources of data but seemed to be set at a higher order level than would be useful for integrated projects.

It seems therefore that local councils will need to develop their own data collection systems to monitor local projects, guided by the examples included in this report, and that the cost of this will need to be added to the project cost. Each local area has some data available from traffic counts, traffic signals and fare-box revenues, for example, but these may need to be supplemented by new data requirements.

Appendix C: Transport monitoring indicator framework (regional data)

Source: Ministry of Transport (TMIF2)

In total there are 10 data sets summarised below. Only the regional data and the indicators relevant to the NZTA role are included here.

Indicator set (ref. code)	Description of indicator set
Transport volume (TV)	Tracks the use of the transport system, including motorised and non-motorised modes. It also shows the age and composition of the fleet.
Network reliability (NR)	Describes the reliability of the transport network, congestion and travel time reliability.
Freight and the transport industry (FT)	Includes information on freight movements (domestic and international). It also includes the share of the transport and storage industry of the gross domestic product (GDP) of New Zealand and transport workforce information.
Access to the transport system (AM)	Shows how accessible the transport system is to a range of transport users. It includes indicators relating to the affordability of transport, social connectivity, and access to motor vehicles, travel perceptions and accessibility of public transport.
Travel patterns (TP)	Shows the use of various transport modes, including active modes such as walking and cycling, for every day journeys such as to work and school.
Transport safety and security (SS)	Shows how transport safety is performing in terms of transport related deaths, injuries, accidents and the social cost of accidents. It also includes personal security, resilience and security of the transport system.
Public health effects of transport (PH)	Shows how transport contributes to the noise levels and air quality that impact on public health.
Infrastructure and investment (II)	Shows infrastructure investment and the size and quality of transport infrastructure.
Environmental impact of transport (EI)	Includes climate change emissions, and information on energy use, land use, water quality and waste management.
Transport-related price indices (TI)	Includes data on transport related prices, including fuel and construction prices.

Transport volume

Indicator	TMIF2 reference	Frequency
Road vkt by road type	TV001	Annual
Person km travelled (Pkt)	TV09	Annual (4-yearly moving averages)
Regional distance travelled per capita in SOVs main urban areas on weekdays	TV013	Annual (4-yearly moving averages)
Public transport boardings (excludes school buses)	TV 020	Annual
Time spent walking	TV016 & TV017	Annual (4-yearly moving averages)
Distance walk and cycle in urban areas	TV018	Annual (4-yearly moving averages)
Number of walk and cycle trip legs	TV019	Annual (4-yearly moving averages)
Vehicles by type	TV004	Annual
1 st registration by vehicle type	TV005	Annual
Average engine size by vehicle type	TV007 & TV030	Annual
Vehicle type by fuel type	TV008	Annual
Vehicle ownership per capita	TV035	Annual

Network reliability

Indicator	TMIF2 reference	Frequency
Congestion index: mins delay per km by time of day. Only for 4 urban areas.	NR002	Annual
% variability of road travel time. By time of day. Only for 4 urban areas.	NR003	Annual

Freight and transport

Indicator	TMIF2 reference	Frequency
Overseas cargo by port and by weight	FT010	Annual
Overseas cargo by port and by value	FT011	Annual

Access to the transport system

Indicator	TMIF2 reference	Frequency
% of population living within 500m of bus route (not bus stop). For 14 urban areas only	AM015	Annual
% of households with access to a motor vehicle	AM006	5-yearly census
Number of households with access to 1,2 or 3 motor vehicles	AM007	5-yearly census.
% of households with a bicycle	AM009	Annual (4-yearly moving average)
Travel perceptions for walking. Akl and Wln only	AM010	2-yearly
Travel perceptions for cycling. Akl and Wln only	AM011	2-yearly
Travel perceptions for bus. Akl, Wln and Chch	AM012	Annual
Travel perceptions for train. Akl, Wln and Chch	AM013	Annual
Travel perceptions for ferry. Akl, Wln and Chch	AM014	Annual
Travel perceptions for public transport in general. Akl and Wln only	AM021	2-yearly
Travel perceptions for car. Akl and Wln only	AM022	2-yearly

Travel patterns

Indicator	TMIF2 reference	Frequency
Mode shifts in schools with travel plans. (Auckland only)	TP001	Annual
Mode share of trip legs	TP002	Annual (4-yearly moving averages)
Ratio of PT trip legs to driver trip legs	TP004	Annual (from 2009)
Active mode share of total trips. Main urban areas. Age 5+	TP005	Annual (4-yearly moving averages)
Mode share for journey to work	TP006	Annual (4-yearly moving averages)
Mode share for journey to school (by age groups)	TP007	Annual (4-yearly moving averages)

Safety and security

Indicator	TMIF2 reference	Frequency
Number of accidents (Also available at TLA level)	SS001	Annual
Accidents per capita (also available at TLA level)	SS002	Annual
Fatal accidents	SS003	Annual
Number of deaths by mode (Includes road, pedestrians and cyclists).	SS004	Annual
Deaths on roads per 100,000 population	SS015	Annual
Number of injuries by mode (Includes road, pedestrians and cyclists).	SS005	Annual
Road injuries per 100,000 population	SS017	Annual
Road deaths with alcohol as a contributing factor	SS006	Annual
Road deaths with speed as a contributing factor	SS019	Annual
Seatbelt wearing rates (includes TLA data)	SS007	Annual
Mean speeds on open roads and in urban areas.	SS008	Annual
Cycle helmet usage rates	SS020	Annual
Social costs of accidents by mode. Includes data for TLAs	SS009	Annual
Perceptions of security when using the transport system. Akl & Wln	SS010	Annual

Infrastructure and investment

Indicator	TMIF2 reference	Frequency
Length of state highways	II001	Annual
Length of local roads. Includes data for TLAs	II002	Annual
Expenditure on infrastructure and services (from NLTP). Central government contributions only	II015	Annual