

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

NEW ZEALAND RESIDENTIAL SUBDIVISION AND DEVELOPMENT CONTROLS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

A Thesis in Fulfilment of Course Requirements for the Degree of Master
of Resource and Environmental Planning at Massey University.

February 1998

Richard Leighton Roy Hills

'Much of our urban development to date has been ad hoc, very urban but not very planned. It has been largely driven by land speculators and developers and has propelled suburban housing ever outward. Urban Planning has traditionally ignored wider environmental issues and as a result has led to highly car-dependant and inefficient cities.'

Tricia Caswell (1995)

ABSTRACT

Recent decades have seen an increased realisation by humanity that the resources of the Earth are not inexhaustible. International conferences have discussed ways in which the resources of the Earth can be better managed, giving rise to the term “sustainable development”.

Since 1991 New Zealand local authorities have been drafting new plans to achieve the ‘sustainable management of resources’. However, with the population of New Zealand becoming increasingly urbanised, greater attention needs to be paid as to whether the ways in which urban areas develop are sustainable. A benchmark needs to be established, against which New Zealand planning controls can be compared to find out how effective those controls are in encouraging sustainability, and pinpoint those areas where improvement is needed.

This research identifies those factors which are generally thought to be important in achieving more sustainable forms of residential subdivision and development, and investigates whether indeed the new Plans which are being developed incorporate provisions which are consistent with those factors. A series of indicators were developed, aimed principally at checking new plan provisions for their consistency with those factors which were thought to assist in bringing about more sustainable forms of residential subdivision and development.

The reported research results found that experts in the field of sustainable development generally felt that sustainable residential subdivision and development avoided locating in areas of high ecological significance, hazards, or high soil value, promoted a more compact, energy-efficient urban form, made the most efficient use of infrastructure and minimised pollution, minimised the use of non-renewable resources, and helped reduce crime.

New Zealand planning controls were generally found to be slightly more sustainable than unsustainable when measured on a continuum. While this may be seen as positive, the fact remains that, there is still much room for improvement. Some of the reasons for the gap between New Zealand residential subdivision and development controls and the ideals of sustainable development undoubtedly lie with the current legislation which tends to separate social, economic and environmental objectives. The Resource Management Act (under which plans controlling subdivision and development are formulated) focuses, principally, on the environment only. Sustainable development on the hand, focuses on objectives associated with all three.

Other factors hindering the development of controls which promote more sustainable forms of residential subdivision and development, are the relatively lack of research into residential design aspects and indicators of sustainability which are appropriate to New Zealand conditions, and, the general lack of awareness and acceptance by the community of planning controls which could help improve sustainability.

ACKNOWLEDGEMENTS

Most works of any substance are rarely carried out by an author without at least some outside assistance. This work is no exception. My grateful thanks go to the following people who have helped me in various ways in the completion of this work.

To my 'editing and comments team': Sandra Frentz, James Low, Richard Coles and Caroline Miller, who toiled valiantly through the tide of paper thrust upon them during the year.

To my colleagues and former colleagues at the Tauranga District Council and Palmerston City Council. My thanks for being there as a sounding board, and providing me with background information.

To those staff at various other local authorities and private organisations who were gracious enough to answer my questions and provide me with some useful background news and anecdotes.

And, last but not least, to my supervisor, Derek Williams, who provided guidance, and without whom the task of planning, researching, and writing this work would have, undoubtedly, been more difficult.

TABLE OF CONTENTS

CHAPTER I: INTRODUCTION..... 1

 Research Context 1

CHAPTER II : METHODOLOGY 6

 Research Methodology 6

 Thesis Structure 9

CHAPTER III: SUBDIVISION AND SUSTAINABLE DEVELOPMENT 13

 Introduction..... 13

 The Institutional Context of Subdivision and Development Controls..... 14

 Subdivision 16

 Sustainable Development and Sustainable Management 16

 Subdivision and Environment Effects 22

CHAPTER IV: LITERATURE REVIEW: RESIDENTIAL SUBDIVISION AND DEVELOPMENT - THE ISSUES. 28

 Introduction..... 28

 Impacts On Flora And Fauna..... 29

 Pollution Of Waterways..... 31

 Aggravation Of Natural Hazards 34

 Energy Usage..... 39

 Air Quality 48

 Global Warming 50

 Traffic Congestion 53

 Reduced Flexibility For Future Land Use 62

 Economic Impacts..... 66

 Social Sustainability. 77

 Conclusion. 83

CHAPTER V: INDICATORS FOR "SUSTAINABLE RESIDENTIAL SUBDIVISION AND DEVELOPMENT"	87
CONTROLS.	87
Introduction.....	87
Indicators And Their Characteristics	87
A Framework For Indicators.....	96
CHAPTER VI: NEW ZEALAND SUBDIVISION AND DEVELOPMENT CONTROLS - DISTRICT PLANS AND ENVIRONMENT COURT RULINGS	125
Introduction.....	125
Selection Of Council District Plans/Proposed District Plans	126
Results - How The Proposed District Plans Measured Up	132
The Approach Taken By The Environment Court.....	148
CHAPTER VII: NEW ZEALAND RESIDENTIAL SUBDIVISION AND DEVELOPMENT CONTROLS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT - CONCLUSIONS.....	155
Sustainable Development In Residential Subdivision Development Design.	155
Review Of Indicators	156
Analysis of New Zealand District Plans	157
Analysis of Environment Court Decisions	158
Directions For Further Study	159

APPENDICES

BIBLIOGRAPHY

LIST OF FIGURES

Figure 1: Components of Sustainable Development 2

Figure 2: Thesis Development Process..... 12

Figure 3: The Urbanisation Of The New Zealand Population..... 13

Figure 4: The New Zealand Government Approach To Sustainable Development 21

Figure 5: Interrelationships Between Residential Subdivision & Development and the
Environment..... 23

Figure 6: The Relationship Between Population Density And Energy Consumption..... 40

Figure 7: Site Orientation To Maximise Solar Energy Availability 43

Figure 8: Carbon Dioxide Levels At Baring Head (N.Z.) 51

Figure 9: Traffic Levels And Their Response To Traditional Intervention Measures 54

Figure 10: Influence Of The Waikareao Expressway On Cameron Road Traffic Flows
(Tauranga) (Tauranga District Council: Department of City Services 1997)..... 55

Figure 11: Remodelling of the Automobile Dependent City..... 59

Figure 12 : Factors Inflencing Housing 70

Figure 13: Hypothetical Example of Intervention Influencing House Prices..... 71

Figure 14: Integrated Local Government Planning Cycle 90

Figure 15: Level Of Information Integration V Target Audience 91

Figure 16: Effect of Corridor Width on Species Diversity. 108

Figure 17: Extent To Which Individual District Plans Are Sustainable In Terms Of The
‘Ideal Model’ 144

Figure 18: Extent To Which District Plan Are Sustainable In Terms Of The ‘Ideal Model’
- By Major Groupings..... 145

Figure 19: Correlation Between Population Size And Indicator Scoring..... 147

LIST OF TABLES

Table 1: Sources Of Pollution For Waterways 32

Table 2: Run-Off Coefficients For Selected Surfaces 37

Table 3: Energy Consumption By Mode Of Transport 47

Table 4: Aerial Pollutants 48

Table 5: Contribution of Gasses To Global Warming 52

Table 6: Techniques For Encouraging The Use Of Alternative Transport..... 57

Table 7: Example of a Pressure-State-Response Indicator Framework..... 95

Table 8: Framework For Possible Indicators 97

Table 9: Final Indicators 120

Table 10: Summary of Proposed District Plan Results V’s Indicators..... 130

GLOSSARY OF TERMS AND ABBREVIATIONS

Biodiversity: A truncation of 'Biological Diversity' which was defined in the 1992 Convention on Biological Diversity as 'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexities of which they are part ; this includes diversity within species, between species and of ecosystems'.

Brownfields (development/sites) development on land previously used for urban or industrial development in built-up areas (Barton, Davis and Guise 1995).

Corridors : In landscape ecology are defined as narrow strips of land which differ from the matrix [surrounding landscape] on either side. Corridors may be isolated strips, but are usually attached to a patch of somewhat similar vegetation. (Foreman and Godron 1986).

Controlled Activity: An activity which is provided for as a "controlled activity" by a rule in a plan or proposed plan and which complies with standards and terms in that plan, and which is allowed only if a resource consent is first obtained from the relevant authority. Under the Resource

Management Act an application to undertake a controlled activity can not be declined, but the consent authority may impose conditions to minimise any adverse effects.

Ecological Deficit: The level of resource consumption and waste discharge by a defined economy or population in excess of locally/regionally sustainable natural production and assimilative capacity. In spatial terms it can be defined by the difference between that economy/population's ecological footprint and the geographic area it actually occupies (Rees, 1996).

Ecological Footprint: The corresponding area of productive land and aquatic ecosystems required to produce the resources used, and to assimilate the wastes produced, by a defined population at a specified material standard of living.

Greenfield (development/sites): Development on/of land which has not previously been built upon or used for urban uses (at least in recent history).

Greenhouse Effect: In the general atmosphere surrounding the Earth, the warming effect due to selective absorption by certain gases such as carbon dioxide, methane, nitrous oxide and other compounds; these greenhouse gases prove transparent to incoming short-wave radiation but relatively opaque to long-wave radiation reflected back from the

Earth, the result being a warming (or greenhouse) effect. The concentration of Carbon dioxide in the atmosphere since 1890 appears to have increased from around 288 parts per million to 345 parts per million. It is thought that if this trend continues, further climatic changes may occur which will be of benefit to some regions but detrimental to others. The sea level would rise due to the thermal expansion of the oceans. The Arctic and Antarctic polar ice caps may also eventually melt (Gilpin, 1990).

Mixed-Use (development): Development which involves more than one activity (residential, retail, office, medical, etc.) taking place in close proximity to each other. Uses can mix on adjacent lots of land, or on the same lot. Use may mix horizontally on the same or separate lots and/ or vertically in buildings.

Non - Complying Activity: an activity (other than one which is prohibited) which contravenes a rule in the plan and is allowed only if a resource consent is first obtained. Often Local Authorities will cover unforeseen circumstances by having a rule in their plan which classifies any activity that has not been listed in their plan as 'non-complying'. The burden of proof (for the purposes of obtaining consent) that is required to prove that adverse effects will not result from a particular proposal, is usually greater than for other activity classes (such as, controlled or discretionary).

Precautionary Principle: Principle 15 of the *Rio Declaration on the Environment and Development* stated that: ‘Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation’. This is commonly referred to as ‘the precautionary principle’.

Rent: The net surplus paid to any factor of production (labour, land, capital) above the amount that is necessary to keep it in its present occupation (Johnston, 1986). The concept is different from income in that it includes the concept of opportunity cost (the income foregone in not taking up an alternative choice or option).

State of the Environment Report (SER): A systematic analysis of environmental conditions and trends obtained through environmental monitoring.

CHAPTER I: INTRODUCTION

Research Context

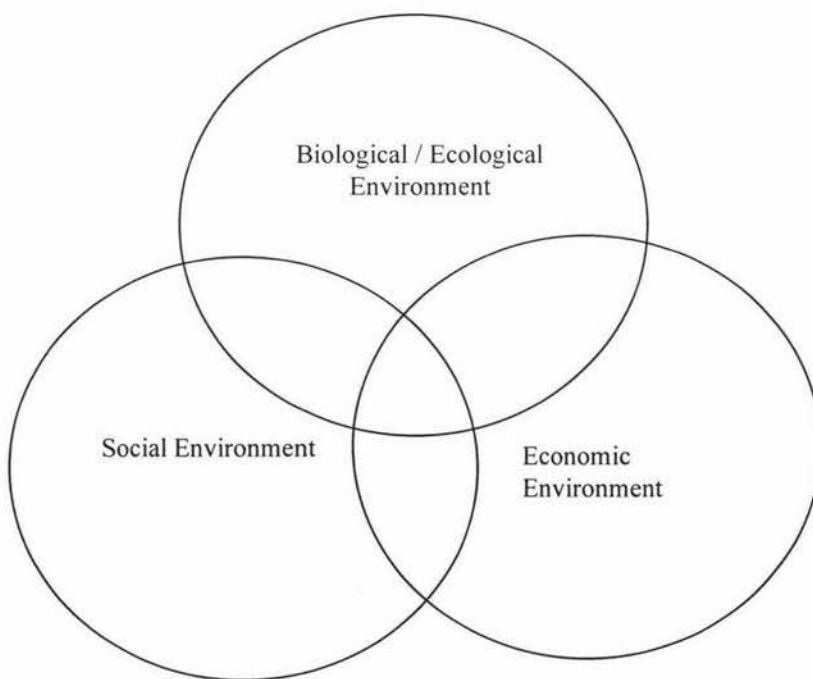
Only in recent decades has there been a wide acceptance by humanity that the resources of the Earth are far from inexhaustible. Since the 1970s a series of international conferences and conventions have been held which have recognised and discussed ways in which the Earth's resources can be better managed. As part of a review of New Zealand's planning legislation, the New Zealand Government included aspects of the new thinking into a new, almost radical piece of legislation.

The coming into force of the Resource Management Act in 1991 brought with it new requirements. Not least of these was the requirement that all natural and physical resources be managed in a sustainable manner to 'reasonably meet the foreseeable needs of future generations' and to 'safeguard the life supporting capacity of air, water, soil, and ecosystems....., remedying, or mitigating any adverse effects of activities on the environment' (Resource Management Act, section 5).

Under the Resource Management Act New Zealand local government is required to develop District Plans to control land use and other activities. Councils are also required to assess applications for the subdivision and development of land, not only in terms of how well they fit their own District Plans, but also in terms of the principles and purposes of the Resource Management Act (see for example Section 104 of the Resource Management Act). This implies that consideration must be given as to whether any effects of the proposed development (such as the creation of a new subdivision) complies with the requirement that it is sustainable in terms of the Resource Management Act .

While it is the responsibility of the applicant to provide information on how their proposal will affect the environment in which it is placed, it ultimately falls to planning officers in local government to make the decisions on firstly, how they will provide for sustainable management of resources when formulating Regional and District Plans, (Section 76(3)) and secondly whether any particular development proposal meets the requirements of their Plan and the Resource Management Act (and its overall principle of sustainable management).

However the Resource Management Act does not cover the full range of aspects that the Bruntland commission's Report *Caring for the Earth* said comprised 'Sustainable Development'. What is contained in the Resource Management Act is a term called 'Sustainable Management'. This term, as discussed later in this work, is more narrowly focused concentrating principally on the management of natural and physical resources in such a way that largely ignores social and economic matters.



Adapted from Barbier (1987)

Figure 1: Components of Sustainable Development

The concept of ‘sustainable development’ as put forward by the Bruntland Commission includes social and economic aspects which cannot be considered as separate entities, but inter-linking elements of a wider system (see Figure 1).

Subdivision of land, and subsequent residential development, also have more than just ecological and ‘physical environment’ effects. There are also social and financial impacts. These need consideration as they place real constraints on residential subdivision design. Examples of what can happen when social and economic factors are not adequately taken into account are not difficult to find. Alice Coleman’s *Utopia on Trial* talks about the housing shortage in post-war Britain. High-rise blocks of flats were seen as the fastest and most physically feasible solution to the shortage, and large government subsidies were granted to stimulate building with the general premise being ‘the taller the block, the more lavish the rate of subsidy’. It is now well documented in Britain and many other countries that such high-rise accommodation has proved to be a social disaster with high crime rates and levels of vandalism. As a result an increasing number are being demolished (Coleman, 1990).

Planning practitioners, particularly in preparing District Plans, therefore need to have some idea as to what features of residential subdivision design contribute to making subdivision, and the subsequent development, ‘sustainable’ in the wider sense. However, without some sort of benchmark, or frame of reference, New Zealand local authorities have no basis for appraising their administrative controls which relate to subdivision and development. Without the ability to measure their plans against a benchmark, local authorities will have difficulty in improving their planning controls to make them more capable of encouraging more sustainable forms of subdivision and

development. There is also the increasing danger (one, which media reports¹ say are already causing concern) that planning controls for subdivision and development will become increasingly inconsistent across the nation. However, there are a few guides available to planners in New Zealand which express the ideals of sustainable residential subdivision and design, and which establish a benchmark alongside which plans can be measured. A similar problem is also likely to exist in relation to the Environment Court. Assuming a suitable benchmark is established, a question is immediately raised as to where New Zealand plans currently stand in relation to the benchmark? The research objective of this work is aimed at contributing to the rectification of the problem, and the answering of the subsequent question.

The Research goal is stated as:

To evaluate the extent to which New Zealand District Plans make provision for sustainable residential subdivision and development.

The research goal has two parts, firstly how does one define which factors contribute to sustainable residential subdivision and development? Secondly, are the local government controls currently being developed appropriate to enable sustainable development in residential subdivision.

The research goal, has an associated number of objectives:

1. To establish what factors contribute to “sustainable development” in residential subdivision and development design
2. To review indicators which could be used to measure aspects of residential subdivision sustainability with respect to the factors in 1

¹ New Zealand Herald, January 1998.

3. Establish a range of relatively simple indicators which can be used by policy makers to 'benchmark' planning controls which influence residential subdivision
4. To review current approaches to residential subdivision control by local government and the Environment Court in light of those indicators established in 3.

CHAPTER II : METHODOLOGY

Research Methodology

This section discusses the principle research techniques which have been used to meet the objectives of this study.

THE LITERATURE REVIEW

Literature reviews played a key part in the writing of this work. A 'pilot' literature review was undertaken at the very start of this work, firstly to determine what the objective of this study was to be, and secondly to provide guidance as to which issues would be relevant for study in the main literature review (the issues identified were categorised and summarised as the basis for Appendix A). The literature review (as noted by Strauss and Corbin, 1990) can be validly used for exactly this purpose. The literature review is vital for enhancing theoretical sensitivity, gaining an understanding of the concepts and interactions which are important to understanding the dynamics of a sustainable urban environment. From the literature review came the categories for the generation of indicators, and some of the indicators themselves.

PLAN SAMPLING AND ANALYSIS

It was initially considered undertaking what Fink (1995) calls 'structured observations'² to obtain information on whether subdivision and development controls were consistent with the concept of sustainable development. This approach was rejected in favour of a 'structured record review' approach whereby District Plan provisions were studied.

² Where data is collected visually in the field and guides the observer into focusing on certain aspects

There were two reasons for rejecting the former approach and the accepting the latter. Firstly, directly observing residential subdivision cases on-site would focus only on the outcome of subdivision and development controls and not the controls themselves. Secondly, the results obtained were likely to be 'contaminated'. By this it is meant that the pattern of subdivision being established was still likely to be (in numerous cases) affected by the old planning controls which were drawn up under previous legislation (as many of the newer plans were still in their transitional 'proposed' stage).

A number of differing sampling techniques were considered when choosing the plans to be studied as part of this work. Simple 'random sampling' was rejected on the basis that, given the large number of local authorities with rural characteristics, a cross-section of plans from authorities with a wide range of circumstances may not be obtained (an informal pilot study of the Palmerston North City and Tararua District Plans had revealed distinct differences which appeared to be related to the different characters of the two local authorities). 'Convenience sampling' was rejected on the basis that it would not produce a fair geographic representation of local authorities, while 'quota sampling' was rejected on the basis that it would lead to too small a number of completely urbanised authorities being studied (and so increase the chances of an 'exceptional' plan giving a false impression of subdivision and development controls being used in urban areas).

The technique chosen for this work was 'stratified random sampling'. A stratified random sample is one 'in which the population is divided into subgroups, or strata, and a random sample is then selected from each group' (Fink, 1995:30). It was chosen because it ensured that a reasonable sample size was obtained across a cross section of authorities, while not being biased towards a given geographical area. There is a danger in this approach however. The overall sample is not as true a representation of the population as is the quota sampling technique.

Analysing data from the sample results was done through coding the plan provisions and then, summarising them into a large table. As both the indicators developed, and the data being studied was of a qualitative nature (and was invariably just checking for the presence of a particular policy or rule) coding tended to be limited to simply 'yes' or 'no' (depending on whether the plan provision existed), or 'NA' (where information from the literature search, and logic, implied that testing a particular plan against an indicator was not appropriate). In the summary table (Table 10), some numbers were left uncoded so as to demonstrate the variation in those standards which were able to be recorded in numerical form. They too, were subsequently coded for the final analysis, in the same way as the rest of the indicators (a simple 'yes' or 'no', depending on whether they fell in the range the indicator standard suggested was desirable).

INTERVIEWS

Interviews can play a large part in qualitative research. They are a valuable way of obtaining information which may not otherwise be available in written form. They allow the researcher to explore more freely through open ended questions and instantaneous feedback. However, as Gordon (1969) notes, there are a number of disadvantages and sources of error which can be associated with interviewing as a technique. These include, competing demands on time (an important consideration in this work, as many planning officers were too busy to spare much time), egos, perceived threats, forgetfulness, chronological confusion and differential confusion (amongst others). As such, interviews were only used in this work to seek clarification on issues that had arisen, either in the literature review, or in the analysis of District Plans. These interviews were undertaken in an informal manner in order to minimise any perceived threat, and to allow the respondent to express themselves freely. In some cases interviews were conducted over the phone (either because only a few questions were being asked, or to save time for the person being interviewed).

Thesis Structure

Step one of the thesis development process has its origins in a review of contemporary planning issues. Looking at a range of literature, it was apparent that in recent years a wide range had been published in respect of urban sustainability, but that much of this work remained at a very abstract level and few articles related directly to the New Zealand context.

Step two of the development process is essentially a review and analysis of existing literature to establish a set of factors which are thought by authors from around the world to contribute to urban sustainability and residential subdivision development. The conclusions from this discussion are used to construct an 'ideal' model of sustainable residential subdivision and development.

Step three takes the factors obtained through the literature search and attempts to develop indicators which can be used to measure them. These are then re-expressed to provide indicators for benchmarking New Zealand residential subdivision and development controls. Many of these revised indicators will be developed through the results of a further, narrower literature search, while others should flow naturally out of the work done in step two.

Step four is closely related to step three. Potentially, a wide range of indicators could be developed to measure aspects of a wide variety of factors. Because this thesis is aimed at helping those at the policy and decision-making, the set of indicators selected to measure aspects of subdivision design need to be kept relatively simple. They also need to be appropriate to match the capabilities of the user and need to be limited in number to prevent them becoming cumbersome to use.

Steps five and six are also closely related . Having developed and selected a set of indicators in the previous steps of the thesis development process these steps provide not only an opportunity to test their practicality but also an indication of how well New Zealand examples of Local Government subdivision and development controls measure up in terms of the sustainable development ideal. It is also realised that not all planning decisions are made by local authorities, and that the Environment Court can have a major influence on the local design of residential subdivision through it's decisions. It was thought worthwhile therefore to also look at some of the more recent, significant Environment Court rulings on residential subdivision developments and establish how consistent they were with the sustainable development 'ideal' (refer to step two).

From the studies of District Plans and Environment Court rulings, conclusions are drawn as to where New Zealand subdivision design and thinking are in relation to the goal of producing planning controls which result in a subdivision that is 'sustainable' in the context of sustainable development.

The last part of this work reviews the work itself. It revisits the objectives, discusses the key findings, and looks at which areas would benefit from further study.

As a final note, the initial steps of the thesis development process outlined above bear a resemblance to that which was intended for the New Zealand Ministry for the Environment's 'urban sustainability project'. According to Edwards (1993), this project sought to obtain the views of experts in the field of urban sustainability to determine what features were desirable and undesirable for a sustainable urban settlement. Having established an understanding of urban sustainability, the second phase of the project was to develop indicators of urban sustainability. However, Edwards did not go on to say what the indicators were to be used for, or, what any further steps had been planned. The Ministry urban sustainability project has since been

postponed indefinitely following a decision by senior Ministry officials to focus on individual elements of air, water and soil instead (Cameron *pers comm*).

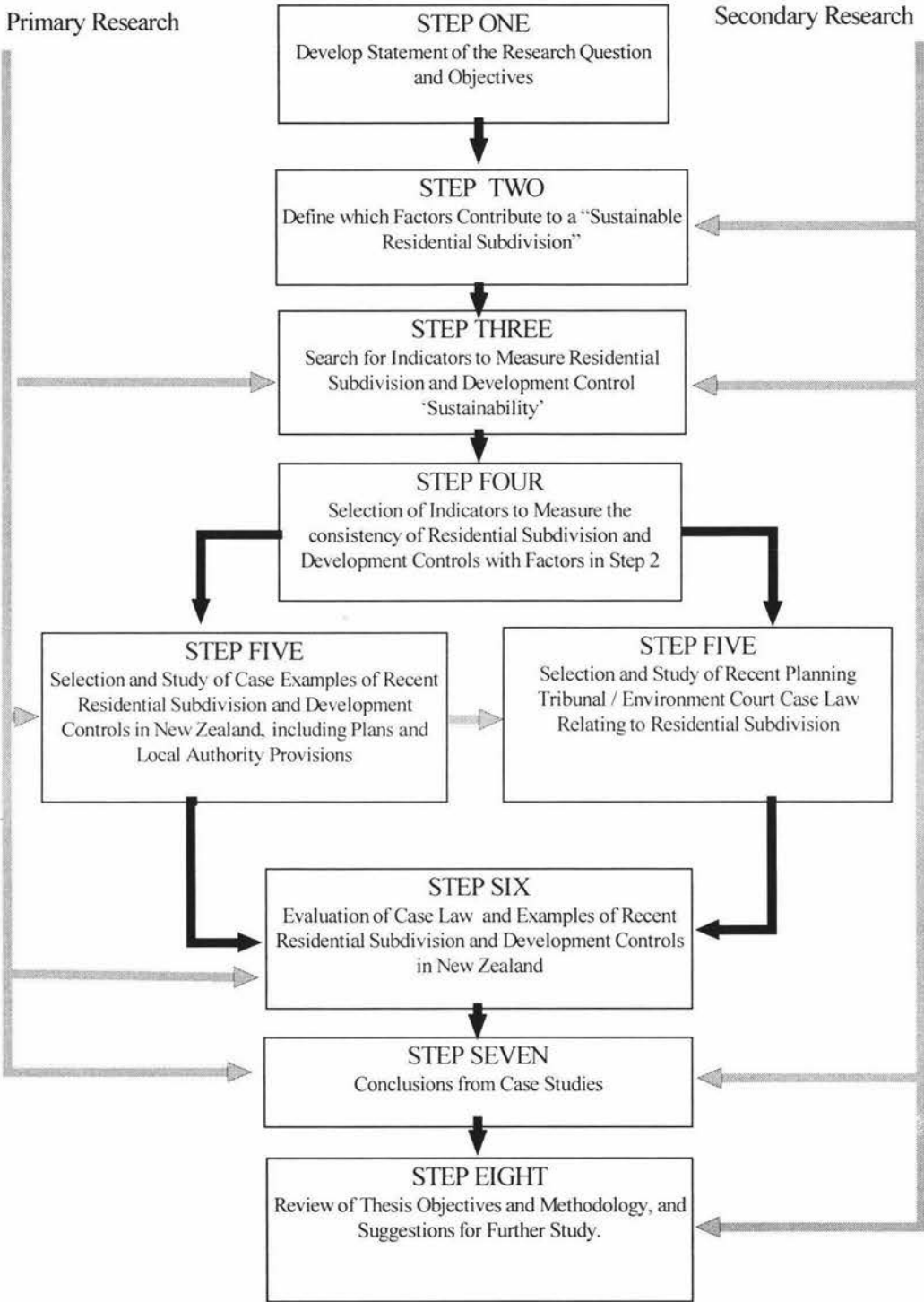


Figure 2: Thesis Development Process

CHAPTER III: SUBDIVISION AND SUSTAINABLE DEVELOPMENT

Introduction

The spectrum of issues which the term sustainable development covers are very broad and may be located in urban, rural or wilderness areas. Serious issues related to sustainable development in New Zealand are found in urban areas where residential development is the largest user of land (by area). While the balance of the New Zealand population has been urbanised for much of this century, with nearly 92% of New Zealand’s population expected to live in urban settlements by 2025, the importance of residential land use is likely to continue to increase.

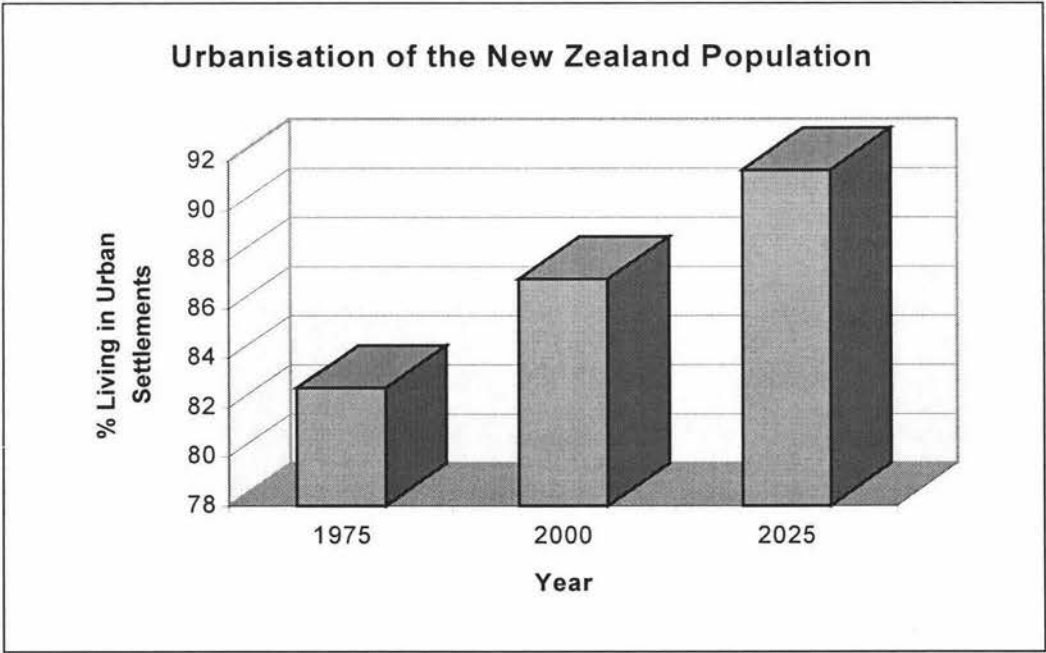


Figure 3: The Urbanisation Of The New Zealand Population

United Nations Centre for Human Settlements (1996)

It is the purpose of this work to look at the important aspect of residential subdivision and its place within the concept of sustainable development.

This Chapter has the objective of discussing the institutional context of residential subdivision and development control in New Zealand, and discussing the concepts of 'subdivision' and 'sustainable development'. It then moves on to a discussion of the environmental effects associated subdivision and development, to set the context for the fourth chapter.

The Institutional Context of Subdivision and Development Controls

The function of controlling the subdivision of land is allocated to territorial local authorities (City, or District Councils) under Section 31 of the Resource Management Act. Section 31 also gives local authorities the function of controlling the use and development of land to promote the sustainable management of natural and physical resources. Such controls include those for the purposes of 'avoidance or mitigation of natural hazards'. Local authorities implement many of their responsibilities under the Resource Management Act through District Plans (as they are required to do under Section 75). District Plans set out set out the objectives, policies and rules through which councils control the subdivision and development of land within their boundaries. Rules in the District Plan have the same effect as regulations under the Resource Management Act, such that they are legally enforceable through the Courts (largely the Environment Court, but the High Court may become involved on points of law [Milne, 1993]).

Typically, the rules in a District Plan will specify that certain activities (or a range of activities) can be carried out without the permission of Council provided they comply

with specific standards (which may place restrictions on height or distance in relation to boundaries, for example). Other activities, which the Council thinks may cause adverse effects on the environment, may be required to seek a 'resource consent' (a permit to undertake the activity) from Council. Usually the construction of houses is able to proceed without the need to obtain a resource consent. Subdivision almost invariably requires consent.

Overlaying the rules in local authority District Plans are rules from another tier of local government, regional councils. While regional councils do not have any direct function related to the subdivision of land, they still have functions under Section 30 of the Resource Management Act which impact on the use and development of land. Regional Councils have responsibilities for controlling the use of land for the purposes of soil conservation, maintenance of water quality and the mitigation or avoidance of natural hazards. Regional Councils also have the function of controlling the discharge of contaminants into air, land and water. In respect of the latter, regional councils can place restrictions on the residential development of land through controlling the means of waste disposal (in terms of requiring that individual land owners or occupiers, and local authorities dispose of waste in a safe and effective manner).

Also impacting on subdivision and development (albeit to a lesser extent than District Plans) are the provisions of other statutes such as the Building Act 1991 (which establishes the basis for building standards and the regulation of building construction and demolition), and the Local Government Act 1974³. While these impact on the subdivision and development of land for residential purposes, they are, nevertheless, outside the scope of this work (which is focused on the key role of District Plans provisions).

³ Which, incidentally, contained many of the provisions relating to subdivision before the Resource Management Act came into force.

Subdivision

In its simplest form subdivision can be thought of as the process through which land parcels are divided up into smaller sections, usually involving the transferral of ownership (or title) from one owner (or set of owners) to a number of others.

In New Zealand Law (section 218 of the Resource Management Act) the meaning of subdivision includes both the division of land for use or the division of a building into separate titles and uses (under the RMA the term allotment includes “a parcel of land or building, or part of a building that is shown on a survey plan, or on a license under the Companies Amendment Act 1964” - Milne 1993: 177), and also includes subdivision through the division of an allotment :

- (i) by an application to the District Land Registrar for the issue of a separate title for any part of the allotment; or*
- (ii) by the deposition by the way of or offer for sale of the fee simple to part of an allotment; or*
- (iii) by a lease of part of the allotment which, including renewals, is or could be for 20 years or longer; or*
- (iv) by the grant of a company lease or cross lease in respect of any part of the allotment; or*
- (v) by an application to a District Land Registrar for the Issue of a separate certificate of Title for any part of a unit on a unit plan.*

Sustainable Development and Sustainable Management

Sustainability, in the ecological sense, is simply a term to describe a rate of resource throughput which can be maintained within the threshold (or carrying capacity) of biological and physical systems. When resources are extracted at a rate beyond which they can be renewed by the environment, depletion occurs. When wastes are produced

at a rate beyond the assimilative capacity of receiving systems, pollution occurs (Ministry for the Environment, 1989).

The concept of sustainable development has its origins in the 1970s. The term evolved from a view that the Earth's resources were not inexhaustible, and that the anthropocentric frontier philosophy of resources always being there for the taking was false (Collier, 1995). This paradigm shift in turn gave rise to a realisation that the viability of future human development was linked to environmental protection (Ward and Dubos, 1972).

While the concept of sustainable development originated in the early 1970s, it was not until the 1980s that the concept began to be refined, firstly through *the World Conservation Strategy* of 1980, and then through the Bruntland Commission *Environment and Development* report of 1987.

Despite the efforts of many there is still no single definition as to what is 'sustainable development'. Pearce, Markandya and Barbier (1989) found while researching their book *Blueprint for a Green Economy* 24 separate definitions.

A widely used definition was that developed by the Bruntland Commission in 1987. It defined sustainable development as:

Development which meets present needs without compromising the ability of future generations to achieve their needs and aspirations.

(Bruntland Commission, 1987, cited in Elkin et al 1991).

This definition has been criticised as being, at best, only partly useful. Some economists see it as being too vague. It is also seen as being too anthropocentric in that while it expresses the general idea adequately it does not focus directly on the

development/environment interface, or the dependency of human beings on the environment (Ministry for the Environment, 1989:5).

There are, within the Bruntland definition many implicit assumptions however. Blowers (1992) makes the point that development is not synonymous with growth. 'Sustainable growth is ultimately contradictory as expansion will run up against the physical limits imposed by the earth's natural resources' (ibid.: 25). Clearly, in order to leave sufficient resources for future generations to 'meet their own needs and aspirations' some sacrifices will need to be made by the present generations in terms of the way it is using resources now. A number of authors (for example Nijkamp et. al. 1992) see these sacrifices in terms of conservation of non-renewable resources, and the protection of ecological and cultural diversity.

Agenda 21, an outcome of the Rio Earth Summit Conference in 1992, essentially restated the Bruntland definition in Principle 3, saying 'the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations'. Edwards (1997) notes that Principle 4 then goes on to say that to achieve sustainable development, environmental protection shall constitute an integral part of the development programme process and cannot be considered in isolation. Despite this statement however, the argument about what is sustainable development, and 'economic growth verses environmental protection has continued' (ibid).

While a common definition of sustainable development has proved elusive, some formative steps towards implementing the concept have been made. The *World Conservation Strategy*, prepared by the World Conservation Union, the United Nations Environment Programme, and the World Wide Fund for Nature recommended the adoption of eight broad principles, which the New Zealand Ministry for the

Environment says appear to be directly applicable to the concept of sustainable development, these may be summarised as:

1. Protection of the natural sustainability of ecosystems by limiting the impacts on the carrying capacity of the biosphere
2. Maintaining the stock of biological wealth (protecting representative ecosystems, and maintaining genetic resources and all ecosystems which support a wide range of species)
3. Ensuring the use of non-renewable resources occurs at a rate which does not exceed their substitution by renewable resources
4. The achievement of a more equitable distribution of the benefits and costs of resource and environmental management
5. Promotion of technologies which increase the benefits from a given stock of resources (this also includes the promotion of techniques that promotes more efficient resource use)
6. The use of economic policy to help maintain natural wealth (e.g., including an environmental or 'actual ' cost component to commodities)
7. The adoption of an anticipatory cross-sectional approach to decision-making
8. Promotion and support of cultural values compatible with sustainability.

(Cited in Ministry for the Environment 1992)

New Zealand's Resource Management Act, incorporates a number of these principles in one form or another though not all. What is contained within the RMA is a term coined Sustainable Management. This is defined as:

'Managing the use, development, and protection of natural and physical resources in a way, or at a rate that, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while:

- (a) Sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and*
- (b) Safeguarding the life supporting capacity of air, water, soil and ecosystems and*
- (c) Avoiding remedying, mitigating any adverse effects on the environment. '*

The sustainable management concept in the RMA is geared principally towards protection of the environment and omits matters of social inequities and the global redistribution of wealth. In the New Zealand Government's thinking these matters can be separated from environmental management and handled through other legislation. They are matters for which the RMA was not designed to cater. Evidence of this thinking can be clearly seen in the New Zealand Government's own *Environment 2010 Strategy* from which Figure 4 is derived, and the comments of the Hon. Simon Upton who in July 1991 said about the Resource Management Bill:

Unlike the current law, the Bill is not designed or intended to be a comprehensive socio-planning statute. It has only one purpose - to promote the sustainable management of natural and physical resources.....the Bill should be seen as legitimising intervention only to achieve its purpose....."

(Ministry for the Environment, 1992*)

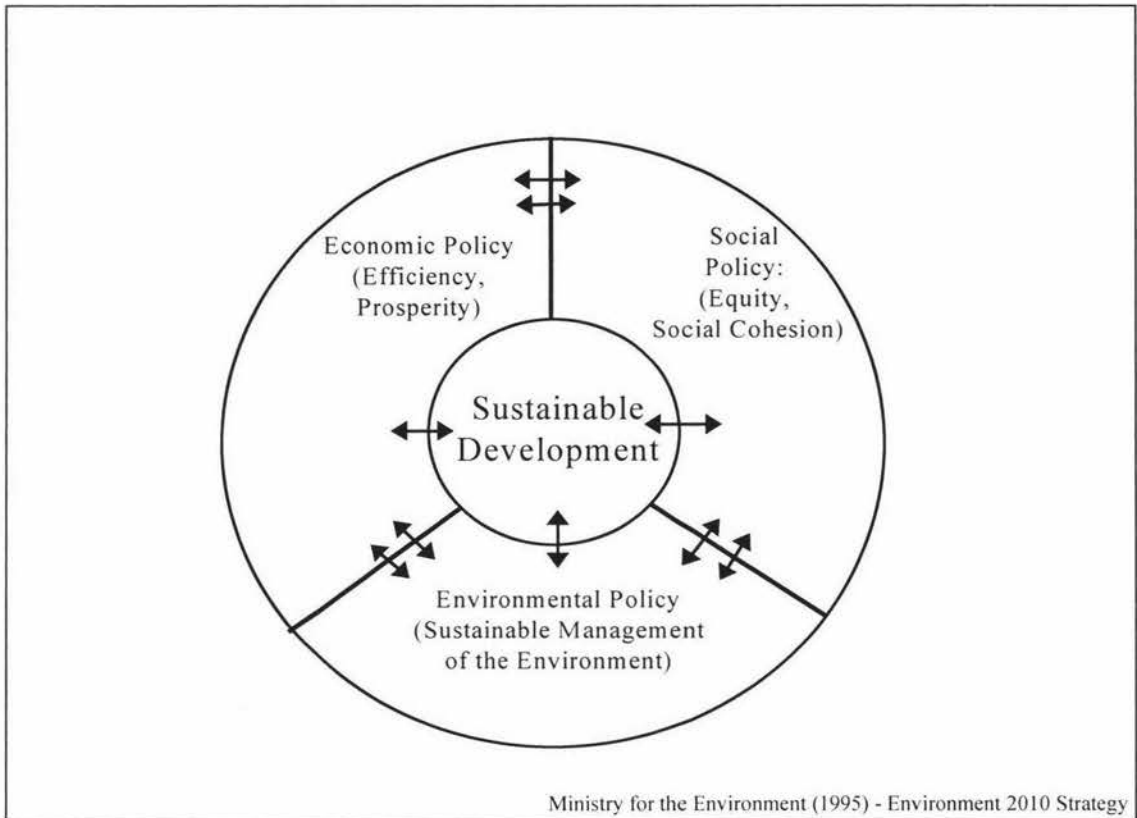


Figure 4: The New Zealand Government Approach To Sustainable Development

Sustainable management therefore is essentially a subset of sustainable development. While limited, the concept of sustainable development is nevertheless useful, as it provides an (albeit narrow) understanding of how sustainable development is being approached in a New Zealand context. Part Two of the Resource Management Act 1991 in which the term “sustainable management” is defined demonstrates a hierarchical framework of priorities in which the protection of natural and physical resources is accorded top priority (Gow, 1991). However in terms of Government priorities the natural environment is still relatively low on an agenda focused on economic sustainability.

Subdivision and Environmental Effects

From a purely legal point of view, the process of subdivision, (as noted by Kinnear 1993, Ministry for the Environment 1992ⁱⁱ and others) has in itself no direct effect on the environment. It does though, give rise to expectations of future development and occupation by new owners. It is, as Works Environmental (1996) note, 'the precursor to new uses of the subdivided land'. The new development which takes place on the land, does not in itself exist in isolation either. It interacts on the surrounding environment, having effects on it, and being affected by it. The density of subdivision (number of dwellings allowed in an area and/or lot sizes) will in turn influence overall urban density, the distances people have to travel to shops, employment and the like, and thereby, energy consumption and aerial pollution.

In turn, development outside the boundaries of the subdivision will impact on the form, viability and desirability of the subdivision being created (for example, an existing roading network will determine, to some extent, the layout of roading within a new subdivision). For this reason consideration of residential subdivision can not be separated from the wider issues of urban form.

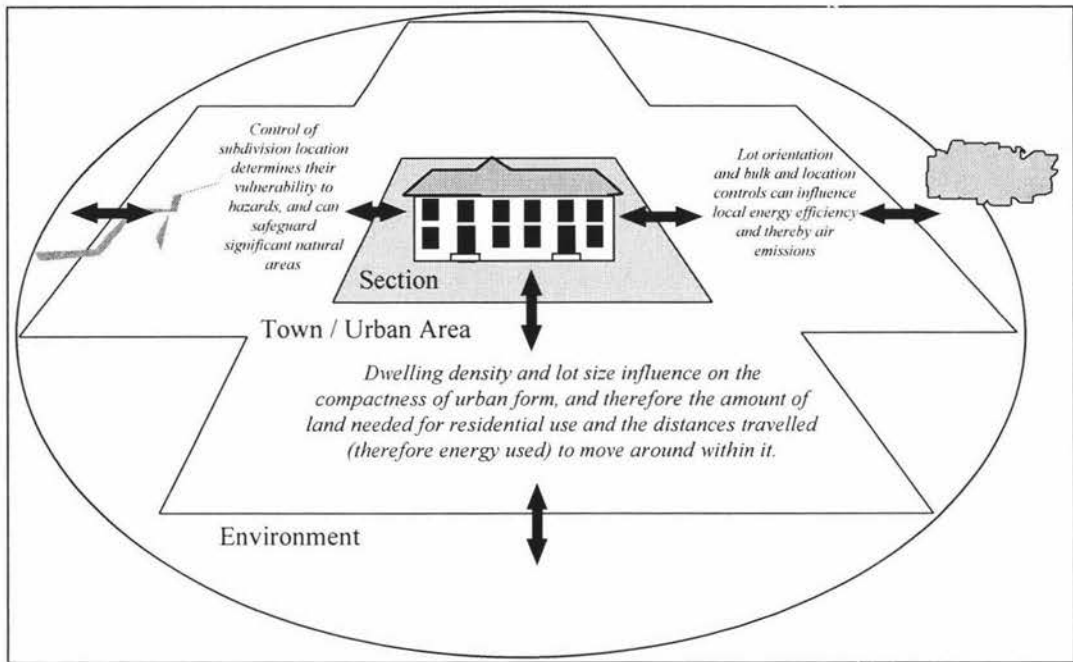


Figure 5: Interrelationships Between Residential Subdivision & Development and the Environment

The process of transforming and preparing the land for occupation, and the use to which the land is put also represent real changes or effects upon the environment. It is the need to control these effects, and the question of how to decide which controls are appropriate that is at the centre of this work.

To make sense of the idea that development associated with residential subdivision has effects on the environment it is, of course, essential to define what is meant by both ‘effect’ and ‘environment’.

Gilpin (1990: 65) states the concept of environment includes ‘all aspects of the surroundings of humanity’, land, landscapes, noise, and water bodies. Gilpin says that the European Economic Commission defined as ‘the combination of elements whose complex interrelationships make up the settings, the surroundings and the conditions of life of the individual and of society as they are, or as they are felt’.

New Zealand's Resource Management Act incorporates all these elements defining environment as:

- '(a) Ecosystems and their constituent parts, including people and communities; and*
- (b) All natural and physical resources; and*
- (c) Amenity Values; and*
- (d) The social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) of this definitions or which are affected by those matters. '*

Note however, that social and economic factors are included only to the extent that they affect or are affected by (a), (b) and (c). Social and economic factors are therefore dealt with after the physical and ecological environment has been considered. This is consistent with the philosophy contained in the rest of the Resource Management Act which places by far the most emphasis on the management of natural and physical resources.

The term 'effect' in the Concise Oxford Dictionary is defined as 'a result, consequence' [in response to a particular action or course of events]. Under the Resource Management Act 'effect' has the meaning of that given in section three;

- '...the term 'effect' in relation to the use, development, or protection of natural and physical resources, or in relation to the environment, includes -*
- (a) Any positive or adverse effect; and*
- (b) Any temporary or permanent effect; and*
- (c) Any past, present, or future; and*
- (d) Any Cumulative effect which arises over time or in combination with other effects, and also includes -*
- (e) Any potential effect of high probability; and*
- (f) Any potential effect of low probability which has a high potential impact. '*

Using this as a basis, effects can be placed into a number of categories. These categories are not mutually exclusive, there are many complex interrelationships between each. The categories are:

<i>Adverse Effects:</i>	Effects seen as detrimental to the ecological, social, and economic well-being of an area (including its amenity and intrinsic value).
<i>Positive Effects:</i>	Effects seen as being beneficial to the ecological, social and economic well-being of an area.
<i>Ecological:</i>	Effects on natural ecosystems and the physical environment.
<i>Environmental Quality:</i>	Effects related to subdivision on a site and the surrounding area, in terms of visual quality and amenity value.
<i>Economic:</i>	Effects on the economic make-up and health of the area in which the subdivision is taking place.
<i>Social/Cultural:</i>	Effects on society, social well-being, social and cultural values.
<i>Infrastructural Resources:</i>	Demand on public utilities (roading, water supply reticulation services, sewerage and stormwater disposal, and the like.)

<i>Temporary:</i>	Effects which are short term in nature and which generally have only a limited impact on the environment (for example noise and dust associated with construction).
<i>Permanent:</i>	Effects which are irreversible, or that would require much effort and time to reverse (for example, fully restoring a wildlife habitat on an large industrial site).
<i>Future:</i>	Effects which may not appear at the time the subdivision is created, but which come into existence some time later as a result of the subdivision or subsequent development.
<i>Past:</i>	Effects which are lost as a result of the removal of some aspect (physical or otherwise) of a site (for example the lost contribution of vegetation in filtering water once that vegetation is removed. (MfE 1992 ⁱⁱ)
<i>Cumulative Effects</i>	Effects which increase in intensity over time.

What constitutes a ‘desirable (positive) effect’, and what constitutes an ‘undesirable (adverse) effect’ is subjective, and opinions vary between individuals. There are many things in society known to be unsustainable however (Peet, 1993). It is known for example, that leaving things such as contaminated sites for future generations to clean up is both ethically unacceptable and physically unsustainable. One way, therefore, to define a sustainable residential development is to focus on those aspects of which

minimise unsustainable actions and effects and maximise those which are thought to be positive. This is the approach which is described in the next Chapter.

CHAPTER IV: LITERATURE REVIEW: RESIDENTIAL SUBDIVISION AND DEVELOPMENT - THE ISSUES.

Introduction

In the early 1990s the New Zealand Ministry for the Environment proposed an ‘urban sustainability project’, based, on a modified version of the methodology used by Newton and Taylor in their 1985 work *Probable Urban Futures* (Edwards, 1993). The first phase of Ministry project was to gain an understanding of what constituted ‘urban sustainability’. This understanding was to be gained through consulting a number of experts to identify those elements of the urban system which are sustainable (desirable), and those which are unsustainable (undesirable).

Following a similar approach to the Ministry for the Environment in their ‘urban sustainability’ project, this Chapter discusses what the ‘experts’ see as being ‘desirable’ and ‘undesirable’ by way of effects associated with, or resulting from residential subdivision and development, and their suggestions for dealing with them. Conclusions from the discussion are then used to formulate a list of issues which, if dealt with by local government, will contribute towards the establishment of a sustainable residential subdivision and development in the New Zealand context.

The subdivision of land often implies some form of subsequent development. The associated effects are varied and numerous (see Appendix A).

Impacts On Flora And Fauna

Some of the effects on flora and fauna associated with subdivision arise during the subdivision process itself. These can involve the cutting of survey lines or access roads through bush and the draining of wetlands as part of site preparation. While these can have immediate effects, the greatest effects on flora and fauna come with the clearance of land associated with the preparation of building platforms, roading and service accessways.

Wetlands make up less than two per cent of New Zealand's land area yet represent habitats with extraordinary biodiversity, and have a significant hydrological, economic, recreational and conservation role (Allan, 1987). Native bush, and especially contiguous areas of bush, form important corridors for wildlife. The clearance of these for subdivision and the development that subsequently follows, generally results in a lower local biodiversity and, in some cases, global biodiversity. Opschoor and Reijnders (cited in Kuik and Verbruggen, 1991) estimate that the rate at which natural species die out world-wide is roughly one million times the rate at which new species are created. In New Zealand alone the OECD (1991) estimated that of the known species, 20.3 per cent of Mammals, 5.7 per cent of birds, 17.9 per cent of reptiles and 4.8 per cent of Vascular plants were on the 'threatened species' list (which includes those considered 'endangered' and 'vulnerable').

Why protect biodiversity? Biodiversity is important to the health and stability of ecosystems upon which many species (including humans) depend. Removing parts of the ecosystem removes the ability of that system to naturally correct itself and may require further human intervention to prevent the problem becoming worse. It is also increasingly acknowledged that maintaining high levels of biodiversity have direct positive implications for human health. Many of the planet's most effective medicines and pest controls come from natural sources (Randall 1987). The importance of the

need to protect ecosystems is such that the first of the eight principles contained in the *World Conservation Strategy* dealt directly with such issues.

Arguably, with the natural realm making up the key component of the environment, sustainable subdivision and development needs to avoid the further destruction of such areas and wherever possible enhance them. This was the key message from the 1992 Convention on Biological Diversity. The Convention (which New Zealand ratified in 1993) said that states should not only identify and monitor areas of high biological diversity but implement programmes of in-situ and ex-situ conservation (see Appendix J) 'as far as possible'. An obvious example of conservation and enhancement in an urban setting would be the planting and extension of riparian areas which run through residential and future residential areas. According to Murphy, (1992) riparian zones provide some of the most productive habitats for wildlife of any ecosystem. Another approach would be the identification of sites of high actual or potential biodiversity and protect them through a zone or special policy area (for example, calling them 'conservation' or 'scientific' reserves).

Breheny (1992) says that the provision of green areas in a city go further than just providing havens for wildlife. They also act as pollution filters and absorbers of carbon dioxide, and have an important impact in regulating the microclimate and the general well-being of people. He concludes, 'any policy should avoid the destruction of such areas'.

To maintain local biodiversity, provide a passive recreation resource for residents, and a filter for airborne contaminants it is recommended that wherever possible residential development should avoid existing areas of high ecological value and those areas should be enhanced through the establishment of ecological corridors (for example the

planting of the edges of waterways) and using land not suitable for residential development (for example land prone to natural hazards) for new reserves.

Pollution Of Waterways

Land clearance for subdivision and development tends to increase surface runoff. Water may run off many hard surfaces, (roofs, driveways, roads, and paths) associated with residential areas. During subdivision and development site works, runoff acts as a transportation agent for contaminants. As well as vegetation clearance, grading, levelling and excavation, when not accompanied by appropriate erosion control programmes, may see a substantial amount of sediment washed off sites (see, for example, Plate One). This soil loss can have three main types of adverse effect:

- Natural and constructed drainage systems may have their capacity reduced and flooding may result
- Sediment may be carried in substantial quantities into nearby waterways disrupting ecosystems
- Because of the loss of topsoil and its accompanying nutrients and micro-organisms, eroded sites may be difficult to revegetate thus reducing aesthetic values and the ability to attenuate runoff in future (Tai, 1996).

Some may say that the conversion of rural land to residential land can improve water quality because runoff from grassed areas would no longer contain pathogens or fertiliser residues. While this is true to some extent, those pathogens and fertiliser residues will be replaced by other, potentially more toxic, contaminants if urban runoff is inappropriately managed. In Auckland, for example, urban stormwater runoff is one of the largest pollutants of natural waterways in the region (Stanley, 1996). As in many other New Zealand towns, stormwater which flows off roads and other hard surfaces is flushed straight into harbours and other waterways, carrying with it

contaminants ranging from heavy metals to hydrocarbons expelled from vehicle exhausts.

SOURCE	CONTAMINANTS
Septic Tank Disposal	Pathogens, Nitrates/ammonium, Phosphate, Synthetic organic compounds (e.g., Solvents)
Landfill (Domestic Waste)	Nitrate/ammonium, Degradable organics Synthetic organic compounds, Heavy metals, Petroleum hydrocarbons
Petrol Stations	Petroleum hydrocarbons
Light Industry	Synthetic organic compounds, acids, heavy metals
Urban Runoff	Chloride, Sulphate, hydro-carbons, Nitrate, Phosphate, Heavy metals (zinc from tyres, copper from brake linings, chromium), Silt and Mineral compounds
Sewage Treatment Plants	Nitrate/ammonium
Sewer lines	Pathogens, Degradable organics
Homes	Fertilisers, Pesticides/herbicides
Parks	Fertilisers, Pesticides/herbicides

Adapted from Atwood and Barber cited in Hedgcock and Mouritz, (1993), and also Melville, (1991)
(Note: An explanation as to the effects of these contaminants is contained in Appendix E)

Table 1: Sources Of Pollution For Waterways

One way of preventing this diffuse source of pollution entering waterways is having in place a strip of untilled vegetated land alongside watercourses, lakes and harbours. Planting of stream banks can prevent rapid runoff and retain much of the sediments and other contaminants on the land (Allan, 1987). Murphy (1992) notes however that these areas (often referred to as “riparian zones” or “riparian reserves”) serve many more functions than just solely as a filter to protect freshwater. Other functions he cites are:

- To protect the natural values of clean water for Maori
- To provide a recreation resource

- To provide an aesthetic resource
- To provide a habitat for terrestrial wildlife
- To maintain biodiversity of representative vegetation types
- To maintain aquatic wildlife and fisheries habitat.

Another way of reducing the impact of stormwater on the environment is to reduce the area of impermeable surfaces that feed the stormwater system. Greig (cited in Melville, 1991: 41) suggests that an option may be to replace large paved parking areas with grassed areas under-laid with blocks which would still allow cars to drive over the surface. The biological action of the grasses would be used to absorb pollutants and attenuate rainfall (ibid). Further techniques for dealing with stormwater runoff were suggested by Hedgcock and Mouritz (1993), these being:

- Increase public open space provision to accommodate dual use for recreation and drainage purposes (see Plate Two). Such spaces should, however, make use of vegetation cover rather than large grass areas as grass areas have less capacity to absorb pollutants and slow runoff than heavily vegetated areas)
- Reduce road reserve and pavement width to restrict the volume and concentration of stormwater runoff (see Plate Three)
- Located roads along the contour of the land to accommodate localised runoff and dispersion
- Where possible have local stormwater disposal at high points in the landscape to disperse infiltration and to maximise the interaction between plants and infiltrating waters.

In conclusion, most authors promote the protection of waterways through the use of planting riparian margins. The other management techniques for controlling waters are

targeted at reducing the amount of surface runoff by reducing the area of impermeable surfaces. Such techniques include reducing sealed road widths, use of permeable surfaces for carparking areas, and the use of 'dual purpose reserves' which are capable of being used as stormwater ponding areas and flowpaths, as well as public recreation areas.

Aggravation Of Natural Hazards

Establishing residential developments in areas prone to hazards is clearly unsustainable. Not only does such a practice endanger human life, but it is also a waste of resources. Much in the way of materials and energy⁴ are required to complete a residential development to a stage where houses have been built and services connected. Having to repeat the process of establishment and construction several times over means the extra use of materials and energy above and beyond what would otherwise be needed. This not only imposes financial and emotional costs on the residents, but resource costs on the environment in general.

An example of how development can aggravate a natural hazard in a New Zealand was demonstrated at Abbotsford in Dunedin. In 1979 there was a major landslip in the hill suburb which destroyed 69 houses. A subsequent investigation found that while no one cause contributed to the disaster, a pre-existing geological condition had been exacerbated by land development and motorway construction.

Residential subdivision and development may be subject to a number of natural hazards and may in fact aggravate these hazards. In New Zealand potential hazards which impact on residential subdivision and development include:

⁴ Baird and Chan cited in K.R.T.A. (1985) revealed that for a standard timber-framed house, energy use in construction equated to 3.63 gigajoules per square metre of floor area. Use of brick veneer or steel increased this figure still further.

- Earthquakes
- Volcanic hazards
- Land slippage and slumpage
- Flooding.

EARTHQUAKES AND VOLCANIC HAZARDS

These are hazards, which in the New Zealand context, are somewhat difficult to avoid. New Zealand's geographical position on the edge of the Pacific seismic belt (which according to Pacione 1990, is responsible for 80 per cent of the World's earthquakes) means virtually all the country may be subject to one or both of these hazards. A number of Regional Councils (and the New Zealand Institute for Geological and Nuclear Science) produce maps which show those areas which have a greater propensity to shake in the event of an earthquake. Some of these areas prone to shaking tend to be very large and located under existing urban areas. Obviously, residential subdivision and development should be located away from volcanoes which are active (likely to erupt), however locating subdivision and development away from areas prone to earthquakes may not always be practicable.

EROSION

Land-use changes associated with residential subdivision and development can aggravate natural hazards by placing pressure on unstable soils or destroying the local ecology which helped stabilise local soil (Mitlin and Satterthwaite, 1990). Erosion associated with construction is reputed to be 200 times greater than that experienced with grassland, and 2,000 times greater than that associated with forested land (American Society of Planning Officials, 1976). To avoid such erosion problems as much vegetation as possible needs to be retained, especially where slopes are known to be unstable. Allan (1987) suggests land unsuitable for development should be included in some form of protection zone or set aside as reserve.

A similar management technique could be applied to land subject to erosion from waterways such as streams and rivers. Whipple (cited in Murphy, 1992) examined the erosion potential of streams in urbanising areas. His analysis of 25 stream reaches found a positive correlation between stream erosion and the degree of urban development, and a negative correlation between erosion and the presence of natural vegetation buffers along the streams. As such, retention of stream-side vegetation can be said to assist in erosion mitigation.

FLOODING

According to Pacione (1990), the process of urbanisation tends to increase the magnitude of floods and reduces the average interval between serious flooding events. Pacione says the major mechanisms which cause this include:

- The greater proportion of impervious surfaces which tend to increase the total volume of stormwater run off and reduce the amount of water that infiltrates into the ground
- The artificial 'improvement' (e.g. paving and straightening) of stream channels which reduces the lag between rainfall and channelled runoff
- Landscaping and subdivision of the land into building sites which shortens the distance over which water flows before reaching a waterway
- Human settlement of flood plains which reduces the space available for storing flood waters in the valley bottom so that water is forced to rise and flow more rapidly.

In almost all cases, residential subdivision and its associated development, in New Zealand, (as with most Western countries) reduces the amount of permeable surfaces (such as bush areas or pasture) and replaces them with impermeable or less permeable

surfaces (for example, the replacement of bush areas with grass and the introduction of roofed and sealed areas). Increasing the amount of impermeable surfaces increases the amount of runoff from a site.

Table 2: Run-Off Coefficients For Selected Surfaces

SURFACE	RUN - OFF COEFFICIENTS
Cultivated Land (medium soakage soil types)	0.20
Bush and Scrub Cover (medium soakage soil types)	0.25
Grassed Areas (playgrounds, parks)	0.30
Concrete Paving	0.85
Roof Surfaces	0.90

Note: The Runoff Coefficient works on the basis of the amount of water collected from the surface when one unit is poured onto it.
Source Building Industry Authority, (1992) full table is in Appendix C

While it is of course necessary for roofs to be impermeable, surfaces associated with transport and movement on a site need not always be. According to Orrskog and Snickars (1992), the land area taken up for transportation purposes can be in the order of 40-50 per cent. Given that the residential unit itself can cover up to 100 per cent of a residential site, the potential for additional runoff is huge. Using permeable surfaces is one way of managing surface run-off. Encouraging the use of permeable services may be criticised as having little use in stormwater control and in extreme rain events this will be true. Any soil, once it has reached saturation point, will not be able to absorb any more water and will result in a runoff effect similar to most impermeable surfaces. What permeable surfaces do however, is act as a baffle and a filter for surface runoff (reducing the velocity of runoff so reducing the frequency of flash flooding), recharge groundwater supplies and provide (arguably - beauty is in the eye of the beholder) better amenity.

While the greater use of permeable surfaces will assist in flood control through slowing runoff, ultimately the most effective solution is to manage those areas which are likely to be flood prone. Allan (1987), suggested that new residential development be kept away from flood-prone land and that this land be used for rural or recreation purposes. A similar view was put by the Auckland Regional Water Board in 1983.

In planning for avoiding flood-prone areas recognition also needs to be given to the long-term effects of global warming. Global warming is widely thought to lead to sea level rises which in future could flood low-lying coastal land and raise water tables (threatening underground infrastructure such as water and sewerage pipes, and buried electricity and telecommunications lines). The amount of sea level rise estimated to take place still varies greatly, Allan (1987) reports a variation of between 500mm and 3.45 metres between the agencies included in her work. A prudent planning approach would be to take one of the higher estimates and declare any coastal land below this figure as being a flood hazard area.

The obvious solution to the issue of hazards is to avoid residential development in areas which are prone to hazards, or where residential development is likely to exacerbate an existing hazardous condition. Examples of this would be:

- Avoiding residential development on flood plains or coastal lands that are likely to be subject to future flooding due to sea level rises associated with global warming
- Avoidance of unstable slopes (often in New Zealand these tend to be slopes which have a gradient of 1:2 (or 33 degrees) or more).

Other than avoiding hazard prone areas, other strategies suggested by the authors to reduce the risk of exacerbating hazards include:

- Maintaining or enhancing the vegetation cover of unstable slopes
- Reducing the area of impermeable surfaces in a residential subdivision.

Energy Usage

According to Owens (1992), the case for energy and land use being related is clear. The form of the built environment exerts a major influence on energy demand in the transport and space heating and cooling sectors. According to Haughton and Hunter (1994), changing the shape, size, residential density, layout and location of activities can bring energy demand variations of up to 150 per cent.

Low-density urban sprawl (in New Zealand terms, dwelling unit densities of less than one dwelling unit per 800 square metres of site area) generates a greater need to travel than more compact structures of mixed land-uses. With transport accounting for between 30 and 40 per cent of many nations total energy use (including New Zealand's, see Appendix I), the relationship between settlement density and energy consumption takes on added significance (United Nations Centre for Human Settlement 1996).

The relationship between population density and fuel consumption was clearly demonstrated by Newman and Kenworthy in 1989 when they produced *Cities and Automobile Dependence: An International Sourcebook*. Their observations (see Figure 6) generally showed an exponential relationship between population density and fuel consumption. Those cities that typically had the lowest densities had by far the higher fuel consumption. From the relationship it can be seen that, in theory, a change in urban density from 10 person per hectare to 30 persons per hectare would result in fuel consumption being cut by between a third and a half. Other than population density, the other key determinate of energy use appeared to be the availability and use of public transport. Newman and Kenworthy use this to explain differences in energy

consumption where population density is the same or similar. Thus, for example, Melbourne and Los Angeles have similar population densities, but Melbourne uses less energy per person as a result of a better integrated public transport system (rather than being almost solely reliant on a motorway system).

Work by Kahn (1996) which attempted to use the same methodology revealed that the New Zealand cities of Auckland and Wellington (the only New Zealand urban areas for which energy-use data was readily available) had similar characteristics to the Australian cities in Newman and Kenworthy’s work in terms of urban density (17-20 persons per hectare) and fuel consumption. Notably however, the fuel consumption in Wellington was lower than that of Auckland. This difference, Khan (like Newman and

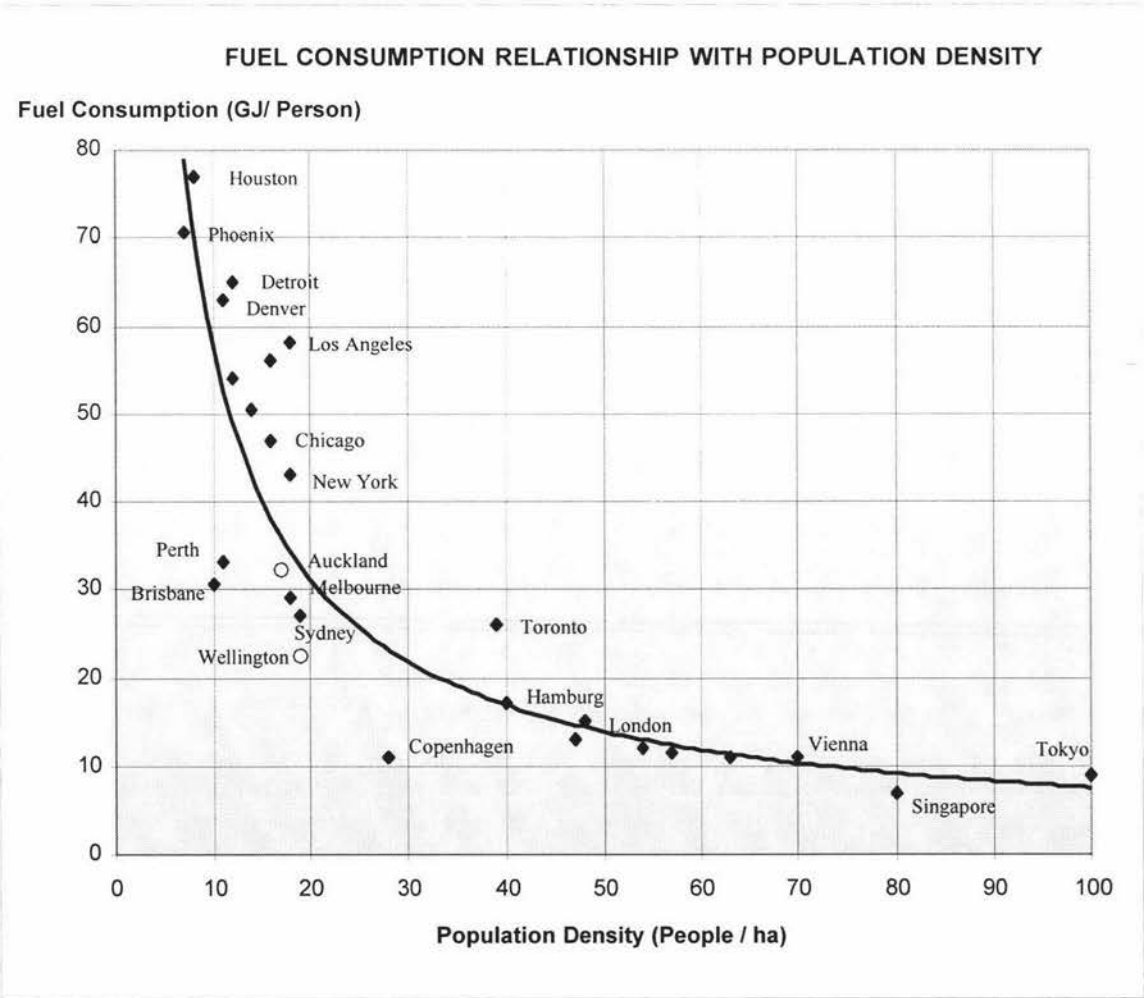


Figure 6: The Relationship Between Population Density And Energy Consumption

Derived From Newman and Kenworthy, 1992

Kenworthy in their work) attributed to the use of rail for public transport.

Some international authors have questioned Newman and Kenworthy, pointing to their own findings as evidence that Newman and Kenworthy's studies may not show such a strong correlation. Mees (1994), has in turn looked at these studies and found that in the first instance, the work of Gordon and Richardson (1989) was relatively inconclusive and the difference from Newman and Kenworthy's work was more likely to be the result of 'statistical inconsistency than a genuine change in trip patterns' (page 4). Studies by Brothie of Melbourne (1992) initially also called into question the findings of Newman and Kenworthy. However Brothie, has since changed his calculations to be more in line with Newman and Kenworthy as a result of finding that figures he used omitted about 50,000 central city workers from the sample.

The domestic sector is the third-largest user of energy in New Zealand consuming 52.6 petajoules of energy in 1994 (see Appendix I). The effects of energy usage in the space heating and cooking areas are not always immediate or visible. The burning of solid (wood and coal) fuels and electricity are the two main sources of energy for the domestic sector in New Zealand. Electricity generation in New Zealand is largely by hydro-electric means. However what few consider is that this 'clean' energy still comes at an environmental cost, flooded productive land (for example prime orchard land in central Otago) and disrupted ecosystems (for example some hydro-electric dams on the Waikato River do not allow fish and eels to move up stream to spawn; or the forests flooded by the Manapouri power project) .

While the effects of the existing hydro-electric dams are likely to be with us for many decades, it is possible through greater energy efficiency to at least delay the need to build more such structures, saving both environmental resources and financial resources.

High-density housing forms are thought to be more energy-efficient in terms of space heating than lower density residential development. Theoretical calculations show that detached houses can require as much as three times the energy input of equivalent attached-housing and flats (Barnes & Rankin (1975) cited in Owens, 1992; OECD, 1995).

Some theorists argue that there appears to be an inconsistency between the desire to reduce energy use by transport through compact urban form and the development of more sustainable, renewable energy sources for cooking and heating. Steadman (1979) and Owens (1986) (both cited in Breheny, 1992) suggest that for any large-scale development of solar heating and wind power, lower-density residential development is required. However, Owens then concedes that a linear grid form of development might facilitate both high-density living and opportunities for renewable energy sources. Clearly however, there will be a limit where high-density residential development does have an adverse effect on renewable energy sources for residential accommodation (for example, high-rise flats located close together will block out sun light). Barton, Davis and Guise (1995) see this limit being about fifty dwellings per hectare. Careful attention to site orientation (see for example Middleton, 1966), and building height controls can also facilitate the requirements of both high density residential development and the use of renewable energy sources.

According to the Joint Venture for Affordable Housing (1989) solar access (design to enable the use of sunlight) and energy conservation are strongly correlated with the orientation of the dwelling and the location of the living areas within the dwelling. The greatest potential for adequate shade in summer and exposure to sunlight in winter occurs where windows to living areas of the dwelling have an orientation within an angle of twenty degrees east and west from north (see Figure 7).

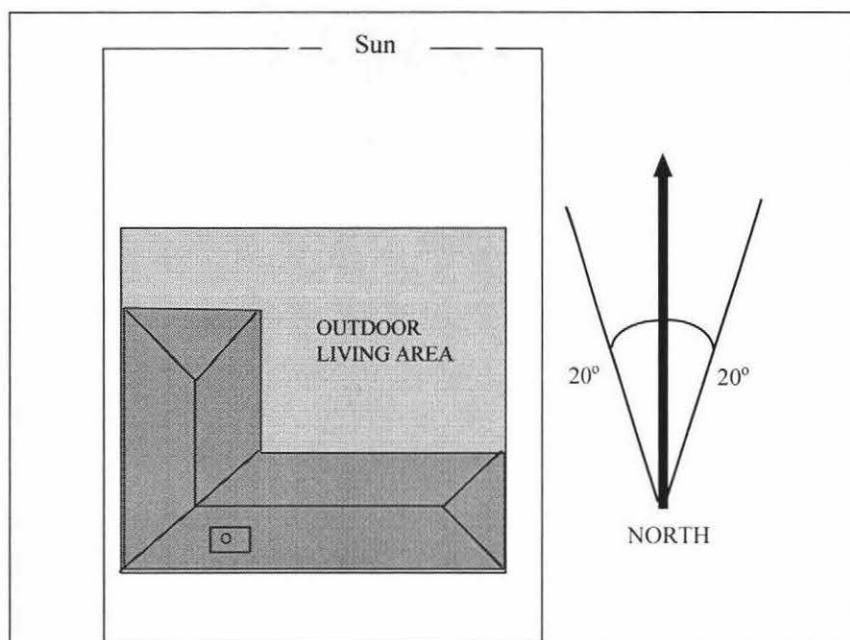


Figure 7: Site Orientation To Maximise Solar Energy Availability

The issue of lot and building orientation has also been addressed by K.R.T.A. Limited (1985). They say that the principle is not new, having been used by the classical Greeks some 2,500 years ago. In terms of local authorities acting on solar orientation, K.R.T.A. cites the city of Davis, California (which they say is pertinent to New Zealand due to its climate) which adopted an 'Integrated Plan and Building Code'. While giving no statistics K.R.T.A. state the code shows 'the benefits over time of careful orientations of subdivisions, and the value of a building code designed to prevent excessive heat gain in the summer and excessive heat loss during the winter' (page 11). A project in Milton Keynes (Britain) showed that such use of solar energy in space heating could result in energy savings of 11-12 per cent (OECD, 1995).

Hodgson (*pers comm.*) is one of a number of New Zealand architects who are advocates of solar design in high-medium density housing. In his view however, most New Zealand planning controls are too inflexible to enable the widespread adoption of some sustainable development initiatives. The main restriction he sees is the insistence of

‘daylighting angles’ on eastern and western boundaries which makes gaining planning approval for terrace housing and similar forms of development difficult. Logically to meet the needs of both higher densities and solar access, daylighting controls would be better applied only to the northern and southern boundaries of sites.

Urban consolidation should reduce the amount of energy expended in transport by reducing the distances between trip origin and destination points. (however congestion could nullify the benefit - see the discussion on congestion). In theory urban consolidation would be achieved through a variety of means, including:

- The subdivision of lots zoned for residential use
- Additional residential buildings on existing titles
- Medium-density or multi-unit housing development (Collie, 1990)
- Encouraging residential use of vacant land
- Conversion of large houses and recycling of non-residential buildings to more intensive residential use
- Rationalisation of housing layouts, possibly involving site amalgamation and new building (McDermott Associates, 1986)
- Rationalisation of housing stock by providing opportunities for smaller households, to find smaller dwellings in the same neighbourhood (ibid).

Kirwan (1992) warns that urban consolidation is not easily achieved. ‘Evidence from a wide range of countries suggests both that raising the intensity of use in already developed areas is difficult and that maintaining high densities at the urban fringe can only be achieved by active policies to restrain the conversion of more land into urban use.’

While it will ultimately be the private sector which will design and build new residential areas, Councils can encourage higher densities by reducing the minimum lot size requirement for residential subdivision, limiting the amount of land zoned for residential purposes and removing rules from plans that typically restricted and encourage residential building to follow a 'one, one-storey house per section' pattern. However it can be argued also, that the pattern of house building in New Zealand is only following what the market demands. Some form of public education programme is also needed to encourage the population to see medium and high-density housing types as being a desirable alternative.

As in the development of housing, it is now almost exclusively the private sector which is involved in the development of retailing centres and employment opportunities. Many theorists have expounded the virtues of being able to integrate such developments into residential areas. Local authorities can help encourage a greater diversity through allowing mixed uses within residential areas. Newman and Kenworthy (1992) suggest the adoption of the 'urban village' concept which combines both medium density with mixed land uses. While the concept undoubtedly has merit it is difficult to see how a local authority in a *laissez-faire* environment could actively encourage the development of such a settlement pattern through a District Plan other than through the freeing up of zoning and density controls. Baily (1997) has suggested one alternative may be to return to using structure plans. These hark back to a more interventionist style of planning but allow planning solutions which better match better the specific conditions in a given area, and are a better way of demonstrating how design elements may be integrated. As Baily also correctly points out, 'the Act prescribes the functions of territorial authorities and there is no section which prohibits the use of methods such as structure plans, to achieve the integrated sustainable management of the resource of the District'. Other methods, such as co-operative partnerships with developers, public

education programmes or financial incentives (for example rates relief), could be used outside the immediate scope of the District Plan.

Another alternative in the transportation field is to use other, more energy-efficient forms of transport. Figures from Statistics New Zealand (see Appendix I) show that more than 73 per cent of the population travel to work by motorised means other than public transport. It was estimated by Statistics New Zealand in 1996 that there were 10 cars for every 17 New Zealand citizens. The situation where we have many cars, vans and trucks clogging our roads which little more than 25 per cent occupancy in the vehicles is far from ideal and, short of using aircraft, one of the most energy intensive transportation modes (see Table 3).

Cycling and walking, are relatively low technology and energy-efficient forms of travel. Wherever possible, use of such simple forms needs to be encouraged. Such encouragement may take the form of dedicated cycle and pedestrian networks within residential areas, and increased use of mixed land-use patterns which allow common trip destinations (for example, shops and reserves) to be located within residential areas and so within walking and cycling distance. Such alternative forms must also be made to appear more convenient than private motorised transport to those travelling to work (or else there will be no desire to change). Further discussion on these aspects is contained in the section on traffic congestion.

Table 3: Energy Consumption By Mode Of Transport

ENERGY CONSUMPTION FOR DIFFERENT PASSENGER TRANSPORT MODES				
Mode	OCCUPANCY RATE (MJ primary energy/ passenger-km)			
	25%	50%	75%	100%
Petrol Car				
< 1.4 Litres	2.61	1.31	0.87	0.62
1.4 - 2.0 Litres	2.98	1.49	0.99	0.75
> 2.0 Litres	4.65	2.33	1.55	1.16
Diesel Car				
<1.4 Litres	2.26	1.13	0.75	0.57
1.4-2.0 Litres	2.76	1.38	0.92	0.69
>2.0 Litres	3.65	1.83	1.22	0.91
Rail	1.14	0.57	0.38	0.29
Bus	1.17	0.58	0.39	0.29
Minibus	1.42	0.71	0.47	0.35
Cycling				0.06
Walking				0.16

(Source: RCEP, 1994 cited in Bachels, 1996)

Subdivision and development features which contribute to lower energy usage can be summarised as:

- Medium to high urban density (not exceeding much more than 50 units per hectare however - to preserve solar access) to help shorten trip destination distances, increase the viability of public transport alternatives and assist in the establishment of more energy-efficient forms of housing
- Development of measures (such as dedicated walking and cycling routes) which promote the use of the two most energy-efficient forms of movement, cycling and walking.
- Mixed-use zoning to allow more trip origin and destination points to be located close to each other
- Site orientation to make use of renewable forms of energy such as solar heating.

Air Quality

The other key effect of energy use comes (typically) in the form of aerial pollution. Aerial (also referred to as atmospheric) pollution *per se* is caused by gaseous emissions (oxides of sulphur, nitrogen and carbon amongst others) and particulate (smoke, dust and grit) wastes emitted into the air.

Aerial pollution associated with residential subdivision and development comes from two principle sources, motorised transport and household activities (cooking and space heating).

Most motorised forms of transport discharge contaminants. Urban sprawl and extensive use of private motor vehicles are key factors in such discharges (United Nations Centre for Human Settlement, 1996, Pacione, 1990 and others). The pollutants emitted by motor vehicles may have a variety of effects on the environment and on health (as shown in Table 4: Aerial Pollutants).

Table 4: Aerial Pollutants

Pollutant	Increase 1978 - 88	Proportion of 1988 Total Emissions From Road Transport	Effects
Carbon Monoxide	20%	85% of total emissions	Morbidity, infertility
Black Smoke	57%	57% of total emissions	Toxic Trace Substances
Volatile Compounds	17%	17% of total emissions	Toxic Trace Substances
Nitrogen Oxide	25%	25% of total emissions	Acid Rain, exacerbates asthma
Carbon Dioxide	33%	18% of total emissions	Global Warming
Sulphur Dioxide	0%	1.5% of total emissions	Acid Rain, Bronchitis

(Derived from Bannister, 1992)
See Also Appendix F

Bickers (1996: page 9) notes that 70-80 per cent of emissions are emitted in the first kilometre of travel. Engineers explain this as being due to fact that in the first kilometre engines have not had time to warm up and are therefore at their most inefficient. Many authors see 400 - 800 metres as being a distance which most people could walk or cycle and would generally be willing to do so. Encouraging people to walk or cycle these distances rather than take a private car could, therefore, help reduce aerial pollution.

Aerial pollution from space heating or cooking is less of a problem in New Zealand than in other parts of the world because of the relative cheapness of electricity and gas which are cleaner and more efficient forms of energy than burning fossil fuels and wood. Nevertheless, smog does represent a problem which has adverse effects under certain conditions, most notably in Christchurch.

According to Pacione (1990) smog occurs during cold anticyclonic conditions in winter when emissions of pollutants increase as the demand for space heating rises. The atmosphere, characterised by only light winds and a restricted mixing layer, has limited capacity to disperse and dilute the emissions. The emissions, therefore, tend to stay in the immediate area leading to smog. When thick, smog is thought to exacerbate respiratory problems to those who are vulnerable and may result in death.

It would be difficult to control such emissions through subdivision development controls alone (although as mentioned in the section on energy use, higher-density semi-detached units tend to be more energy efficient). Rather, the incorporation of better insulation, double glazing and the omission of open fireplaces from future building designs would be more effective.

In summarising the case for reducing aerial pollution only a few strategies can be influenced through subdivision design:

- Higher urban densities - reducing the need to travel and enabling energy efficient dwellings to be built
- Subdivision design which allows greater use of alternative transport forms.

Global Warming

Gases released into the atmosphere as a result of human activities are thought likely to be enhancing the natural greenhouse effect⁵ at a rate which could extensively damage biological, economic and social systems (Ministry for the Environment, 1995). The main effects of the so-called 'greenhouse effect' are higher global mean temperatures, sea level rises, changes in weather patterns and changes in the frequency and severity of extreme weather conditions (see, for example, Greenpeace International 1994).

Sea level rises will obviously be disruptive to settlements on coastal and estuarine areas and will also bring rising groundwater levels in coastal areas which will threaten existing sewerage and drainage systems (United Nations Centre for Human Settlement, 1996).

Carbon dioxide is estimated to contribute 55 per cent (see Table 5) to global warming as a greenhouse gas (Mitlin and Satterthwaite, 1991). Levels of carbon dioxide in the atmosphere have been growing consistently for many years (Royal Society of New Zealand, 1988).

⁵ See Glossary

New Zealand has commitments under the United Nations Framework Convention on Climate Change to reduce levels of carbon dioxide emissions to 1990 levels. In addition to

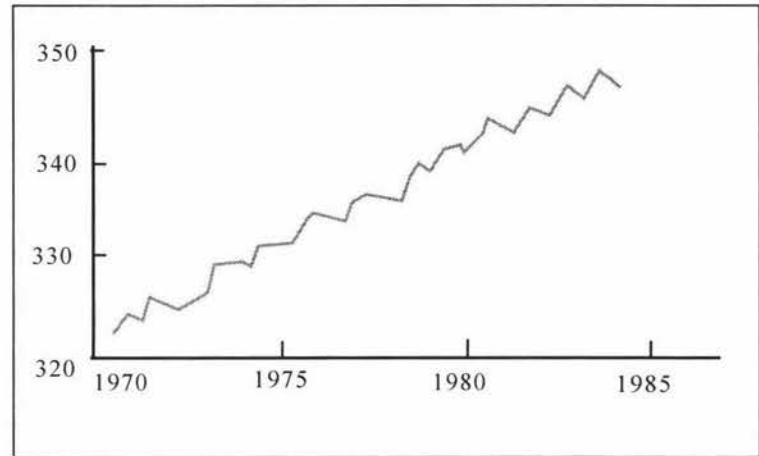


Figure 8: Carbon Dioxide Levels At Baring Head (N.Z.)

this, signatories are also to ‘promote the sustainable management of resources’ and establish programmes to ‘mitigate climate change by addressing anthropocentric emissions by sources and removal by sinks of all greenhouse gasses...’ (Hewison, 1994 - see also Appendix K).

The burning of fossil fuels for transport and heating are major contributors to the production of carbon dioxide. In New Zealand it is estimated that about 40 per cent of the country’s greenhouse gas emissions are produced by transport (Horne, 1991). Further, the process by which private motor-vehicles are made itself creates enormous amounts of wastes, including carbon dioxide (see Box 1) which are not immediately visible in New Zealand (as virtually all cars are now imported ready-built or in kit form). It follows that reducing the use of fossil fuel powered forms of transport will help reduce New Zealand’s carbon dioxide emissions and reduce the contribution of that gas to global warming, not only directly through exhaust emissions, but also through reducing need for such vehicles to be built.

BOX. 1: From Manufacture to Disposal - The Private Car.....

produces 70.1 tonnes of carbon dioxide over its life, which is 16.8 tonnes more than the 53.3 tonnes coming from its exhaust pipe. Before the car is manufactured, extracting the ore, smelting and refining the 880 kilograms of metals produces 400 million cubic metres of polluted air and 30 tonnes of solid waste. Before the car is used, 10.8 tonnes of carbon dioxide and 1.5 tonnes of factory waste are produced from its manufacture and the processing of over a tonne of metal, plastic and glass in each car.

In its working life the average car has to be serviced, which produces 6 tonnes of carbon dioxide in its repairing and disposing of it.

(Parker, 1995)

Table 5: Contribution of Gasses To Global Warming	<i>Contribution to radiative forcing in the 1980s (%)</i>	<i>Contribution over 100 years (%)</i>	<i>Atmospheric lifetime (years)</i>
Carbon Dioxide	55	61	50 - 200
Methane	15	15	10
CFCs	24	9	65 - 130
Nitrous Oxide	6	4	150
HCF 22	n.a.	0.4	n.a.
Other	n.a.	10.6	n.a.

Source: Haughton and Hunter, 1994

There are two principle ways in which this objective can be met. The strategies proposed are the same as advocated for energy use and aerial pollution. The first is the use of an alternative urban form that reduces the need to travel (higher densities, mixed-used zoning). The second is to encourage the use of forms of transport other than the private car.

Traffic Congestion

Closely related to the issues of energy use and aerial pollution is the issue of traffic congestion. New Zealand urban areas are styled around automobile dependence, that is, low-density housing and an increasingly wider geographic spread of retailing activities.

Higher-density residential areas, as already shown, have been seen by a large number of authors as being part of the solution to energy use in transport and aerial pollution, and are also seen as a way of reducing the impacts of 'urban sprawl' which could otherwise use land which is valuable for other purposes.

One of the more popular arguments against higher urban densities is that higher densities will result in greater traffic congestion. Following this argument one step further, traffic congestion would also contribute to higher levels of energy consumption and aerial pollution as it is likely that drivers caught in traffic congestion would not turn their engines off. The problem of congestion is likely to be more real in large urban centres. In solving problems of traffic congestion New Zealand, like Australia, has faithfully followed the United States pattern of road building (easing perceived congestion points by building wider, straighter, roads). Newman and Kenworthy (1992), the United Nations Centre for Human Settlement (1996) and others say such an approach is doomed to fail and will result in gridlocked roads. Commenting on the inevitability of congestion, the United Nations Centre for Human Settlement (1996: 314) said:

'Sophisticated traffic management systems can increase the efficiency of the use of road spaces and the number of vehicles using road systems without congestion. But increasingly, even if the incorporation of these advances was

accelerated, it is seen as insufficient as the sheer volume of cars, trucks and other motorised road vehicles overwhelm cities.'

The reason for the situation being expressed is relatively simple. Assuming the number of cars on a road continues to increase over a lengthy period of time, traditional intervention measures (increasing the number of lanes, using multi-level interchanges to replace controlled intersections, or building another road) would simply delay the inevitable.

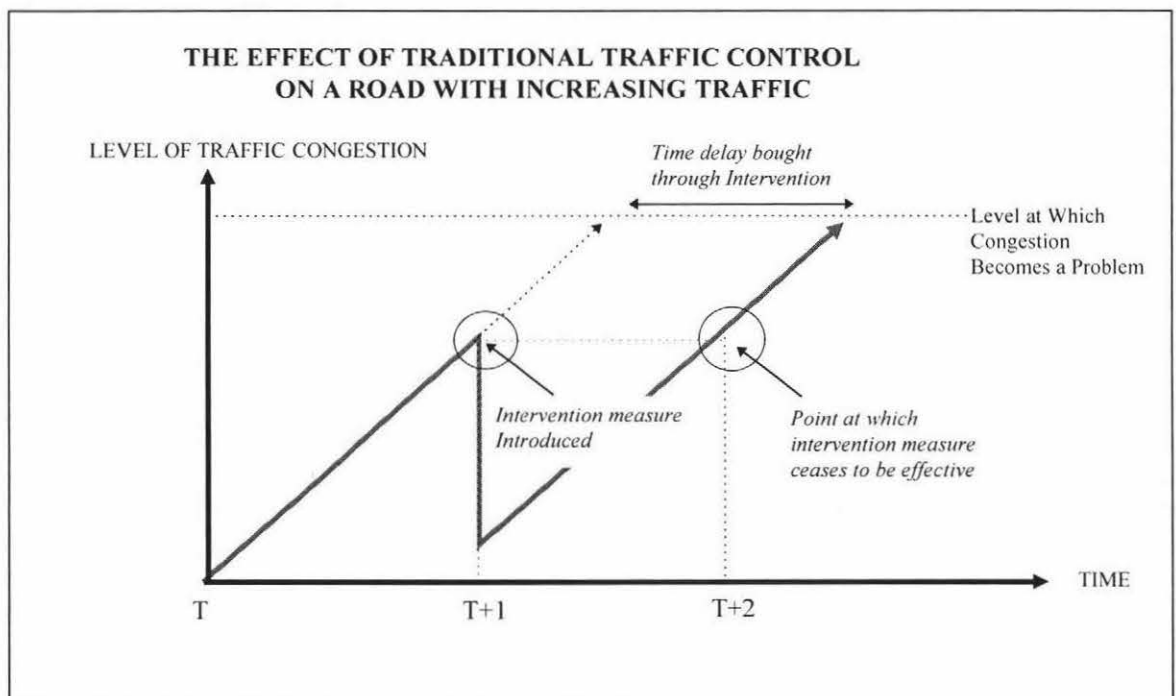


Figure 9: Traffic Levels And Their Response To Traditional Intervention Measures

While immediately after the intervention takes place there will be an initial drop or levelling out of congestion, there will be a point at which the intervention (for example extra lanes) will not be able to absorb the increasing capacity. Once the intervention measure being used is at, or near its capacity, the trek towards traffic congestion will continue.

New Zealand examples of this pattern are easy to find. Figure 10 illustrates a case in Tauranga where traffic on Cameron Road had been steadily increasing over a number of years to the point where it was perceived that freedom of movement and safety was compromised (see Plate Four). As part of a long-term roading strategy the District Council built a motorway (the Waikareao Expressway, see Plate Five) which essentially by-passed Cameron Road. The opening of the road saw an immediate drop in the numbers of vehicles using Cameron Road, but now however, the situation is now returning to 1992 levels⁶. Clearly, the long-term solution does not lie in traffic management through building more roads.

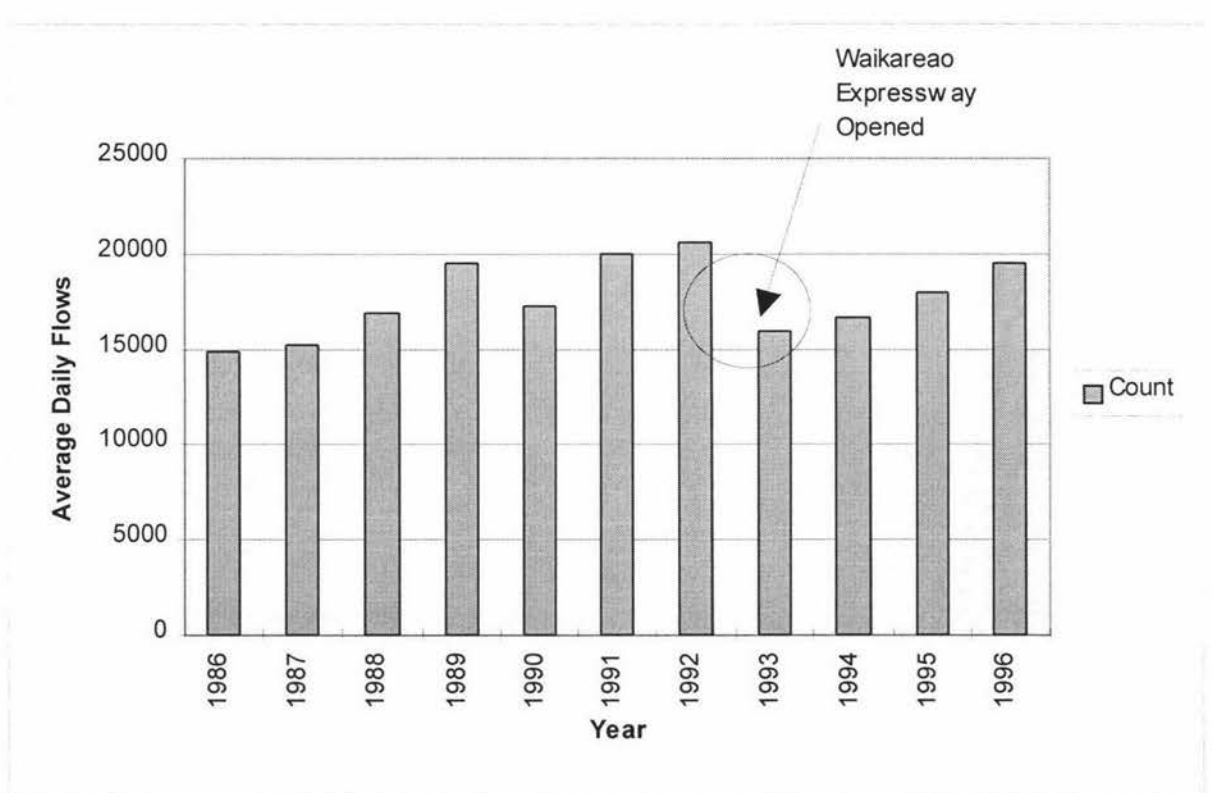


Figure 10: Influence Of The Waikareao Expressway On Cameron Road Traffic Flows (Tauranga) (Tauranga District Council: Department of City Services 1997)

⁶ Note the earlier drop in numbers portrayed in the graph coincided with the opening of the Tauranga Harbour Bridge.

The answers would appear to lie in an integrated approach aimed at reducing the need for trips, and encouraging the use of alternative forms of transport to the private car.

Newman and Kenworthy (1992) suggest a three-way solution:

- Traffic Calming: Encouraging community life by turning streets into more pedestrian-friendly environments. The idea is not to ban cars altogether, but to encourage pedestrians back on to the street
- Urban Villages: Similar to European developments which combine medium and high-density housing with diverse commercial facilities in car-free environments
- Light Rail: A convenient, attractive and environmentally-friendly mass transit system.

These strategies are similar to those gaining increasing popularity world-wide.

The traffic calming strategy is one of a number being put in place to make alternative forms of transport (in this case walking) more attractive. Cervero (1996) notes that educational, promotional, co-ordination and other similar techniques used in the United States had negligible influence in changing transportation habits. To encourage people to walk, cycle or use public transport, the alternatives being offered have to be made more attractive than using a car. Techniques for doing this which have applicability to residential subdivision and development include those shown in Table 6.

Table 6: Techniques For Encouraging The Use Of Alternative Transport

Activity Area	Technique	Example
Parking Management	<ul style="list-style-type: none"> Reducing carparking requirements and capacities in both residential and commercial areas. This reduces the convenience of the car and promotes an environment more conducive to walking and cycling. 	<ul style="list-style-type: none"> Copenhagen reduced central parking by 3% a year, cutting private vehicle trips to the commercial centre substantially (Edwards, 1997) In Paris, 100,000 parking spaces were eliminated in 1990 when it was found that car dependence had resulted in a third of urban space was devoted to cars (Horne, 1991).
Traffic Calming	<ul style="list-style-type: none"> Narrowing the width of residential streets forcing traffic to slow down providing safety and room for pedestrians. This may be done by narrowing the carriageway width itself, introducing rough-paved surfaces, the use of planter boxes to narrow the carriageway or similar techniques. (Some Australian examples are shown in Appendix H). 	<ul style="list-style-type: none"> Studies by the ARRB (1978), Brindle (1989) and others have established guidelines based on experience to slow traffic in Australian residential neighbourhoods. These are now being implemented in cities such as Melbourne and Freemantle and, according to Newman and Kenworthy (1992), have met with some success overseas.

Activity Area	Technique	Example
Dedicated Cycle and Walking Routes	<ul style="list-style-type: none"> • Car-free common areas Which ensure pedestrians and cyclists can move around in the area safely. • An entirely separate walking and cycling network located away from roads and following the most direct paths to common destinations as possible. 	<ul style="list-style-type: none"> • Examples in Kolding (Denmark) developed using principles found in Munkstrup and Lindberg (1996) and Almere (Netherlands).
Increasing the Usability of Public Transport	<ul style="list-style-type: none"> • Making inner city bus routes car-free during certain times so that buses and light rail vehicles can move freely. • Use of bus-only lanes and traffic lights which give priority to buses. • Increasing the capacity, frequency and facilities of existing services and resurrecting abandoned services. 	<ul style="list-style-type: none"> • Auckland City, among a number of other New Zealand local authorities, is already using bus-only lanes. The concept is also used in Europe and Britain, though is still not widely applied in most areas.

The urban village concept is a technique for dealing with transportation issues which has gained the endorsement of the United Nations. Potentially, the urban village can accommodate almost all the features discussed in this work to date.

Work carried out by Newman, Kenworthy and Vintila (1992) demonstrated one possibility for the rehabilitation of existing 'Automobile Dependent Cities' (see Figure

11) using the urban village concept. In their work a series of high-density mixed-use centres were located at transport stops within the existing city fabric. These centres were to be designed in such a way as to allow pedestrian movement as the principal mode of local transport. Surrounding the centres are areas of medium-density housing (within 800 metres of the transport stops) and beyond these again, areas of lower-density housing. All centres are linked by an extensive public transport network based on railway lines and major road links.

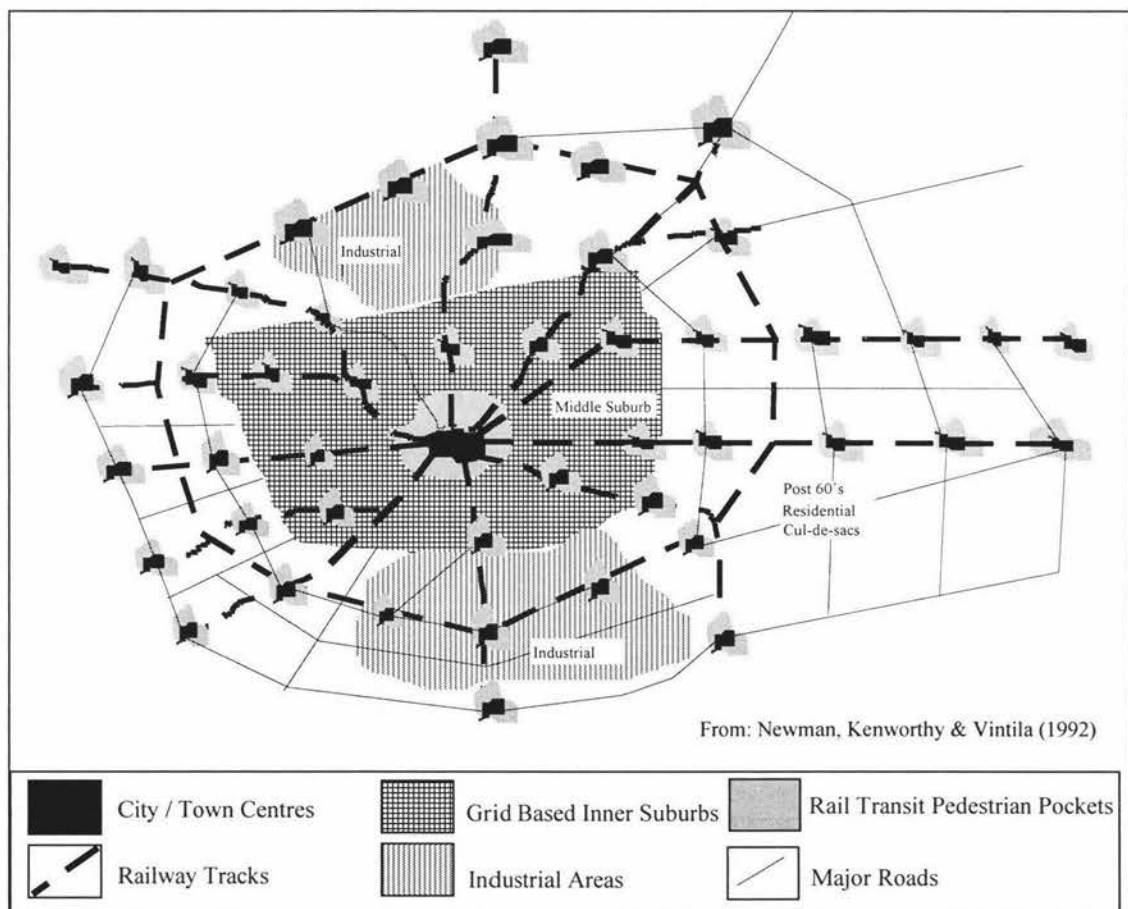


Figure 11: Remodelling of the Automobile Dependent City

The nodal layout suggested by Newman, Kenworthy and Vintila (1992) is however, only one possible way of re-engineering urban areas to better facilitate alternative transport use (and one which does have the support of the United Nations). Barton,

Davis and Guise (1995) suggest a number of alternative forms based on linear forms of development. Essentially, the principles used in each development are the same, high-density mixed-use areas based around public transport routes and stops. The dimensions of these are such as to allow all activities in the high-density mixed-use areas to be within easy walking distance of the public transport stops, thus reducing the need to use cars.

Work by Newman and Kenworthy (1992), the United Nations Centre for Human Settlement (1996), and many other authors cite the use of public transport systems based on railways as part of an integrated solution to automobile dependence and its effects. However, because of the costs associated with such elaborate systems few, if any, New Zealand urban areas would be likely to install elaborate light rail systems in the next twenty or so years. However, the principles can still be used and buses are a relatively cheap alternative which could have an increased role.

There is general agreement that public transport systems are most effective where residential density is above a certain level. According to Cervero (1996), research has shown urban densities need to be at least 30 to 40 people per hectare to draw people to the streets and support a reasonable level of public transportation services. Such figures appear to be consistent with those stated in Barton et al. (1995) and by Australian authors.

Parker (1995) advocates the greater use of bicycles as an 'environmentally friendly' form of urban transport. The RCEP (in Bachels, 1996) has already demonstrated that cycling is the most energy-efficient form of transport (see Table 3: Energy Consumption By Mode Of Transport) and many other authors have commented on the use of cycling and other modes of alternative urban transport as possible ways of reducing carbon dioxide emissions (see, for example, Haughton and Hunter 1994). The

work by Parker (1995) however, also attempts to work out the financial cost of the private car, and the benefits of reducing dependence through the use of bicycles. He concludes there are significant savings in the use of bicycles. For a multi-car household, use of a bicycle can save up to 59 cents per kilometre travelled (when externalities are factored into the costs - see Appendix L). While the benefits of cycle transport could also produce cost savings in New Zealand (Parker's data were for Victoria, Australia), the savings would probably be smaller (due to less traffic congestion - which Parker identifies as major contributing factor).

Taking a different perspective, economists could argue that a proper pricing structure (such as congestion fees, emission taxes and parking fees) would eliminate the need for public intervention into the land market (to control urban sprawl), and thus ideas of greater public-transport-orientated cities and mixed-use land zoning would not be necessary. In theory, with substantially higher road prices, people would move closer to jobs and transit stops to economise on travel, and shops would be welcomed into residential neighbourhoods. Cervero (1996) says this approach is taken in New Zealand in the current *Land Transport Pricing Study* (which seeks ways of internalising the external costs of transport). He goes on to say that true market pricing would however be even more unpopular than transportation-land-use linkages. Martin Wachs (1994) is quoted as saying 'except for professors of transportation economics and planning, who hardly constitute a potent political force, I can think of few interest groups that would willingly and vigorously fight for the concept'. A survey by Gendall *et al* (1994) would appear to demonstrate that this would also be true for New Zealand. The 1993 survey of nearly 2000 people found that a majority (55- 75 per cent) opposed the use of permits, tolls or charges to cut down on unnecessary car use (*ibid.*).

Reduced Flexibility For Future Land Use

Almost any new residential subdivision and development on the fringe of an urban area in New Zealand results in the loss of agricultural land.

Following the lead of the marketplace, traditional building bylaws and zoning regulations have favoured greenfield sites at low density. Advertising has led to a model of the ideal home as being a separate, single-storey, three-bedroom home and almost all other options are portrayed as second-rate (McDermott Associates, 1986, Works Environmental, 1996). Such development has resulted in relatively low-density residential developments which have the disadvantages of increasing energy use and aerial pollution, as well as using more land than higher-density housing developments. In New Zealand the trend appears to be continuing as the year 2000 approaches, although, apartment and 'town house' living is becoming more popular, and in some urban areas, such as Waitakere, options to develop medium-density is starting to be taken up by private property developers (Turner *pers. comm.*).

In terms of economic return it can be easily argued that 'growing houses' rather than crops is the best use for land. In economic terms, for any plot of land there will be several possible uses, each offering some given economic rent. In an open market Von Thunen theories predict that land will be assigned to the use returning the highest economic rent (Alonso, 1964, and Randall, 1987). For rural land to be put to urban uses there does however, have to be a market for such development, and, as Randall notes, such markets tend to exist only where there is already an existing settlement and therefore a realistic chance of the land being put to urban uses.

In the short term at least⁷, land once converted to residential use is unlikely to be used for any other use (due to high costs associated with the re-establishment of the land - Works Environmental, 1996). At the same time the land, no matter how fertile, has essentially lost its value in terms of agricultural yield or ecological worth, and in some cases agricultural and horticultural uses will be forced on to less fertile land. It is questionable whether these costs are adequately factored into the cost-benefit equation when the market decides that land should be subdivided for housing. Certainly current valuation practice appears to place little value on the presence of such things as wetlands on a property. The reason for this is because there is no market for such land. Traditional economic markets are an anthropocentric construction and so any item that is in huge abundance, or which has no apparent use for humans (regardless of scarcity), is not allocated a market price.

Given that the present economic valuation system appears to place greater benefit of converting land to residential use, why should there be a need to protect high-quality agricultural land?

There are two inter-related answers to this question. The first and simplest argument is that most countries are losing productive soils at a much faster rate than the natural environment can create them (*ibid*). The New Zealand Institute of Agricultural Science (1974) stated that although nine per cent of New Zealand's land area is suitable for arable farming, only three per cent (800,000 ha) has soils capable of sustaining a high production of a wide range of crops. Less than 0.04 per cent of New Zealand soils are classified as being 'superior horticultural soils' capable of continuously intensive cropping. An OECD (1991) estimate has since put the amount of arable land at only

⁷ Over many centuries whole cities have been known to disappear and the land reclaimed by nature. Even in New Zealand settlements like Mangapurua (the former town associated with the 'Bridge to Nowhere') have been reclaimed by the bush.

two per cent of land area⁸. Just how much of the 'superior horticultural soils' remains is uncertain. Ultimately, covering such highly productive soils will impose future costs to the community as the land that remains will not have the same productive capacity as that which was lost. Produce will have to be brought in from further afield to sustain the urban area, or increasingly expensive fertilisers will need to be applied to the land to maintain production at a level that is able to meet demand. This latter aspect brings us to the second answer.

K. A. Edwards (1997) claims that cities and towns are not self-contained. If they were, it would be obvious that such concentrations of people could not procure the resources they consume from within the urban boundaries nor dispose of the waste produced. Most of the world's cities depend on rural areas, if not for economic viability, then for the resources which the cities can no longer produce. All urban areas have what is referred to as an 'ecological footprint'. In its simplest form this can be described as the land required to supply the urban area with food and resources, dispose of wastes, and the area of vegetation required to absorb carbon dioxide output. It is in essence an indicator of a settlement's sustainability, which has the value of demonstrating the settlement's reliance on the wider environment that may not otherwise be obvious.

Work by Bicknell *et. al.* (1996) suggests that the ecological footprint for the average New Zealander is 3.27 hectares⁹. That is, it takes 3.27 hectares of ecologically productive land per year to sustain the average New Zealander's lifestyle (World Resources Institute, 1996). The figure of 3.27 hectares compare favourably against the United States (at around 6 hectares) but poorly against the World average of 1 hectare. The difference between the three figures reflects relative affluence, accessibility of

⁸ It is possible the OECD definition of arable land differs from that of the New Zealand Institute of Agricultural Sciences. Nevertheless, the OECD reports a 12.3 per cent decrease in the amount of arable land 1970 -1988.

⁹ However Taylor and Smith (1997) estimate 5 hectares and up to 9.8 hectares if the marine fisheries and carbon dioxide absorbing potential of forests are included in calculations.

resources and lifestyle choice (*ibid.*). Clearly, most people who live in urban areas do not each live on 3.27 hectares of land, if they did a city like Porirua would cover an area of more than 158,600 hectares (more than eight times the combined urban and rural areas of the current city). Obviously, urban areas “borrow” from rural areas to sustain themselves. The value of maintaining rural areas to avoid what Bicknell *et al.* call ‘ecological deficit’¹⁰ is therefore quite apparent.

Another consideration with regard to the rural-land preservation argument is that rural areas often provide more intangible benefits to the community in terms of their amenity value. It is no coincidence that residents in New Zealand cities such as Tauranga, Nelson or Waitakere place high value on the appearance on the relatively non-urbanised ranges and hills that form the backdrop to their settlements (Dialogue Consultants, 1993, Waitakere City Council, 1995, and others).

In the protection of high-value agricultural lands, as with transport and energy issues, urban consolidation is often promoted as the panacea. It is however recognised that some outwards expansion of the urban areas of New Zealand’s growing towns and cities will be inevitable. Where this growth is unavoidable it is suggested that new development avoid (except where there is no other feasible alternative) building on land which has high life-supporting capacity (which, for example has the properties described by Webb *et al.* 1995 - see Appendix G and which contains a habitat with a wide diversity of species).

¹⁰ See Glossary

Economic Impacts

INFRASTRUCTURE

With subdivision and development comes pressure on local government to provide services for the community and protect the environment from contamination. Ultimately it is the community and the environment at large which has to pay the cost for forms of residential subdivision and development which lead to the inefficient use of services. The community pays in several ways:

- As purchasers, through a proportion of the price new residents pay developers and subcontractors for the servicing and development of the section
- In New Zealand local government pays a percentage of the cost to upgrade and extend services, some of this cost may be passed on to the community in the form of a rates bill
- If too much of the rates take is taken up funding services the provision of other facilities and services to the community may suffer.

Mitlin and Satterthwaite (1990) note that low-density forms of residential development confer higher infrastructural costs than higher-density forms. The reasoning is quite simple, a compact urban form, catering for the same population as a lower-density counterpart, while it may generate the same demands for water reticulation and sewage disposal simply requires less pipe (and possibly other infrastructure such as pumping stations) because the distances that need to be covered are not so great. McDermott Associates and Sheppard & Rout (1986) further note that a dispersed of population in low-density urban forms has important implications in facilities and services in that 'its net effect has been detrimental in that it has tended to result in costly duplication'.

Of course, the establishment costs are only part of the equation. The infrastructure, once in place still needs to be maintained if it is to remain effective. In the United States, New Jersey recently embraced the ‘compact city’ in its state-wide growth management plan; there, studies showed that, in accommodating 520,000 new residents over the next twenty years, the state would save 1.3 billion United States Dollars in infrastructure construction and 400 million United States Dollars in annual operating and maintenance costs (Cevero, 1996).

The benefits are not just limited to physical infrastructure (pipes, roads and the like) of course, consolidation also has benefits for social infrastructure (schools, hospitals - see Appendix B).

Other than promoting compact form, work by the Department of Housing and Regional Development (Infrastructure and Urban Strategies Branch, 1995) in Australia has demonstrated significant savings can be made through the incremental sequencing (both geographically and chronologically) of urban growth at the urban fringe to permit the efficient extension of infrastructure. The general premise appears to be to make the most efficient use of existing capacity before investing in new infrastructure. The use of existing capacity represents a ‘free resource’ from the perspective of the relevant authorities’ expenditure. The ability to postpone the construction of the facilities eventually required for a new community on the urban fringe which the existence of ‘off site’ (existing urban) capacity permits represents a considerable saving in the discounted cost of providing infrastructure for new development (ibid).

In sequencing infrastructure provision, it is considered by the Department of Housing and Regional Development that ‘the optimal timing occurs when the cost of continuing to rely on existing facilities outweighs the cost of providing new supply in advance of a level of demand that is equal to its capacity’.

That an adequate standard of infrastructure is important to a residential area in terms of its ability to sustain itself has not been questioned by authors. There appears to some agreement that a compact urban form makes infrastructure provision and maintenance more affordable, however the extent of the benefit appears to be dependent on such things as whether existing infrastructure is being used to capacity.

THE HOUSING MARKET

According to Maslow's hierarchy of needs (see, for example, Giddens, 1989), housing (or more specifically shelter) is one of the basic needs for any human. Sustainable development, as defined, is as much about enabling the current generation to meet its needs as it is about future generations to meet theirs. It follows, therefore, that any residential settlement must provide an adequate level of shelter for its residents before it can claim to be sustainable. Further, according to Edwards (1997), the sustainability of urban communities is also inextricably linked to economic and environmental sustainability. While social and economic division among people may be inevitable, the growing inequality between the 'haves' and 'have nots' and the increasing deterioration of environmental conditions of the poor is a threat to the sustainability of human settlements and society as a whole (*ibid.*). Put another way, not allowing some sectors of society to meet their basic needs could result in high levels of crime, and may even see the return of diseases which have been eradicated. Both of these have the potential to threaten viability and habitability of settlements for society as a whole.

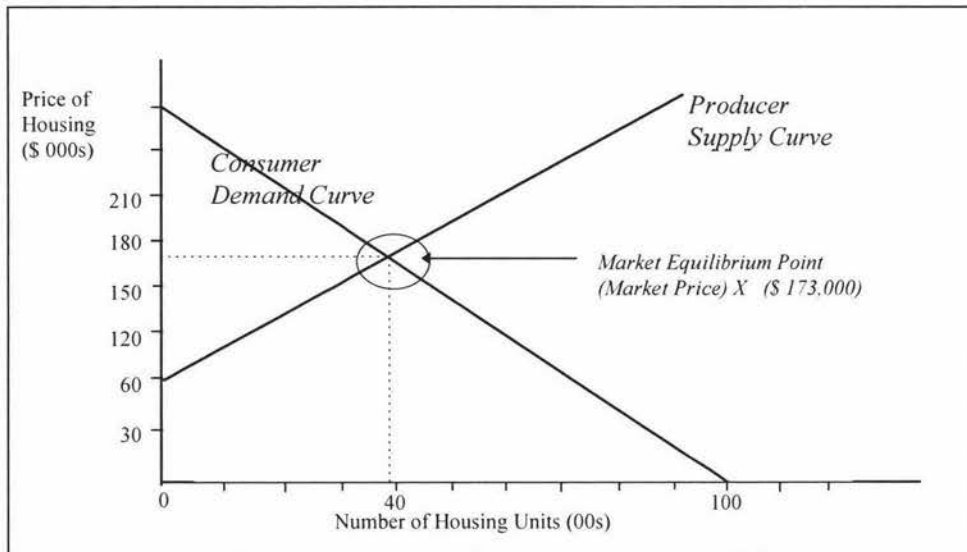
The final cost of housing (and therefore availability of housing across a wide socio-economic spectrum) is influenced primarily by the balance of supply and demand for both the physical housing unit and the land on which it is situated. Cost of construction

is the second most important component. The cost of housing may be expressed through the formula:

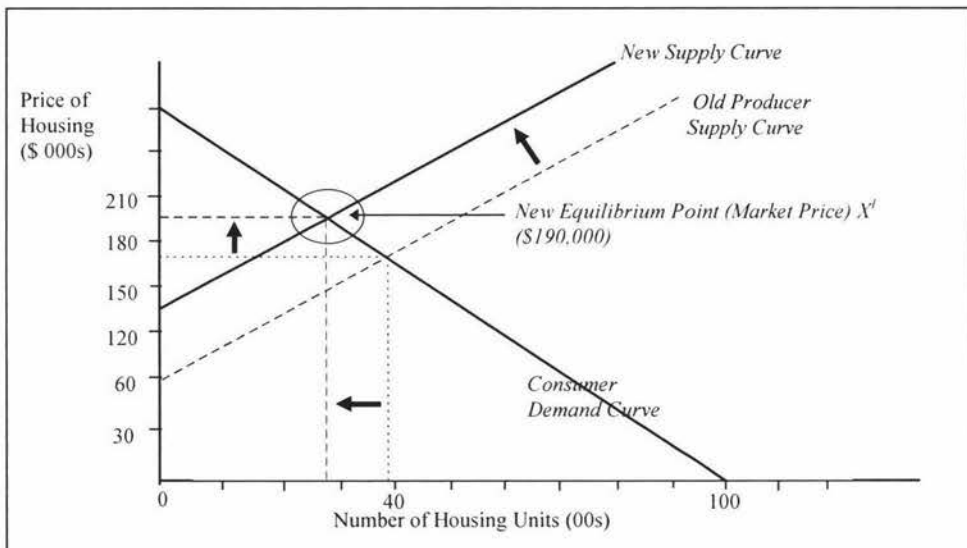
$$CV = LV + (BC + P)$$

where CV is the capitalised value of the dwelling unit (house or flat), LV is the land value, BC the building cost and P the profit margin made by those constructing the dwelling unit.

The impact of local government tends to be in regard, firstly, to the cost or value of the land (LV) through the supply-side of the equation, and in particular in the role of regulator of land conversion and development, and land use. Later, and to a much lesser extent, costs may also be imposed through rigidly formulated and enforced construction standards (see Figure 12).



Situation Before Supply Is Restricted



Situation After Supply Is Restricted

Figure 13: Hypothetical Example of Intervention Influencing House Prices

All other things being equal, effectively restricting the number of housing units available on the market through, for example, not rezoning new land on urban fringes (to prevent urban sprawl) while demand continues to rise will see the number of units available for sale reduce (increasing market scarcity) forcing the market price upwards, sometimes to levels which are above the ‘real’ market value (Pavletich and McShane, 1997). This supply-price relationship is shown in Figure 13.

While it is certainly true that restrictive planning regulations can result in higher prices for housing (not only through restrictive zoning, lot sizes and density controls and lengthy processing times can also be factors according to the United Nations Centre for Human Settlement), there are two factors that need to be considered before any further discussion takes place;

- What happens in areas where there is little or no demand? In theory restricting the supply of housing will make little difference. The demand curve in the model would be flat (in economic terms, almost no market elasticity). Thus this ‘problem’ of restricting residential land for housing supply only exists where residential areas are expanding at a moderate to high rate.
- Also, as shown in Figure 12 the influence of local government in terms of restricting land supply is only one factor which influences the cost of housing. The United Nations Centre for Human Settlement (1996) notes that the planning systems in Britain and Australia have been judged to be successes. Both the examples cited specify land controls which control and restrict the direction of urban growth through such things as greenbelts, and curbing the amount of agricultural land taken for urban development. Clearly such controls would affect the amount of land available for development, but do not appear to have resulted in very high accommodation costs.

In considering ways to overcome the problem of land and housing prices being driven higher through regulations, the United Nations Centre for Human Settlement looked at the appropriateness of the land-use regulations themselves. While not offering any ‘ultimate solution’ it did suggest that changes would be needed to the traditional ‘rigid’

planning forms of control would be needed. Essentially what was proposed was, a mixed approach instead of a blanket policing approach to land-use control. This would consist of an 'enabling' approach within urban areas and a 'policing' approach for the protection of sensitive areas.

The 'policing' approach is straightforward, restricting the location of certain activities in certain areas. The key component of the United Nations 'enabling' approach was identified as being the development and planning control system should be permissive (i.e., the initial assumption by the planning authority is that the individual or business developer should be able to proceed with particular residential, commercial, mixed use or other project with the minimum of restrictions). It should be noted that the enabling approach is essentially that which has (supposedly) be adopted in the Resource Management Act.

Randall (1987), says that in terms of resource scarcity, increased market pricing will offer an incentive for end users to look at alternatives that for whatever reason had previously been unattractive. Hence controlling the release of land for residential development on the urban fringes may make alternative sites within existing urban limits more attractive to developers. To do this successfully new development within urban areas needs to be enabled rather than discouraged.

If urban sprawl is to be controlled through the controlling of land being released for residential development on the peri-urban fringe, some other mechanism is needed that allows supply to meet demand. An obvious way of doing this is reducing or eliminating rules which determine minimum lot size and housing density. Such action would allow more housing units to be built on the same area of land. In this way opportunities would exist for the creation of further housing units within the existing urban area itself to help meet demand. While it is possible that the actual cost of the

land on which the dwelling units themselves are built will increase (due to scarcity of new sites on the rural-urban fringe), some, if not all of these costs could be offset by the higher yields available from existing sites and other savings (such as those resulting from the need to provide less in the way of materials for infrastructure).

Complementing the reduction in minimum lot size or increase in allowable density would be mixed-use zonings. Mixed-use zoning would allow housing to be located in areas outside the typical 'residential zone' and establish in commercial areas (for example, above shops) or on vacant land which had previously been designated for another purpose which was never established. For this to work however, dwellings would need to be insulated against noise and designed in such a way that residents were afforded an acceptable level of amenity to enable them to live in these areas without endangering their health.

Just having these rules in a city-wide form however, may be counter-productive to achieving other 'sustainable development' objectives. A random scattering of high density developments is not likely to be conducive to public transport which tends to follow carefully defined routes (Van Tonder *pers comm*). It also has to be recognised that medium and high-density housing will not meet the demands or requirements of everyone in the community (for example, a large family is not likely to find a two-bedroom flat practicable). Higher-density and mixed-use zoning, while being allowed flexibility to establish according to market preferences, should be actively encouraged in certain areas so a series of nodes of medium-high-density mixed-use developments are focused around public transport routes.

Local authorities can also have a degree of control over two other factors (other than the controlling the supply of land through zoning) to assist in keeping the cost of housing low.

The availability and cost of infrastructure for housing can make up a significant proportion of the cost of housing overall (the exact proportion depends on the market price of the house and the sophistication of the infrastructure provided). It follows that any reduction in the cost of infrastructure provision will assist in reducing the cost of the dwelling unit itself. As already discussed, a compact urban form can result in reduced infrastructure costs, while reducing residential road widths not only reduces the cost of the road itself, but also makes for a more pedestrian-friendly environment, and frees up land for housing and reserves. Similarly, much space is wasted in parking. In studying sale prices of apartments in Australia, Berkhout and Hill (1992) found that an 8 per cent saving on the sale price could be made (through better land yields and reduced construction costs) if parking spaces for cars were reduced from two to one, and a 19 per cent saving on sale price if parking was eliminated from the development altogether.

The second area over which local authorities have control is building height. This typically would not be considered a subdivision control *per se*, but is regarded as a common development control. Also, as shown in an earlier chapter, the modern definition of subdivision now includes subdivision of building. In this way, building height can be thought to be similar to lot size. Berkhout and Hill (1992) and a number of other authors (for example, Barton *et al.* 1995) comment on the expense of providing lifts for tall buildings. Other than the fact that lifts require extra energy to function, Berkhout and Hill found that the introduction of lifts to a building had ‘a significant bearing on the cost of construction which could not be offset by the increased yield...’.

So, local government actions can affect housing affordability through controlling the distribution and type of residential development which occurs in an area. While techniques such as zoning can direct development away from high-quality soils, areas

with high biodiversity or hazards, and discourage urban sprawl, the effect of such intervention can drive the price of housing upwards. Ways in which such price rises can be avoided or mitigated tend to be vague, if mentioned at all in most literature, but a strategy that is broadly complementary to other sustainability factors discussed in this work would appear to contain:

- Controls for new residential development within existing urban areas should follow an enabling approach
- The loss of residential development opportunities on the urban being compensated for within the urban area itself. New opportunities can be developed through less restrictive density requirements and mixed-use zoning that allow residential development opportunities to develop in a wider range of areas
- Recognition that blanket high density may be counter-productive in that it is unlikely to satisfy the diversity of demands from the market and could lead to transportation problems
- Reducing the amount of space devoted to cars and car parking on a residential site.

One last point to consider is that in many cases a strategy of urban consolidation in a New Zealand context would need to be worked through with neighbouring local authorities and policies developed which are complementary. Unless this happens, all that may result is a 'leapfrogging' of urban expansion over the administrative boundary.

Social Sustainability.

CRIME & URBAN VIOLENCE

Where ever increasing numbers of people are drawn together issues of crime surface. Sociologists such as Giddens (1989) say there are many causes for violence. These may include inadequate income, the destruction of cultural identities, racism or discrimination. This work is not a sociological or psychological study of crime, nor does it intend to suggest social policies to eliminate crime. However, good residential design (as recognised by Coleman , 1990, Dixon, 1993, and others) can play a major part in dissuading criminal and other forms of deviant behaviour. The nature and quality of street-life has a considerable influence on the incidence of crime and vandalism. So, too, does the physical design of housing areas (United Nations Centre for Human Settlement, 1996).

Jane Jacobs (1965) found that successful neighbourhoods in tended to share the same things in common:

- Close texture
- A high-density assemblage of mixed land uses
- Many destinations were within walking distance
- Almost constant foot traffic.

Land-use zoning which came into common usage in New Zealand as a result of the 1926 Town-Planning Act and which was copied from overseas¹¹ has created a strong segregation of land uses (Ali Memon & Perkins, 1993). Alice Coleman (1990) argues that such segregation means few destinations are now within easy walking distance, so people use cars for most purposes. The vehicles are impersonal and make people more

¹¹ Ali Memon and Perkins (1993) suggest the United States, though zoning was also known to be in use in Germany at or before this time.

anonymous. Oscar Newman's (1972) work *Defensible Space* found that 'anonymity' (defined as 'the impersonal character of areas, where residents are not able to get to know each other') was a key factor in crime. Because residents no longer knew who was local and whom was about to commit a crime. Similarly it was found that where common grounds were shared by a large number of residences crime was more prevalent.

The other issue with segregation of land uses is that because many work hours are still defined by the hours of daylight, areas with no permanent residents effectively emptied out at night and so natural surveillance and 'passive policing' during the hours of darkness was lessened (Safe City Committee of the Toronto City Council & City of Toronto Planning and Development Department, 1992). This factor - lack of surveillance - was also identified by Newman (1972) (and subsequently others such as Coleman, 1990) as contributing to crime. Criminals like to operate unobserved, that is, in screened, secluded places where few people can see them. The level of surveillance depends not only on the number of people in the vicinity, but also on the type of outdoor space. Newman (1972), Coleman and others suggest that open space which has windows looking out on to it tends to be the best. Entrances to houses facing on to the street and, particularly, flush to the street were found to be the least prone to crime. A path winding its way through high greenery while attractive, was also dangerous.

A third key aspect found by Newman (ibid.) related to the number of entrances, exits and pathways serving a residential area or apartment block. In simple terms, the more pathways there are, the more potential escape routes for criminals and deviants. A greater number of possible routes to, from and through a residential area also tends to disperse the number of people (those using the pathways for law-abiding reasons) available for passive surveillance (Coleman, 1990).

The solution to the issue of pathways presenting escape routes appears to be self-evident, reduce the number of pathways. The Department for the Environment DICE (Design Improvement Controlled Experiment) programme recommended a return to the more traditional forms of street which 'reduce escape routes for criminals, concentrate the public presence along fewer routes, where people feel safer, and cut the cost of maintaining an unnecessarily labyrinthine network' (Coleman, 1990: 147). Relatively straight streets, would assist in minimising trip distances. However, as Jane Jacobs (1965) suggests, a dense network would be preferable to a small number of long routes. To assist 'permeability' (the ability to gain access to, or through an areas) for pedestrians and cyclists block sizes need to be kept small or accessways provided which enable them to take the most direct route possible to local facilities (shops, parks, public transport stops and the like). Presumably the tight grid-network of streets would only be used in higher-density residential areas however. Blanket use of such a network throughout an entire town could lead to traffic flow problems (such as, jams or accidents).

An alternative to the recommendations of DICE may be the use of culs-de-sac. Cul-de-sac have only one entry and exit point (unless another thoroughway is provided for foot or cycle traffic). With this approach design has to be carefully considered. Lengthy, winding culs-de-sac will increase vehicle trip lengths, and (unless more direct pedestrian and cycle routes to local facilities are provided) discourage local trips on foot or by bicycle.

These aspects (passive surveillance, anonymity, number of exits and pathways) are of course equally (if not more) applicable to another form of subdivision which is becoming more in common in New Zealand, the 'strata' or 'apartment building' style of subdivision (see definition of subdivision in Chapter III). Indeed, much of the work by

Coleman (1990) and Oscar Newman (1972) was focused directly towards the relationships between design elements and crime in these buildings.

Interestingly, while quite a number of new apartment buildings in New Zealand are being built with ten or more floors and with thirty or more dwelling units (see, for example, Plate Six) , both Coleman and Newman see such a scale as undesirable. High-rise blocks are regarded as creating anonymity because they segregate people at different levels rather than allowing normal interaction. High - rise blocks were also found to have psychological effects on residents such as inducing neurosis, were perceived to have a high fire risk by residents, caused problems in the supervision of children, and created fears of being attacked in lifts or stairwells (Coleman, 1990: 32). Newman recommended a limit of around six floors, while Coleman recommended a height threshold of three or four floors (see Plate Seven). For the time being at least, crime in New Zealand high-rise apartment blocks is comparatively rare (as the blocks are new, and have been built for the affluent). However, should such blocks become more common, and those which are in less desirable locations become old (such that they become, in effect, lower-income flats) crime could become more prevalent.

Other design features in Dixon (1993) which were thought to improve community safety and reduce crime were:

- **Adequate Lighting:** Where lighting is poor or creates dark areas and shadows it not only causes fear and anxiety about the unexpected, but can create environments which facilitate crime. It can provide opportunities to surprise a potential victim and to commit an act without being seen.
- **Landscaping:** The avoidance of sharp or blind corners, or features which obstruct surveillance and obstruct pedestrian views of the path immediately ahead.

HEALTH

According to the United Nations Centre for Human Settlements (1996), the built environment which forms the residential areas of urban settlements should be a safe environment, places where environmental hazards are minimised and where environmental factors do not feature as major causes of serious injury, illness or premature death. Although any person's health is the result of interactions between human biology, lifestyle and environment, historically it is the environment which has always had the major role (*ibid*).

Pathogens, both chemical and biological, which are in the air, water, soil or food have always been among the main causes of disease and death. New Zealand is fortunate in that virtually all residential areas are already serviced in terms of water supply and sewage disposal. In those areas which are not connected to such systems, there alternative systems which are in place which ensure an adequate level of human health is maintained.

While waterborne contaminants are not a major threat to human health (via drinking water) in many of New Zealand's urban areas, health problems associated with aerial pollution are on the increase. In Auckland Stanley (1996) says levels of pollution at some intersections are already exceeding World Health Organisation standards. The Canterbury Regional Council is, meanwhile reported in the national media as attributing a number of deaths in Christchurch to respiratory trouble associated with aerial pollution. In the former case the problem was associated with emissions from motor vehicles while the latter case was associated with both motor vehicles and smoke from fires used for space heating. Reducing the use of private motorised transport, and careful design and orientation of lots and residential buildings are two ways in which

emissions can be reduced. Other ways were also mentioned in the discussion on aerial pollution.

Noise is an effect which can easily be overlooked in residential development. Noise can result in damage to hearing, the loss of sleep, poorer work performance (an economic impact), and increased levels of stress and anxiety. The last are critical factors which influence mental disorders and social pathologies (World Health Organisation in United Nations Centre for Human Settlement, 1996). Similarly the OECD (1995) states that constant exposure to levels of noise above 65 decibels is unacceptable for individual psycho-physical stability. In urban areas noise can come from one of five principal sources:

- Airports
- Industrial operations
- Construction activities
- Highway traffic
- Activities undertaken by residents themselves.

The solution to mitigating the effects of noise from these activities (for example, limiting the hours in which construction can take place, or building standards which specify noise insulation) will in many cases lie outside the scope of subdivision controls. However subdivision controls can ensure that residential areas are not located in the noise footprint of airports or, noisy industrial areas. At the same time, specific development controls can ensure that noisy, or other noxious activities, do not locate in close proximity to existing residential activities.

As already mentioned natural hazards such as flooding and land slippage also have an impact on human health. While earthquakes and volcanoes are relatively hard to avoid

in New Zealand, controls can be placed on subdivision which prevent residential development in areas prone to hazards such as flooding or land slippage.

In developing residential subdivisions, a wide range of issues need to be taken into account. Other than natural hazards, residential subdivision and development controls also need to ensure that residential activities are not located close to non-residential activities which would have detrimental effects on the health of residents.

Conclusion.

Conclusions from the forgoing discussion can be drawn thus. Residential subdivision and development controls which could help produce a subdivision that is regarded as 'sustainable' within the context of 'sustainable development' would typically address the following issues:

- **Develop in a way which preserves local biodiversity and avoids the destruction of areas of high ecological value:** Residential subdivision and development should avoid locating in those areas which have high biodiversity or which are ecologically significant. Where ever possible, the maintenance of existing ecological corridors should be encouraged, and new corridors to link high quality remnant patches established.
- **Avoid destruction of the life-supporting capacity of ecosystems:** Topsoil loss associated with earthworks should be kept to the minimum possible. Waterways should be protected from contaminants through the establishment or maintenance of vegetated riparian margins, and the requirement that all sewage be treated to a level which eliminates its potential to harm organisms.
- **Avoids pollution of air and water:** In relation to water, residential development should be connected to a high quality sewage disposal system to avoid contamination of surface and groundwater. Streams, rivers, lakes and waterways

should be protected from urban run-off by a planted riparian margin of sufficient width to screen out contaminants carried by run-off.

- **Minimise risks to life and property from natural hazards:** Residential subdivision and development should be discouraged from locating away from areas which will put life and property at risk. As such, no development should take place on land that is subject to slippage, falling debris, inundation from any source or flooding. With regard to the last, account should also be made for the effects of sea level rise on low lying land in coastal areas.
- **Avoid the loss of land which has soils of high fertility, life-supporting capability or versatility for agricultural/horticultural use:** Residential subdivision and development should be discouraged from locating on land which has high productive value. Alternatives to such development include urban consolidation (though higher densities of the use of vacant waste land within urban boundaries), or the location of new development of land that has little productive potential. Only where other viable alternatives have been exhausted should development be allowed on productive land.
- **Minimise the use of non-renewable resources such as fossil fuels:** Where possible, alternative forms of transport (such as walking, cycling or public transport) should be encouraged. Attached forms of housing should also be encouraged, as these are more efficient in retaining heat (and therefore require the use of less energy) than individual units.
- **Promote and enable the use of renewable resources and energy sources such as sunlight:** Residential buildings, and section layout, should be designed in such a way as to maximise the ability of dwellings to use solar energy and, where appropriate, other forms of renewable energy.
- **Allow the recharge of groundwater and reduce the volume and velocity of surface water runoff:** Stormwater runoff can be reduced, and groundwater recharged more quickly where impermeable surfaces on-site are kept to a minimum.

- **Avoids the erosion of stream and river banks:** Removal of vegetation from stream and river banks increases the potential for these to erode, and should be avoided.
- **Avoids reliance solely on private motor vehicles to meet the transport needs of the community:** The extensive use of private motor vehicles results in pollution of the air, the use of fossil fuels and traffic congestion. Where ever possible, design elements should be encouraged which encourages reduced use of private motor vehicles and increased use of alternative forms of transport. Higher-density development should locate around main public-transport routes, traffic calming used in residential streets, and the establishment of dedicated walking and cycling routes encouraged.
- **Avoids the effects of activities which jeopardise health of residents:** Residential subdivision and development should be discouraged from locating in areas where residents will be subject to the effects of activities which may endanger their health (for example, on land which is subject to the effects of any natural, or artificial [of human origin] hazards). Heavy industry, or human activities which can adversely effect the health of residents should not be allowed to locate in residential areas (in such circumstances where is not possible to avoid or satisfactorily mitigate their adverse effects).
- **Makes the most efficient use of social and physical infrastructure:** Compact urban forms result in the more efficient use of infrastructure. Similarly, sequencing of land development can assist in ensuring that the most efficient use is made of existing infrastructure, before new infrastructure is built.
- **Keep final housing prices affordable:** High housing prices mean that quality housing is less accessible to a greater proportion of the population. Poor quality housing may lead to higher crime rates and poorer health. Policies and rules within a plan should not be so detailed and restrictive as to stifle innovation in lot layout and dwelling design which may produce more cost-effective designs. Overly detailed

and complex policies and rules can also impose unnecessary costs on residents through requiring that standards be met which do not encourage sustainable long-term outcomes. Compact urban forms result in lower infrastructure costs, which, directly or indirectly flow through to the final cost of housing (either through direct charges, or through the rates take). Similarly, sequencing of land development can assist in ensuring that the most efficient use is made of existing infrastructure, before new infrastructure is built.

- **Minimise the opportunities for crime:** The incorporation of a number of design elements into residential development and design can help discourage criminal activity. Mixed land uses can assist in reducing the level of crime in urban areas through enabling people to walk to work and ensure certain areas do not ‘empty out’ at certain times of the day (or night). This increases the opportunities for natural surveillance or ‘passive policing’. Similarly, the use of living area windows overlooking public space can also facilitate natural surveillance. Reducing the ratio of entrances and exits to residential units can reduce the level of anonymity, such that strangers are more noticeable.

Being able to resolve all these issues is of course an ideal, not every local authority will be in a position to adequately deal with all the issues¹².

¹² Possibly because of topographic or geographical constraints, or lack of resources.

PLATES



Plate One: Large-scale earthworks associated with subdivision can result in the loss of valuable topsoil and the clogging of waterways with silt. Options to control this loss include restricting the area which can be worked before replacement planting is required, and/or the use of silt traps, fences and diversions which can lessen the amount of soil lost through runoff or wind dispersion.

PLATES



Plate Two: Leaving natural wetlands and drainage patterns intact within new subdivisions provides both a means of dealing with stormwater runoff and maintaining local biodiversity. Stormwater can contain a variety of contaminants however, and such areas should have planted margins of sufficient width to filter these out.



Plate Three: Many modern New Zealand subdivisions have roads wider than necessary for the traffic they carry. Such practices tend to use land inefficiently and create extra runoff as the area of impermeable surfaces increases.

PLATES



Plate Four: Typical traffic conditions on Cameron Road, Tauranga (taken at 3.30pm 13 July 1997)



Plate Five: The Waikareao Expressway: a motorway style bypass designed to take traffic away from Cameron Road. The road runs through a former wetland (the remains of which can be seen centre left) along the edge of the Waikareao Estuary.

PLATES



Plate Six: High-rise residential development (Marine Parade, Mount Maunganui), an example of new high-density residential development New Zealand style. Development of this sort in many Western countries has proved to be unsuccessful for the general populous. Many high-rise apartments have proved unpopular and become prone to crime (see Jacobs, 1965, Newman, 1972, or Coleman, 1990).



Plate Seven: The scale of development which Coleman (1990), Barton Davis and Guise (1995) and others see as being more suitable to medium and high-density residential development. (Note narrow road width and traffic calming measures).

CHAPTER V: INDICATORS FOR "SUSTAINABLE RESIDENTIAL SUBDIVISION AND DEVELOPMENT" CONTROLS.

Introduction

This chapter has the purpose of identifying and selecting indicators to measure those factors contributing to a subdivision's "sustainability", demonstrated in the conclusion of Chapter IV. This chapter opens with a discussion on the fundamental purpose of indicators and their characteristics and then moves on to the development of a framework of indicators, culminating in a final list able to be used as a basis for comparing the 'ideal model' with the controls actually in use in New Zealand.

Indicators And Their Characteristics

It is difficult for decision-makers to understand all the background issues which may be associated with a particular problem. Complex issues need to be simplified so that they become manageable. (Ministry for the Environment & Department of Statistics, 1991). Indicators provide information in a simpler, more accessible form than complex statistics or other kinds of economic or scientific data.

What are indicators? In much of the literature on indicators, the terms 'indicator for sustainable development' and 'environmental indicator' appear to be used interchangeably. According to the Ministry for the Environment (1991), there is, as yet,

no standard use of the term “environmental indicator”. Notwithstanding this a number of different definitions exist including:

- *‘A variable used to identify the presence or condition of a phenomenon that cannot be measured directly’* (Genilas and Slaats 1989 quoted in Ministry for the Environment and Department of Statistics 1991);
- *‘An alternative, surrogate, or proxy measure which is used when it is not technically feasible to observe and/ or record the actual phenomenon’* (Genilas and Slaats, 1989, quoted in Ministry for the Environment and Department of Statistics, 1991);
- *‘Aspects of the environment (known as parameters) which are monitored regularly to show trends or sudden changes in a particular environmental condition. An environmental indicator may include an animal or plant that is particularly sensitive to an environmental change, a chemical or pollutant in water, soil or air, or simply a measure of the physical quantity of a resource’.* (Ministry for the Environment, 1996).

There are also a number of different typologies which have been proposed for environmental indicators. Braat (in Kuik and Verbruggen, 1991) makes the distinction between two types:

- RETROSPECTIVE INDICATORS: the traditional policy and evaluation and historical trend indicators based on measured data
- PREDICTIVE INDICATORS: those which provide information about an expected future state of the environment and which are usually based on mathematical models of the human-environment system.

In relation to this work, the indicators are used in the role of helping decision-makers evaluate which residential subdivision and development planning controls are available and have been used, and their appropriateness towards achieving a subdivision design that could be classified as 'sustainable'. Most of the indicators that need to be developed will, therefore, be of the 'retrospective' type, focusing on policy decisions which have already been made. While the word 'retrospective' tends to suggest measuring the effects of a particular course of action after it has become known, or has occurred, such indicators are still very useful in a plan development role for evaluating what areas need to be improved and where further action needs to be taken. Indicators are an integral part of the monitoring process, and almost all monitoring is a cyclical rather than a linear process. An example of this is shown in Figure 14 which has the context of a local government planning cycle. In this example monitoring is carried out in the 'Annual Report' and 'State of the Environment Report' phases and feeds back into the 'Vision' or 'Mission Statement'. In this respect information derived from indicators in the 'Annual Report' and 'State of the Environment Report' serve both as a basis for reviewing the effectiveness of policy, and as a basis for helping decision makers decide on the direction for the next planning and policy cycle.

This view is shared by Kuik and Verbruggen (1991) who say that indicators may be used for two intertwined purposes:

- *'Planning: problem identification, allocation or socio-economic resources and policy assessment*
- *Communication: notification (warning), mobilisation and legitimisation of policy measures'.*

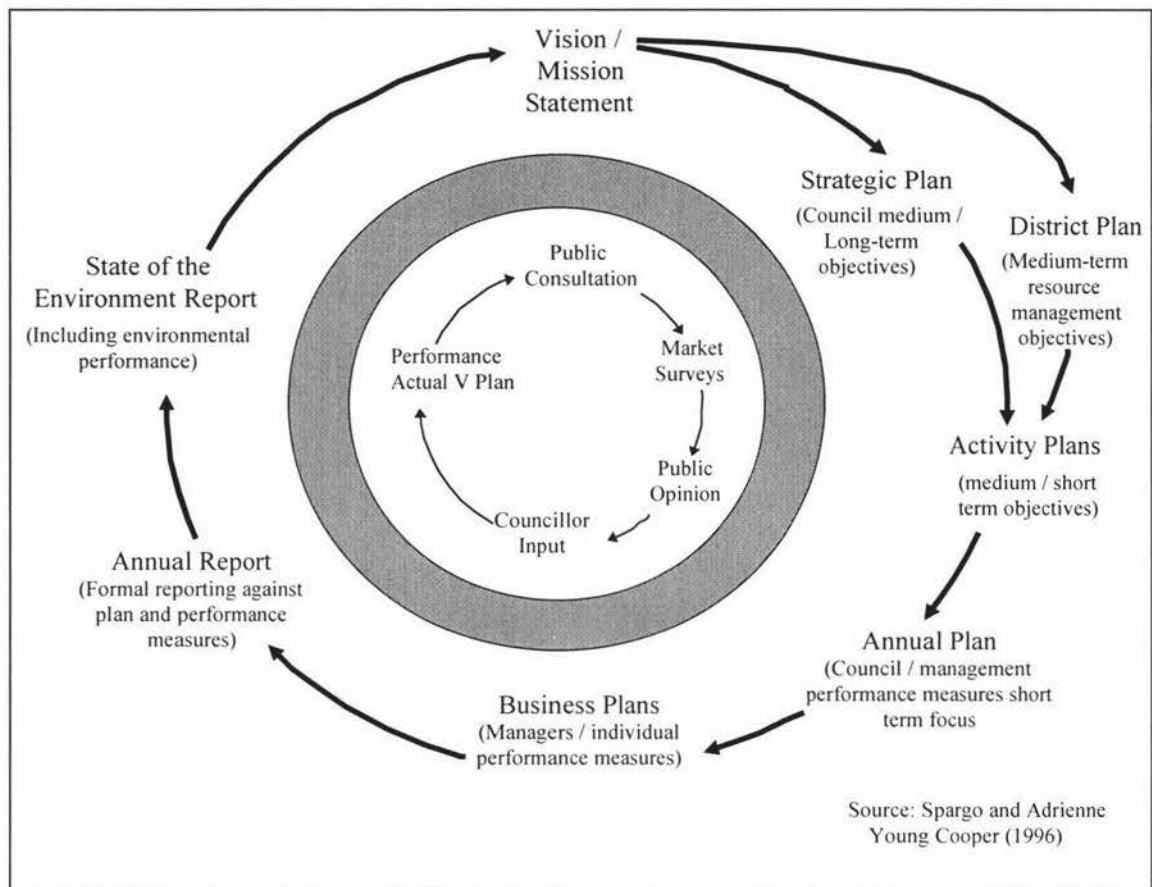


Figure 14: Integrated Local Government Planning Cycle

According to Hammond *et al* (1995) characteristics of successful indicators include:

- *User Driven*: Indicators must be useful to their intended audience. They must convey information meaningful to decision-makers and in a form which they and the public find understandable (a way of portraying the relationship of indicator complexity to end user is shown in Figure 15)
- *Policy Relevant*: Indicators must be pertinent to policy concerns
- *Highly Aggregated*: Indicators may have many components, but the final indices must be few in number; otherwise decision makers and the public will not readily absorb them (see Figure 15: Level Of Information Integration V Target Audience).

To these can be added characteristics from other authors (for example Genilas and Slaats, 1989) such as:

- *Be Based on Ease of Data Collection:* and where possible be based on existing data collection, storage, retrieval and interpretation programmes (this presumably makes the collection of data more cost effective).

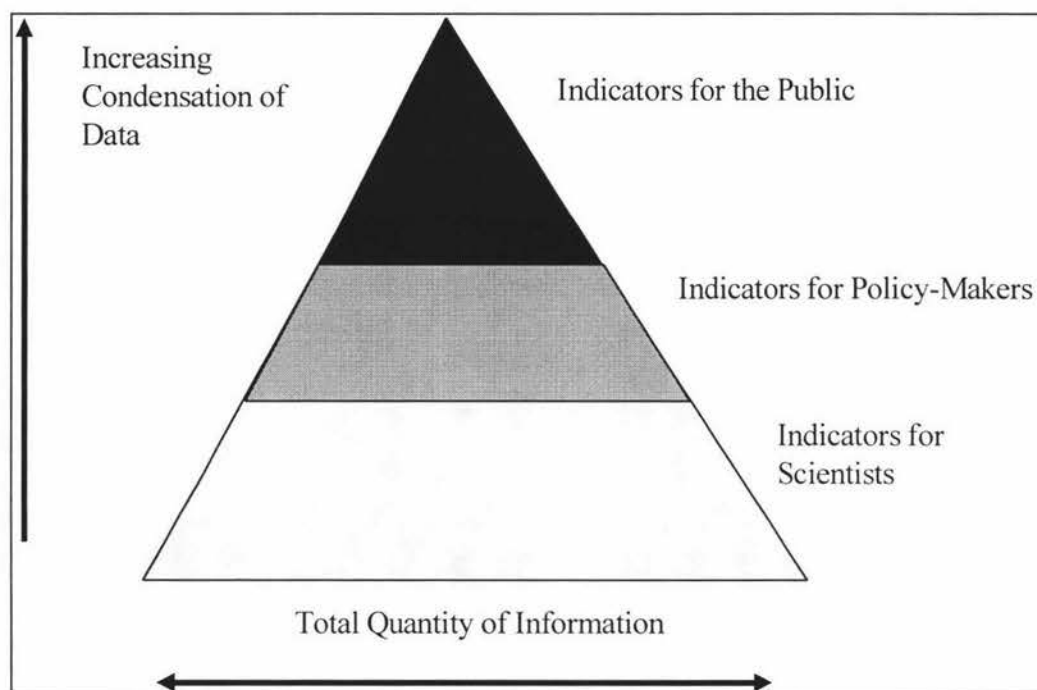


Figure 15: Level Of Information Integration V Target Audience

Source: Kuik and Verbruggen, 1991

The Ministry for the Environment (1991) notes that when embarking on the task of developing indicators it is paramount not to lose sight of the central question, who is reporting what for whom? In terms of this work, the target audience for the sustainable development indicators are largely policy-makers who, in many cases will have at best, limited background in the sciences. To be both readily useable and meaningful to this target audience indicators have to feature a relatively high level of aggregation.

Indicators are rarely gathered in isolation, more often they will be part of a framework, be that framework formal (as in a company's end-of-year report on performance) or informal (for example, a set of criteria for a person buying a new car). A number of frameworks have been suggested for environmental indicators.

Sheehy (1989, cited in Ward 1990) suggests that traditionally two typologies have existed for indicator frameworks:

1. SPATIAL FRAMEWORKS

Jurisdictional or Administrative

Information presented for geographic units based on jurisdictional or administrative boundaries. Most State of the Environment Reports produced by government agencies, international organisations or local government are of this type.

Environmental Component

Information presented for geographic units determined by particular environmental factors such as vegetation or climatic zones.

Ecosystem

Information presented for geographical units which contain distinctive sets of abiotic or biotic features which are ecologically inter-related. The New Zealand ecological districts would fit into this category.

Combination Approach

Comprehensive State of the Environment Reports often use more than one spatial framework (for example, Australia's State of the Environment Report).

2. ORGANISATIONAL FRAMEWORKS

Issues Framework

Selects and reports on environmental problems.

Resource Sector

Reports on conditions and trends of natural resources such as in forestry, fisheries and agriculture.

Environmental Media

Describes the state of the environmental media (for example, air, water, land).

Environmental Process

Reflects the dynamic nature of ecosystems in a stress-environment response approach.

Combination Framework

Where more than one organisational framework is used in a State of the Environment Report.

(Adapted from Ward, 1990)

An increasingly widely used framework for environmental indicators in New Zealand is the Pressure-State-Response model (see for example Ward and Beanland, 1992). This framework was developed by Raport and Friend and initially used in a Canadian State of the Environment Report. According to Ward (1990), it provides an alternative to more traditional methods of organising statistics as it distinguishes between a range of indicators and categorises them in a way which demonstrates their inter-relatedness and ecosystem dynamics. As the name suggests, it has three key areas:

- *Indicators of Environmental Pressure*: Refer to actions, or impacts derived from them, which are believed to contribute to environmental stress, whether to particular organisms, ecological functions, or physical, chemical or other processes. They are broadly classified as direct (biophysical) or indirect (human activities, natural events) pressures.
- *Indicators of Environmental Conditions (State)*: Deal with the ambient conditions of natural and physical resources and ecosystems. They can include, biological, physical and chemical indicators
- *Indicators of Societal Responses*: Are defined as deliberate actions undertaken to address observed or predicted environmental changes or adverse effects. Indicators of environmental response include, for instance, the implementation of resource management plans, waste reduction strategies, the establishment of protected natural areas, or the number of pests killed (Ministry for the Environment, 1996).

Table 7: Example of a Pressure-State-Response Indicator Framework

Chapter of Agenda 21	Driving Force (Pressure) Indicators	State Indicators	Response Indicators
Chapter 20: Environmentally sound management of hazardous wastes	<ul style="list-style-type: none"> • Generation of hazardous wastes • Imports and exports of hazardous wastes 	<ul style="list-style-type: none"> • Area of land contaminated by hazardous wastes 	<ul style="list-style-type: none"> • Expenditure on hazardous waste treatment.
Chapter 14: Promoting sustainable agriculture and rural development	<ul style="list-style-type: none"> • Use of agricultural pesticides • Use of fertilisers • Irrigation percent of arable land • Energy use in agriculture 	<ul style="list-style-type: none"> • Arable land per capita • Area affected by salination and waterlogging 	<ul style="list-style-type: none"> • Agricultural education
Chapter 11: Combating deforestation	<ul style="list-style-type: none"> • Wood harvesting intensity 	<ul style="list-style-type: none"> • Forest change area 	<ul style="list-style-type: none"> • Managed forest area ratio • Protected forest area as a percent of total
Chapter 9: Protection of the Atmosphere	<ul style="list-style-type: none"> • Emissions of greenhouse gases • Emissions of sulphur oxides • Emissions of nitrogen oxides • Consumption of ozone-depleting substances 	<ul style="list-style-type: none"> • Ambient concentrations of pollutants in urban areas 	<ul style="list-style-type: none"> • Expenditure on air pollution abatement

Source : Edwards 1997.

A Framework For Indicators

To develop a preliminary list of indicators as to whether New Zealand local government controls on subdivision and development are consistent with the 'ideal model' in the previous chapter, a framework is proposed based along similar lines to the 'Issues Framework' but using a 'Pressure-State-Response' style matrix. The reason for adopting this approach is that through it, possible indicators can be matched with the issues identified in the previous chapter in a explicit and systematic manner. The importance of the latter aspect was identified by Ward (1990) who said 'the choice of appropriate indicators must be related to the problem or objectives of the study'. Where indicators are not related to the objectives of the study it will be difficult to firstly check that the correct items or factors are being studied, and secondly, it will also be difficult to gauge whether progress has been made towards meeting the objectives of the study.

An additional and equally obvious benefit of the approach is its ability to identify areas where one response indicator can be used to cover a range of effects. Such indicators become apparent through the duplication of that indicator of response in a number of cells within the matrix.

Because the objective of the exercise is to look at the policy response to issues affecting subdivision and development, the focus is on the response end of the equation, rather than on developing indicators for each level. Therefore while the matrix has three columns, only the third actually contains the possible indicators.

The first column looks at the 'issue' or 'pressure' (for example, carbon dioxide emissions contributing to global warming) and the second looks at the effects the pressure will (or has the potential to) generate. These are essentially derived from the effects discussed in Chapter IV. The third column lists possible indicators of the management response that authors suggest should be adopted to deal with the pressure and its effects.

Table 8: Framework For Possible Indicators

Issue	Effect(s) to be Avoided Remedied or Mitigated	Indicator of Policy Response
Loss of local (and possibly national) biological diversity	Clearance of native bush and drainage of wetlands associated with site preparation and development	<ul style="list-style-type: none"> • Zoning of wetlands and areas of native vegetation for conservation or low-intensity recreational use. • Presence of provisions that prohibit or restrict the amount of vegetation which can be cleared. • Percentage of wetlands and bush remnants protected by the District Plan.
Destruction of the life-supporting capacity of ecosystems	Destruction of habitat of local flora and fauna.	<ul style="list-style-type: none"> • Establishment of a network of “green corridors” for the protection and movement of fauna (such as along stream corridors). • Width of corridors. • Retention of significant vegetation and habitat areas.
Pollution of air	Use of polluting fuels for space heating.	<ul style="list-style-type: none"> • Lot and building orientation to encourage the best use of solar energy and minimise the use of less ‘clean’ space heating alternatives. • Use of separation distances and daylighting angles along the north-south axis to ensure access to solar energy. • Use of maximum height limits to control the effects of shadowing on neighbouring properties. • Controls based on emissions and the use of processes that burn fossil or solid fuels (for example, open hearth fires)

Issue	Effect(s) to be Avoided Remedied or Mitigated	Indicator of Policy Response
	Use of motorised transport which emits carbon monoxide and other toxic gases and particulates.	<ul style="list-style-type: none"> • Provision of cycleways and pedestrian paths to encourage non-motorised forms of transport (thereby reducing emissions). • Traffic calming measures along residential streets to produce more pedestrian and cycle-friendly environments. • Public transport stops within convenient walking distance of all high and medium density housing. • Policies and rules which encourage a street layout and housing density which minimises trip density.
Global warming	Use of fuels for space heating which emit carbon dioxide and other 'greenhouse gases'.	<ul style="list-style-type: none"> • Lot and building orientation to encourage the best use of solar energy and minimise the use of less 'clean' space heating alternatives. • Use of separation distances, and or daylighting angles along a North-South axis to ensure access to solar energy. • Use of maximum height limits to restrict the shadowing of neighbouring properties. • Controls based on emissions and the use of processes that burn fossil or solid fuels (for example, open hearth fires). • Rules which restrict the amount of vegetation which can be cleared (and therefore act as a carbon 'sink').
	Use of motorised transport which emits carbon dioxide and other 'greenhouse gases'.	<ul style="list-style-type: none"> • Provision of cycleways and pedestrian paths to encourage non-motorised forms of transport (thereby reducing emissions). • Policies and rules promoting a compact urban form. • Public transport stops within convenient walking distance of all high and medium-density housing.

Issue	Effect(s) to be Avoided Remedied or Mitigated	Indicator of Policy Response
	Removal of vegetation that acts as a 'sink' for carbon dioxide.	<ul style="list-style-type: none"> • Policies and rules which encourage a street layout and housing density which minimises trip density (and thereby carbon dioxide emissions by transport).
Pollution of water	Contaminated surface runoff entering streams, rivers and other waterbodies	<ul style="list-style-type: none"> • Use of planted riparian strips or margins to filter out potential contaminants carried by surface runoff or wind and for shading (cools water and helps control water weeds. • Percentage of waterways protected by planted riparian margins. • Width of riparian margins. • Rules that require all new residential subdivisions to be connected to a high quality sewage disposal system. • Standards which restrict the maximum site area to be covered by impermeable surfaces (thereby reducing surface runoff).
Risks to life and property from natural hazards	Location of residential subdivision and development in areas subject to damage from hazards.	<ul style="list-style-type: none"> • Restriction of residential subdivision development on flood plains or coastal areas prone to flooding. • Restriction of residential subdivision and development on land prone to slippage, slumpage or falling debris. • Use of physical measures such as coastal protection works and building platforms to mitigate effects of hazards.
	Removal of vegetation that provided slope stability	<ul style="list-style-type: none"> • Rules controlling the amount of vegetation removal on unstable slopes.

Issue	Effect(s) to be Avoided Remedied or Mitigated	Indicator of Policy Response
	Excessive erosion of stream and river banks resulting from the loss of vegetation along banks of rivers and streams	<ul style="list-style-type: none"> • Rules restricting the removal of vegetation from riparian margins. • Use of planted riparian margins to control erosion.
Loss of land which has soils of high fertility, life-supporting capability or versatility for agricultural / horticultural use.	The subdivision and development of residential housing on land which has soils of high fertility, life-supporting capability or versatility for agricultural/ horticultural use.	<ul style="list-style-type: none"> • Zoning of land which have soils of high fertility, life-supporting capability or versatility for agricultural / horticultural use as 'rural'. • Identification of high-quality soils and protection of them from development through the use of specific rules and provisions.
Use of non-renewable resources (for example, fossil fuels)	Reliance on private motorised forms of transport	<ul style="list-style-type: none"> • Provision of cycleways and pedestrian paths to encourage non-motorised forms of transport (thereby reducing emissions). • Policies and rules promoting a compact urban form. • Public transport stops within convenient walking distance of all high- and medium-density housing. • Policies and rules which encourage a street layout and housing density which minimises trip distance (and thereby carbon dioxide emissions by transport).

Issue	Effect(s) to be Avoided Remedied or Mitigated	Indicator of Policy Response
	Time and energy lost through traffic congestion	<ul style="list-style-type: none"> • Provision of cycleways and pedestrian paths to encourage non-motorised forms of transport. • Public transport stops within convenient walking distance of all high- and medium-density housing. • Policies and rules which encourage a street layout and housing density which minimise trip distance.
Recharge of groundwater and high volumes and velocity of stormwater runoff	Land coverage by large areas of impermeable surfaces	<ul style="list-style-type: none"> • Rules restricting the maximum area of impermeable surfaces on a site. • Reduction of road carriageway width standards. • Reduction in onsite parking requirements.
Health of residents	Location of activities in residential areas which have, or which have the potential to have, adverse effects on the health of residents	<ul style="list-style-type: none"> • Use of rules which prohibit or restrict the location of activities which generate unhealthy levels of noise, odour, vibration or dust (or other particulate matter) in residential areas.
	Establishment of new residential developments near activities whose effects have an adverse impact on the health of residents	<ul style="list-style-type: none"> • Zoning or rules which restrict or prohibit residential subdivision and development in areas where neighbouring activities will otherwise have adverse effects on the well-being of residents.

Issue	Effect(s) to be Avoided Remedied or Mitigated	Indicator of Policy Response
	Lack of suitable sewage disposal.	<ul style="list-style-type: none"> • Rules requiring all new residential subdivision and development to be connected to a high- quality sewage disposal system.
Cost of housing	Inflexible rules which do not allow the housing market to be supplied from within urban boundaries	<ul style="list-style-type: none"> • Flexibility in minimum lot size and density requirements to allow for higher-density housing . • Flexibility in separation distances to allow for terrace housing type developments (particularly those running on an east-west axis).
Cost of infrastructure	Inefficient development, and use of social and physical infrastructure.	<ul style="list-style-type: none"> • Geographic sequencing of land zoning for development and infrastructure provision. • Higher residential densities and mixed use zoning to allow for more residential development opportunities in existing urban boundaries.
Crime, vandalism and antisocial behaviour	Lack of passive surveillance.	<ul style="list-style-type: none"> • Use of mixed-use zonings to enable 24 - hour passive surveillance. • Requiring windows of dwellings adjacent to public spaces, such as parks, to overlook those public spaces.
	Number of escape routes	<ul style="list-style-type: none"> • Street and accessway layouts which restrict the number of escape routes (for example, the use of short culs de sac.
	Anonymity	<ul style="list-style-type: none"> • Rules relating to the maximum number of dwellings in a cul de sac or apartment building. • Restrictions on the maximum height (and therefore on the number of floors) of residential buildings.

While this framework is useful, it is nevertheless just a starting point from which a more refined list of indicators can be developed.

At the start of this chapter the characteristics of ‘good indicators’ were described. These characteristics included:

- User driven
- Policy relevant
- Highly aggregated
- Be based on ease of data collection.

As evidenced in Table 8: Framework For Possible Indicators, there is a wide-ranging menu of possible policy response indicators. It can be seen there are numerous indicators which are common over a variety of effects. This tends to suggest the effects (for example energy use and carbon dioxide emissions) are closely related and can be mitigated or avoided using the same policy response. Put another way, using these indicators only once enables a degree of aggregation. Other indicators too are similar enough in description and character to be aggregated in single indicators. This is generally seen as positive as it simplifies things for the end users (decision-makers). These indicators are obvious choices for which to compare New Zealand subdivision and development controls with the ideal model. Other indicators have been selected or discarded based on their relevance and the anticipated ease of data collection.

Preliminary Indicators

- 1 Zoning of wetlands and areas of native vegetation for conservation or low-intensity recreational use.
- 2 Presence of provisions which prohibit or restrict the amount of vegetation that can be cleared.
- 3 Presence of policies and rules for the establishment of a “green network” or ecological corridors.

- 4 Use of planted riparian strips or margins to filter out potential contaminants carried by surface runoff or wind, for shade, and as ecological corridors.
- 5 Width of riparian strip/corridor.
- 6 Controls restricting topsoil loss during earthwork preparation for subdivision and development.
- 7 Solar-orientated lots and buildings
- 8 The presence of policies and rules requiring a north-south axis, or separation distances between buildings on the same lot or on different lots
- 9 Provision of cycleways and pedestrian paths
- 10 Traffic calming measures along residential streets
- 11 Presence of policies and rules directed at promoting a compact urban form
- 12 Presence of objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.
- 13 Policies encouraging the provision of public transport stops with walking distance of all medium and high density residential housing areas.
- 14 Restrictions placed on residential subdivision and development on flood plains or coastal areas which may be prone to flooding, and on land prone to slippage, slumpage, inundation or falling debris.
- 15 Rules controlling the amount of vegetation which can be cleared from unstable slopes and riparian margins.
- 16 Restrictive rules or zoning of land which has soil of high fertility, life-supporting capacity or versatility for agricultural or horticultural use.
- 17 Rules restricting the maximum amount of site area which can be covered by impermeable surfaces.
- 18 Location of new residential development away from areas which contain activities whose effects would be incompatible with the health and well-being of residents.
- 19 Use of rules which prohibit or restrict the location of activities whose effects (noise, vibration, odour, fumes, dust or other particulate emissions) on residents would adversely effect their health.
- 20 Presence of Rules requiring all new residential subdivision and development to be connected to a high-quality sewage treatment system.

- 21 Flexibility of lot size and parking requirements.
- 22 Geographic sequencing of land release on urban fringes for residential subdivision development.
- 23 Use of mixed land-use zonings (light commercial and residential mix).
- 24 Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.
- 25 Street and accessway layouts which restrict the number of escape routes.
- 26 Rules restricting the number of dwellings in a cul-de-sac or apartment building.
- 27 Policies and rules which restrict the maximum height of buildings in residential areas.

Having obtained the preliminary set of indicators there is a need to refine them to give them more relevance. Part of this process is the establishment of an indicator standard, that is, a benchmark or a point against which to compare the results.

An indicator standard need not be a complex scale or set of calculations. It may (as is the case for a number of indicators in this work) be simply the noting of the presence ('yes'), or absence ('no') of a particular feature (in this case, policies or rules relating to an aspect of subdivision design). Alternatively, it may be a point on a scale or a continuum.

The first of the preliminary indicators deals with the zoning of wetlands and areas of native vegetation for conservation or low intensity recreational use. Before this question can be answered satisfactorily another question must first be asked, does the District Plan in question identify the presence of such areas in the District? The indicator therefore in reality has two parts:

- (a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?

(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low intensity recreation?

In terms of meeting ethical, legal (Convention on Biological Diversity obligations) and long term sustainability requirements, needs and obligations it is desirable that areas of ecological significance be protected through rules associated with their being zoned or designated as policy areas for conservation or low-intensity recreation. To do this however, such areas have to be identified. The standard for both parts of this indicator would be 'yes'. Note however, that it does not necessarily follow that just because an area is identified as being of ecological significance it should be protected.

In regards to part (a), to arrive at the conclusion that the standard had been met, one would expect certain types of provisions to be within the plan. Items to be looked for would include a schedule of significant ecological sites, or a map (or maps) identifying the location of special ecological sites or showing the location of policy areas or conservation zones. Features to be looked for in relation to part (b) would be the presence of rules relating to the areas identified in '(a)' which effectively prevent development in, and damage to, those areas.

Indicator three covers establishing a 'green network' through District Plan provisions. Essentially, what is being looked for here is a set of policies, methods and perhaps rules (methods listed may dictate that implementation of the policies lie outside the District Plan) which would allow the establishment and maintenance of a network of environmental resource (bush, streams, wetlands) corridors and patches connected or able to be used as a habitat for a variety of flora and fauna. Continuity of *corridors*, and the ability of those corridors to link to *patches* are identified by authors such as Foreman and Godron (1986), Baschak and Brown (1995) and others as being important to the success

and survival of species which use them. Given this importance the standard for this indicator should be 'yes'.

Indicator four looks at the protection of waterways through the use of riparian planting. While it is recognised the management of water quality is a function of Regional Councils in New Zealand, local authorities can assist the Regional Councils through requiring esplanade reserves to be set aside and planted in both existing and new residential areas. The benefits of riparian planting in protecting waterways from pollution are well documented (see, for example Collier *et al.* 1995). Foreman and Godron (1986) also note that planted riparian margins also act as a valuable corridor for terrestrial flora and fauna. Given the benefits the standard for this indicator would be 'yes' answer. Objectives, policies, methods and rules being looked for in District Plans in this case could relate to the establishment of esplanade reserves or strips upon subdivision, the designating of land for future esplanade/riparian reserves, or methods cross- referencing to reserve management plans which establish planted riparian margins. Alternatively, where the management and protection of waterways is agreed to be solely the role of the Regional Council, one would expect this to be stated in the plan.

Indicator five is a follow up to the fourth preliminary indicator. It looks at the width of the riparian margins. Generally the wider the strip is the more effective it will be preventing contaminants from entering the waterbody. Similarly, Foreman and Godron (1986) say, the wider the corridor (in this case the planted riparian strip) the greater the species diversity likely to be found (see Figure 16).

Unfortunately other than stating the relationship, Foreman and Godron do not provide a minimum width which appropriate for a corridor. Similarly, Fleury and Brown (1991) say that a corridor must be wide enough to shelter animal species from predators, allow for movement and provide feeding and nesting opportunities. They then cite Loney and

Hobbs (1991) saying ‘a guideline does not exist which suggests how wide is wide enough’ (page 167).

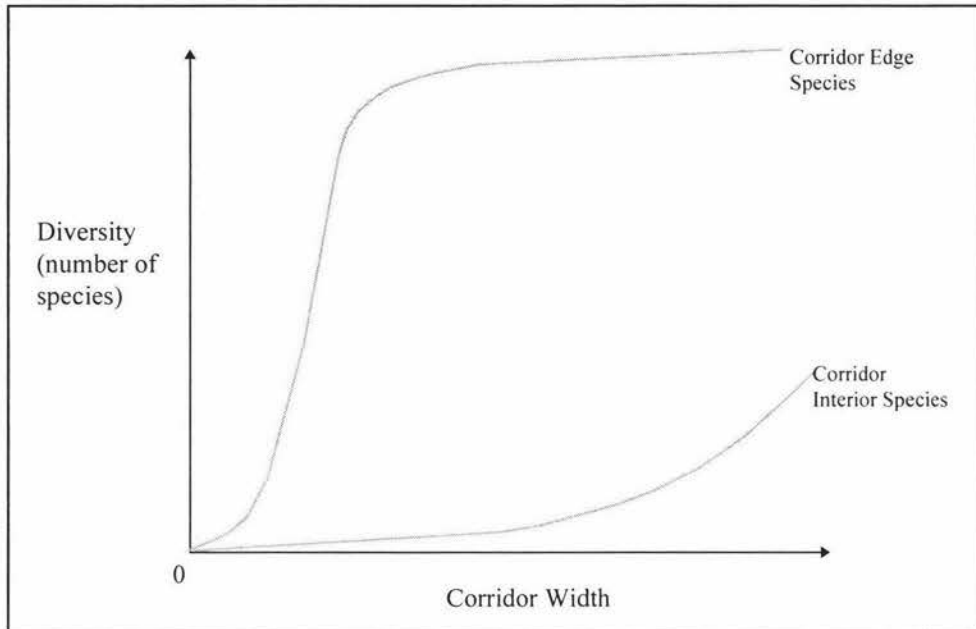


Figure 16: Effect of Corridor Width on Species Diversity.

If width cannot be determined through ecological network specifications another way to establish the width of riparian margins is to use the information on waterway protection standards.

Murphy and Phillips (in Murphy, 1992) say that in urban areas the width of riparian margins should be around thirty metres. The Auckland Regional Water Board (1983) in its guidelines for the Upper Waitemata Harbour suggested twenty metres along permanent watercourses and ten metres along small watercourses. They note however that these figures are arbitrary and indicative of minimum zone width only, and that actual width should vary according to slope, vegetation and climate. The figure of 20 metres is also widely used elsewhere (such as the Resource Management Act itself). In the absence of any conclusive riparian strip width information it has been decided to use 20 metres minimum width as a reference and note that any variation to that width should

be determined according to a formula which takes into account slope and vegetation cover. As a landscape element, a minimum of 20 metres width on each riparian margin would provide a corridor of at least 40 metres width along stream courses. Whether or not this width is sufficient to enable the movement of a wide range of species is open to debate however.

Indicator six relates as much to the pollution of waterways as it does to the conservation of soils. To prevent the loss of topsoil and the pollution of waterways during site preparation and earthworks subdivision controls are needed (hence the reference for this would be 'yes'). Controls could include:

- Phasing of development
- Temporary sediment traps
- On-site diversion
- Perimeter diversions
- Use of flood-retarding basins

Alternatively, because Regional Councils are given the functions of 'control of land use' under the Resource Management Act 1991 for the purposes of soil conservation, and the maintenance of the quality of water, a reference (in policies, rules and/or methods) to the appropriate Regional Plan could present an alternative.

Indicator eight covers several possibilities, with separation distances only one method of avoiding or mitigating the effects of buildings overshadowing neighbours. Other methods include 'daylighting' or 'overshadowing' angles, controls on the maximum height of buildings, or the specification of yards (essentially separation distances by another name). To reflect these other possibilities the indicator needs to be restated. One alternative wording could be:

- (a) Are there policies and/or rules in the District Plan which restrict the overshadowing of neighbouring properties and buildings?
- (b) Do these rules make provision for terraced or attached housing by limiting the control to a north-south axis where such development is proposed?

Because it is desirable that as many buildings as possible can make use of solar energy, and because medium-density housing types such as terraced housing are also seen as better able to promote sustainability, the standard for both parts of the indicator would be 'yes'.

Indicator twelve is a continuation of indicator eleven in that it looks at a particular aspect of urban consolidation which various experts and authors have identified as being important to sustainable urban form (in which residential subdivision and development plays a vital and integral part). The indicator is designed to check the District Plan for the presence of objectives, policies and rules and methods which provide for higher-density development around key transportation corridors. Because of the general agreement as to the benefits of such a pattern of density, the standard for this indicator is 'yes'. Generally one would expect that residential density in these areas would be in the vicinity of one unit per 130 - 631 square metres.

Preliminary indicator thirteen relates to the presence of policies and rules which encourage the provision of public transport stops within convenient walking distance of all dwelling units in medium and high-density areas. Oluwoye (1997) favoured a shift from cars to walking where journeys are less than 5 kilometres. This is perhaps too optimistic as journeys by foot could take more than an hour for the longer journeys, using time and energy most people would be unwilling to use. Most authors who have written on the relationship between public transport use and the distance people are willing to walk to use that transport, have said most people are willing to walk only 400 metres

(typically 800 metres at most - See for example Barton, Davis and Guise, 1995). As such, the indicator should perhaps be rephrased to take this factor into account. It would then become:

The presence of Policies and/or Rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium density residential areas.

Potentially, the situation could also work if reversed, that is, if new medium and high-density housing was encouraged to locate within 400 metres of public transport routes (railway lines, main roads, bus lanes or even ferry terminals). To take into account this possibility, the indicator needs the addition of another clause so it reads:

- (a) The presence of policies and/or rules in the District Plan which encourage the establishment of medium and high-density housing within 400 metres of public transport routes; or
- (b) The presence of policies and/or rules which encourage the establishment of public transport stops within 400 metres of dwellings in medium and high-density residential areas.

Because 400 metres is the most widely used figure for walking distances used in literature 0 - 400 metres is used as the standard. Some allowance will be made for variations close to this figure (due to local circumstances, for example topography, a figure of 500 metres may be used) however.

Indicator fourteen checks the District Plan for policies and rules which restrict residential subdivision and development on flood plains, coastal areas which may be prone to flooding, or on land that may be prone to other hazards (such as slippage or subsidence).

Examples of such policies and rules may be the zoning of such areas as 'rural', 'conservation' or for reserve purposes. Where development is allowed it is expected that rules be put in place that require (for example) sections to be raised above expected flood levels, or mitigate measures. As the avoidance of such hazards is important in the sustainable use of resources and the health and well-being of residents, the standard for this indicator is 'yes'.

There is of course a second issue here. As mentioned in Chapter IV, one of the predicted effects of global warming (a theory which now has wide acceptance) is a rise in sea levels. This rise needs to be taken into account when identifying hazard-prone areas and controlling residential subdivision and development. This needs to be expressed in the indicator, and can be done so by adding a second clause:

(b) Is provision made for future sea level rise in controlling subdivision in coastal areas?

While there is still some uncertainty as to whether sea level rise will actually occur and to what extent, the United Nations recommends the adoption of the precautionary principle¹³, such that provision should be made for future sea level rise when planning future settlement (United Nations Centre for Human Settlement 1996). This being the case, the standard for this indicator should be 'yes'.

Indicator fifteen is related to the presence of rules and policies which restrict the removal of vegetation on unstable slopes (those prone to slippage). There is no recommended figure for this as each slope has different characteristics (gradient, soil type and geology, local climate, and area). There is a reasonable amount of agreement in New Zealand literature at least, that slopes with a gradient of 33 degrees or more do tend to be unstable

¹³ See Glossary

and prone to slippage, and, that vegetation improves slope stability. With this information the indicator can be rewritten to make it more specific, for example;

The presence of rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which, because of their soil type and geology, are prone to slippage.

Minimising the risk of slippage is beneficial not only because the damage it can do to life and property, but also because slips generally are associated with, or result in, the loss of topsoil and, where a waterway is nearby, the silting of waterways. Given this, the standard for this indicator would be 'yes'.

The seventeenth indicator looks for controls in the District Plan which limit the amount of site area that can be covered by impermeable surfaces. The use of permeable surfaces allows for the recharging of groundwater, slows and filters stormwater runoff and provides an element of amenity for residents. Rules being looked for may include those which specify an 'outdoor living court' of a certain size which cannot be sealed or built on, or specification of the maximum area which can be covered (percentage of site area, or an actual area). While authors such as Hedgcock and Mouritz (1993) tend to favour the use of permeable surfaces to attenuate the effects of stormwater runoff, there does not appear to be a particular area or percentage specified in literature as to the extent a residential site can be covered by impermeable surfaces. As such the indicator reference cannot do more than state as to whether such rules are present in the Plan. Because the presence of permeable surfaces is generally seen as having positive effects, the reference for this indicator shall be 'yes'.

Indicator eighteen is the first of two indicators which checks how the District Plan deals with the effects of non-residential activities on residential activities. What is being looked

for are policies and rules which separate residential activities from the effects of non-residential activities (which would otherwise have adverse effects on the health and well-being on residents). Such rules may involve restricting housing development within the noise footprints of airports, or the establishment of buffer strips or zones between heavy industrial areas and residential development. Because the health and safety of residents is a key component to any residential subdivision development which seeks to be 'sustainable', the standard for this indicator would also be 'yes'.

The nineteenth indicator is closely related to the eighteenth, though it takes the reverse approach. While it is desirable for a range of non-residential and residential activities to be located close to each other (to shorten trip distances, enhance security, reduce energy consumption and emissions - see Chapter IV), such mixed-use zoning should not be at a cost to the health and well-being of residents.

There are in fact two parts to this indicator, and it would be better that this is made more explicit in the wording of the indicator. Firstly, activities which produce effects which would be detrimental to the health of residents and which can not be avoided, or mitigated to a level where those effects are acceptable, should be excluded from locating in residential, or mixed-use areas. For the second part, where the adverse effects of non-residential activities can be avoided or reduced to a level where they become acceptable the activities should be allowed to locate in mixed-use and residential areas. To police this latter situation and to provide guidance as to what the local community sees as acceptable, there need to be rules and standards in the District Plan.

Typically, it would be expected that there would be rules in the District Plan relating to maximum noise levels, light spillage (artificial light crossing boundaries during the hours of darkness), and bulk and location (to ensure the scale is consistent with other buildings in the area, and to avoid overshadowing - among others). As it is desirable that such

rules exist (not only to mitigate effects, but also because of the certainty it provides residents and businesses) the standard for both parts of this indicator will be 'yes'.

Indicator twenty-one relates to flexibility of lot sizes and car parking requirements. There are in fact two different indicators. To keep the indicators simple, this indicator needs to be broken down into its components. Further it would be more helpful to measure these indicators in terms of 'what standard is being used' and comparing this to the reference. Something which the indicator (as currently expressed) also fails to take into account is that densities under the models put forward by the United Nations Centre for Human Settlement (1996), Barton Davis and Guise (1995) and Newman and Kenworthy (1992) should not necessarily be uniform. The areas of high density proposed (following public transport routes) lie amongst areas of lower density which Van Tonder (*pers comm.*), and Newman and Kenworthy (1992) envisage as being similar to existing residential areas found throughout Australia and New Zealand. In theory then maximum lot sizes need to differentiate between the high density areas and those areas of lower density (in this way the indicator is in fact closely related to indicator 12). Given this the indicator is better expressed as three new indicators:

- (21) Minimum lot size in high-density residential areas and residential areas adjacent (within 400 metres) to public transport routes
- (22) Minimum lot size for areas not designated for high-density development or which are not adjacent to public transport routes
- (23) Number of carparks required per residential unit in medium and high-density residential areas.

Not all local authorities will make provision for medium density housing however. Predominantly rural districts have no need for such innovations because of the scale of

their urban areas. For rural districts therefore this indicator will be deemed as not being applicable.

Work by a number of authors has (largely borrowing from the work of Newman and Kenworthy) has suggested that for public-transport-orientated development a minimum density of 30 - 40 people per hectare was required. This equates to approximately 10.3 - 14.0 dwellings per hectare¹⁴, a minimum density of one dwelling unit per 714 - 970 square metres of gross site area. Barton Davis and Guise (1995) suggest the maximum limit for dwelling density should be in the vicinity of 50 dwellings per hectare (the equivalent of one dwelling per 200m² of gross site area) or 143 people per hectare. In terms of gross area the range of lot sizes in transport-orientated medium/high density nodes would therefore be 200-970 square metres.

Such numbers however, fail to take into account that within each hectare of residential land approximately 35 per cent of land will be used for roading and other forms of public space¹⁵. When this is taken into account the average ratio of houses per square metre becomes one unit per 130 to 630 square metres. This then becomes the reference for new Indicator 22, such that, where rules encourage sections sizes, or dwelling density of one unit per 130-360 square metres, the District Plan will be deemed to have met this indicator standard.

For lots outside the medium and high density areas there should, ideally, be a greater range of lot sizes to meet the needs of residents and prospective residents. It is difficult to say what the minimum lot size or density should be in such cases though, obviously, a lot should be big enough to accommodate a residential unit in such a way that does not

¹⁴ Based on an average household size of 2.89, the hypothetical New Zealand average from the 1996 Census.

¹⁵ This is an approximate average based on an analysis of randomly selected residential areas in Tauranga, Palmerston North, North Shore City and Christchurch City. The amount of space associated with roading accounted for 20 - 30 % of total land use, the range being 7% - 32% and the overall average 24.3%.

adversely affect neighbours (for example, by depriving them of sunlight). One approach would be to follow the United Nations suggested path of 'enabling controls' and not specify a minimum lot size or density.

A completely *laissez faire* enabling approach has the potential to be counter productive however. Allowing any density, anywhere within urban boundaries, could result in high density areas being located away from transport routes and intended high density nodes, diverting medium and high density development away from them, and, detracting from the effectiveness of such areas (Van Tonder *pers comm.*). There is also possibility that sporadic medium and high-density development could further damage the image higher-density housing (as, to a certain extent, haphazard infill development has, see for example Dialogue Consultants, 1993, and Hewetson, 1994). A further damaged image would make medium and high-density housing forms more unpopular and, therefore, less viable as a strategy for sustainability. A more logical approach would be to use a minimum lot or density figure which is close to the upper limit of the medium-high-density range. The Joint Venture For Affordable Housing (1989) has adopted a standard housing layout based around 15 houses per hectare (between 430 - 500 square metres per dwelling). This figure of 15 was also favoured by Department of Housing and Regional Development (Infrastructure and Urban Strategies Branch) (1995). The figure of 500 square metres will be used here, in the absence of any conclusive evidence as to what density is appropriate for New Zealand. This figure is close to the lower end of the medium-density housing density range, and is also close to the what many New Zealanders already accept (550 - 800 square metres¹⁶). Hence the reference for this indicator will be 500+ square metres.

¹⁶ Averaged figures obtained from Hewetson 1994ⁱⁱ, Tauranga District Council Subdivision Data, Hamilton City Council Survey of Greenfield Subdivision Study 1987.

With regard to the number of car parks per residential unit, one of the arguments for high-density nodes being centred around public transport routes, and high-density residential areas and public transport stops being within 400 metres of each other, was to reduce reliance on private forms of motorised transport. To reinforce making public transport a more attractive option, car parking requirements in high density areas should be set at a minimum. This would tend to suggest a reference of one or one car park per unit.

Indicator twenty-five also relates to the issue of resident health and safety through crime reduction measures. The indicator is designed to check District Plans for policies and rules which encourage a 'street and accessway layouts which restrict the number of escape routes'. As it stands, this indicator is extremely broad. It has its origins in the work of Alice Coleman (1990) and her study of housing estates in Britain. A return to this point is important, as it should be emphasised that most of the housing estates (by which is meant blocks of apartments arranged in various geometric patterns) were set in an open park-like setting which offered a huge number of possible escape routes. Recommendations by DICE and subsequently Coleman (*ibid*) were for a return to more traditional forms of street and accessway layouts with a relatively dense network of straight streets. Alternatively, short culs-de-sac could be used to perform a similar purpose. Incorporating this information into the indicator would make it more clearly defined and measurable. The indicator can therefore be rewritten as:

Presence of policies, rules or other methods in the District Plan which encourage residential subdivision street/accessway layouts to be based upon a tight grid network of straight streets/paths and short culs-de-sac, wherever topography allows.

Note that a qualifier has been added ('where topography allows') to the indicator. This has been done in recognition that a grid network of straight streets will not always be

possible because of constraints imposed by local topography (for example, harbours, steep ridges and gullies).

Coleman and others also suggest that a straight, dense network of streets would have benefits in terms of reducing trip length and increasing block permeability for pedestrians and cyclists. Given these benefits, and the perceived benefits associated with crime reduction, the reference for this indicator would be yes.

The twenty-sixth indicator checks for rules restricting the number of dwellings in a cul-de-sac or apartment building. This indicator is taken from the work of Oscar Newman (1972) and Alice Coleman (1990). These authors each carried out studies which found that the number of apartments in a block of flats influenced feelings of insecurity and crime. While there does not appear to be any research to prove the fact, it is possible that similar principles could apply to cul-de-sac development. Essentially both forms of housing are characterised by a number of residential units served by only one entry and exit point. The greater the number of dwellings in each form of development, the greater the level of anonymity and the potential for crime.

The indicator as written implicitly contains two questions; firstly, are such rules present? and, secondly, what is the threshold that had been set. With regard to the second, because authors who have carried out research in the field have agreed that large numbers of units to contribute to crime, the standard should be 'yes'. Coleman's research meanwhile suggested a threshold of around 20 dwelling units per apartment block.

Building height, the subject of preliminary indicator twenty-seven (revised as indicator twenty-nine), is important for two principal reasons in the context of sustainable development. Tall buildings cast longer shadows, and shadows inhibit the ability of buildings to take advantage of solar design. The second aspect is that higher buildings are

often associated with higher levels of crime. Newman in his work recommended a height of six storeys (approximately 18 metres) as a maximum (before the level of crime noticeably increases) while Alice Coleman (1990) recommends a maximum of three or four storeys (9-12 metres). Most New Zealanders are not used to high-rise living (mainly because historically there have been few such residential buildings built) and while this is slowly changing, widespread adoption is unlikely to take place in the next 10 to 15 years. Given this the lower threshold identified by Coleman is more likely to be workable. The maximum suggested building height for residential areas should be between nine and twelve metres.

In regard to preliminary indicators two, seven, nine, ten, eleven, sixteen, twenty, twenty-two, twenty-three, and twenty-four, the authors that were studied did not provide any conclusive information upon which a numerical indicator standard could be based. There was also no perceived need (judged from the pilot study) to change or refine the indicators. It was evident however from the literature search of Chapter IV, that all of the aspects to which these indicators related were both important to sustainability and desirable. As such the indicator standard for each of these indicators is a simple 'yes'.

From the discussion the revised and final set of indicators are as follows:

Table 9: Final Indicators

No.	Indicator	Standard
1	(a)Have areas of ecological significance been identified in the District Plan?	Yes
	(b)Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?	Yes

No.	Indicator	Standard
2	Presence of policies and rules which restrict the amount of vegetation that can be cleared.	Yes.
3	Presence of policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes
4	Presence of policies and rules encouraging or requiring the use of planted riparian strips or margins as filters for contaminants and ecological corridors.	Yes
5	Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.	20 metres + formula for slope and vegetation
6	Presence of policies, rules or methods which control topsoil loss during earthwork preparation for subdivision and development.	Yes
7	Presence of policies and rules which encourage solar orientation of lots and buildings (due north + or - 20°).	Yes
8	(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?	Yes
	(b) Do these rules make provision for terraced or attached housing by limiting the control to a north-south axis where such development is proposed?	Yes
9	Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.	Yes
10	Presence of policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes
11	The presence of policies and rules directed at promoting a compact urban form.	Yes

No.	Indicator	Standard
12	Presence of objectives, policies, and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes
13	<p>(a) The presence of policies and/or rules which encourage the establishment of high and medium-density residential dwellings within 400 metres of public transport routes. <i>Or</i></p> <p>(b) The presence of policies and/or rules which encourage the establishment of public transport stops within 400 metres of dwellings in medium and high-density residential areas.</p>	<p>Yes, 0 - 400 metres</p> <p>Yes, 0 - 400 metres</p>
14	<p>(a) Presence of policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding or land prone to damage from slippage, slumpage, inundation or falling debris.</p> <p>(b) Is provision made for future sea level rise in controlling subdivision in coastal areas?</p>	<p>Yes</p> <p>Yes</p>
15	The presence of rules which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which, because of their soil type and geology are prone to slippage.	Yes
16	Presence of policies and rules which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural/horticultural use.	Yes
17	The presence of rules which restrict the maximum amount of site area which can be covered by impermeable surfaces.	Yes

No.	Indicator	Standard
18	The presence of policies and rules which separate new residential areas from areas which contain activities whose effects would be detrimental to the health and well-being of residents.	Yes
19	<p>(a) Are non-residential activities which have adverse effects which can not be avoided or mitigated excluded from residential and mixed-use areas?</p> <p>(b) Are non-residential activities which locate in residential and mixed-use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	Yes
20	Presence of rules which require all new dwelling units in a residential subdivision and development to be connected to a high-quality sewage treatment system.	Yes
21	Minimum lot size in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes.	130 - 631m ²
22	Minimum lot size for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1
24	Presence of policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.	Yes
25	Presence of policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.	Yes

No.	Indicator	Standard
26	Presence of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes
27	Presence of policies, rules or methods which encourage residential subdivision street/accessway layouts to be based upon a tight grid network of straight streets/paths and short culs-de-sac, wherever topography allows.	Yes
28	(a) The presence of policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac. (b) Maximum number restricted to (threshold).	Yes 20
29	Maximum height of residential buildings.	9 - 12 metres

None of the authors on sustainability studied in this work provided any form of consistent ranking as to which features of sustainability were more important than others. Thus while it is possible that factors like higher residential densities or green networks may be more effective than others in helping to achieve a sustainable pattern of residential subdivision and development, in the absence of any evidence on which to prove these assumptions, no weightings are assigned to the indicators.

CHAPTER VI: NEW ZEALAND SUBDIVISION AND DEVELOPMENT CONTROLS - DISTRICT PLANS AND ENVIRONMENT COURT RULINGS

Introduction

Chapter V developed a series of indicators by which New Zealand residential subdivision and development controls (as contained in District Plans) can be compared with the 'ideal model' that was developed in Chapter IV. Information for this chapter is based on a study of a number of New Zealand District Plans and Proposed District Plans (as prepared under the Resource Management Act 1991). In cases where the Plan would have passed through its hearing process, or where provisions required some clarification, staff at the Councils were contacted to provide additional information.

Information obtained from reviewing District Plans is used to draw up a table of the controls each Council uses in relation to residential subdivision and development. The table for each District Plan is contained in Appendix N. Each of the tables for each Council is combined into a summary table, based loosely on that used by Froude (1997) which consisted of a large checklist. From this an overall impression of residential subdivision and development controls is drawn, and compared with the 'ideal model'.

A number of relevant cases from the Environment Court of New Zealand are analysed to gain an understanding of how arguments over aspects of subdivision 'sustainability' are viewed by the judiciary.

Selection Of Council District Plans/Proposed District Plans

A sample of District Plans and Proposed District Plans were gathered from around New Zealand to identify the types of controls being used to sustainably manage residential subdivision and development. Plans were selected on a stratified random sample.

In selecting the Plans to be studied, a number of criteria were established:

- The plan had to be an ‘Operative District Plan’ or a ‘Proposed District Plan’ prepared under the Resource Management Act 1991;
- Four plans had to be from predominantly ‘Urban’ authorities (defined as more than 50 per cent of land used for urban purposes¹⁷);
- Four plans had to be from authorities which had a mixed split of rural and urbanised land (between 5 per cent and 50 per cent land used for urban purposes and having a population exceeding 45,000 - the majority of which live in urban areas);
- Four plans had to be from authorities predominantly rural in nature (less than 5 per cent of land used for urban purposes).

The first criterion is designed to ensure that the most recent thinking from New Zealand local authorities on resource management issues and residential subdivision is being studied. The remaining criteria ensure a range of plans, taking into account a range of circumstances (urban, rural, and mixed land-uses) are studied.

To assist in the selection process, New Zealand local authorities were matched against the criteria (as shown in Appendix M). Those local authorities which had not produced a district plan or proposed district plan were immediately disqualified from further

¹⁷ Defined for the purposes of this work at ‘land used for housing, commercial buildings, and transportation’.

consideration. Plans were then selected at random from the menu of eligible plans in each of the strata (Rural, Mixed or Urban). This was done by allocating each plan a number, and then using a random number generation programme to pick out numbers. As a result the following local authority plans were selected:

Predominantly Urban Local Authorities:	Wellington City			
	Christchurch City			
	North Shore City			
	Kawerau District			
Mixed (Urban and Rural) Local Authorities:	Waitakere City			
	Porirua City			
	Manakau City			
	Wanganui District			
Predominantly Rural Districts Local Authorities:	Western Bay of Plenty District			
	Masterton District			
	Hurunui District			
	Far North District.			

Having selected the plans to be studied, each plan was systematically read. Those policies, rules and methods which were relevant to indicators were then recorded as they were found (see Appendix N). Where, after reading each Plan, an indicator did not have a mark recorded next to them, they were declared not to have been met by the plan (by default).

To assist in the measuring of plan provisions against the indicators further annotations were added to the recording sheets (these are shown in italics in Appendix N). These further annotations served several purposes. Firstly, the annotations used helped provide guidance to indicator result recording by listing possible responses that may be applicable to each indicator. Secondly, the use of annotations ensured a greater degree of consistency and transparency in making decisions as to whether a particular plan met a particular indicator's criteria. The third function the annotations provided, was, that they enabled the provision of extra information, (for the purposes of a more detailed analysis in this work) which, would not otherwise have been readily accessible from interpretation of the indicators alone.

Results from the analysis of Proposed District Plans (in terms of how well they met the indicators) are shown in Table 10: Summary of Proposed District Plan Results V's Indicators.

In deciding how well individual plans meet the indicators, it needs to be realised that, not every indicator will be applicable to every plan. It would, for example, be pointless to check for indications that sea level rise had been taken into account in a local authority's hazard planning if that local authority was landlocked. Because of this, plans are only judged against those indicators which appear relevant to them. Where an indicator is not considered applicable, it is recorded in Table 10 as 'NA'.

In some cases it was expected that some plans would not specify minimum lot sizes. In such cases plans might say, instead, that a permitted (or 'complying') lot should be able to accommodate a dwelling which meets the relevant bulk and location controls contained in that plan. In such cases the minimum lot size is recorded as being zero square metres. While it is highly unlikely that such a lot would ever be created (unless

used as a ‘spite strip’¹⁸), it has been decided to use this figure as to demonstrate that lot sizes have been taken into account in the plan, but, no minimum has been set.

As a general note, it was not one of the objectives of this work to explain why some plans do not meet individual indicators, though, this is done in this chapter where information has been volunteered by local authorities which help explained the results obtained, or where a plausible reason for the results was relatively obvious.

¹⁸ A strip of land that has been surveyed out between a road and another lot with the specific purpose of denying access to that road (usually for safety reasons), these lots can be as little as 5 cm in width.

Table 10: Summary of Proposed District Plan Results V's Indicators.

INDI. Number	COUNCIL PROPOSED PLAN												TOTAL
	Masterton	WBOP	Far North	Hurunui	Wanganui	Waitakere	Manakau	Porirua	Christch.	North Shore	Kawerau	Wellington	
1a	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	11 / 12
1b	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	11 / 12
2	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	10 / 12
3	-	-	-	-	-	YES	YES	YES	YES	YES	-	-	5 / 12
4	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	-	11 / 12
5	20	20	10 - 20F	20	20+	20+	20F	20	12-20	20	NA	20	4 / 12
6	-	YES	YES	YES	YES	YES	-	YES	YES	YES	YES	YES	10 / 12
7	-	-	-	-	-	-	YES	-	YES	-	-	YES	3 / 12
8a	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	12 / 12
8b	-	-	-	-	-	-	SA Only	YES	YES	-	-	YES	3 / 12
9	-	NA	YES	NA	-	YES	YES	YES	YES	YES	NA	YES	6 / 9
10	-	-	-	-	-	SA Only	SA Only	-	-	-	-	YES	1 / 9
11	YES	NA	YES	YES	YES	YES	YES	YES	YES	YES	NA	YES	10 / 10
12	-	NA	NA	NA	-	YES	YES	-	YES	YES	NA	-	4 / 8
13a	-	NA	NA	NA	-	500-1000	-	-	YES	Y - None	NA	-	3 / 8
13b	-	NA	NA	NA	-	-	-	-	YES	-	NA	-	1 / 8
14a	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	12 / 12
14b	YES	YES	YES	YES	YES	YES	-	-	YES	YES	-	-	8 / 12
15	YES	-	YES	-	YES	-	-	-	YES	YES	-	-	5 / 12
16	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	-	-	10 / 12
17	-	-	YES	YES	-	YES	YES	YES	-	YES	YES	YES	8 / 12
18	YES	YES	-	YES	YES	YES	YES	-	YES	YES	YES	YES	10 / 12
19a	YES	YES	YES	-	YES	YES	YES	YES	-	YES	YES	-	9 / 12

INDI. Number	Masterton	WBOP	Far North	Hurunui	Wanganui	Waitakere	Manakau	Porirua	Christch.	North Shore	Kawerau	Wellington	TOTAL
19b	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	12 / 12
20	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	-	11 / 12
21	-	NA	NA	NA	-	0	0-400	-	0	150	NA	-	2 / 8
22	300	350	300 - 400	250-350	0	450	400-1200	None	360- 1000	325-1200	0	-	3 / 12
23	NA	NA	NA	NA	-	1	2	-	1	1-2	NA	1	4 / 7
24	YES	-	-	YES	YES	-	YES	YES	-	YES	-	-	6 / 9
25	NA	NA	YES	YES	YES	YES	-	YES	YES	YES	NA	YES	8 / 9
26	-	-	-	-	-	SA Only	SA Only	-	-	-	-	YES	2 / 12
27	-	-	-	-	-	-	SA Only	-	-	-	-	YES	1 / 12
28a	-	-	-	-	-	-	-	-	-	-	-	-	0 / 12
28b	-	-	-	-	-	-	-	-	-	-	-	-	0 / 12
29	10	8	8-9	10	10	8	5.5-9.5	10	7-11	8-9	8	10	9 / 12
TOTALS	14 / 33	12 / 28	18 / 30	16 / 28	20 / 35	27 / 35*	22 / 35*	18 / 35	25 / 35	24 / 35	10 / 24	19 / 35	223 / 378
As a %	42%	43%	60%	57%	57%	71%	65%	53%	71%	69%	42%	56%	59%
RURAL DISTRICTS 61 / 118 (52%)					MIXED DISTRICTS / CITIES 85 / 138 (62%)				URBAN CITIES / DISTRICTS 79 / 130 (61%)				

KEY TO TABLE

Yes: Has met, or, exceeds the standard set by the indicator reference.

- : Does not meet the standard set in the indicator reference.

NA Indicator not applicable (due to particular circumstances associated with the local authority).

SA Only Provisions apply only to selected geographical areas within the local authority, and only in specific circumstances.

*Note: If the indicators recorded as “SA Only” are also added, Manakau City scores 26 out of 35 (74%), Waitakere City 27 out of 35 (77%) and “Mixed Cities / Districts” category 91 out of 139 (65%).

Results - How The Proposed District Plans Measured Up

Eleven of the twelve Proposed District Plans studied had made some effort towards identifying areas of ecological significance within their local authority's boundaries. It was difficult to determine if all ecological sites within the District had been identified in every case however. Collier (*pers comm.*) for example, notes that since the release of the Western Bay of Plenty Proposed District Plan, a number of potentially significant areas have been removed from the register of ecologically significant sites in that plan.

Masterton District Council has not yet completed a register of significant ecological sites, or included it in its Plan. Dalhberg (*pers. comm.*) says, that funding has still not been allocated for such a task. The problem of funding for work on ecological sites was also found by Froude (1997) to be a problem, particularly, in those districts which had a large land area and small population. Nevertheless, in the case of Masterton, at least, some existing sites which had protection under previous District Schemes, or, which were protected through other means (such as being under the control of the Department of Conservation) have been given some protection under that plan (a common approach for the more poorly resourced Councils according to Froude, 1997).

In almost every case where ecological sites were identified, they were been protected through special zonings, specific policies, or general rules which prevented or at least restricted residential development. Ten out of the twelve local authorities studied had 'general rules' in their plans to protect significant ecological sites. 'Policy Areas' (areas that were not necessarily Council owned, but were protected through a set of policies and rules, rather like a zone) were used by seven local authorities. The setting aside of areas as reserves was a technique used by half of the local authorities studied. Most plans tended to take a combination approach, using general rules in combination with at least one other approach.

Just over half of the plans studied placed restrictions on the amount of vegetation that could be cleared (Indicator 2). Most commonly, the areas where vegetation removal was restricted was adjacent to a reserve or significant ecological area (six plans have rules to this effect). Often, it was only native bush areas that were afforded protection under these rules. Standards varied as to how much vegetation could be cleared. Some plans specified figures in square metres, while others talked about hectares. While most plans looked at vegetation as a natural resource the Wellington plan took a somewhat different approach. Wellington linked its vegetation clearance rules to landscape aesthetics rather than ecological conservation.

Although many plans made provision for the protection of ecologically significant areas as isolated remnant patches, only four recognised the importance of linking such areas together to form a network. The most comprehensive planning for the establishment of green networks was that of Waitakere City (see for an example of Waitakere City's approach, Appendix O, Indicator 3). The Waitakere plan contained provisions aimed at re-establishing links between isolated remnant patches of native vegetation 'to improve their sustainability' (Waitakere City Council, 1997). Areas for 'restoration' were identified on planning maps. These were then backed up by provisions which encouraged revegetation and preservation. The reasons given by Waitakere for the inclusion of such provisions was similar to that of Christchurch (see Appendix O). Compared to Christchurch, provisions in the Waitakere Plan are more extensive, however, reflecting the latter authority's 'Eco-city' image, and the relatively large amount of native vegetation that exists within Waitakere's boundaries.

North Shore City and Manakau City were also plans which contained provisions for the establishment of green networks. The Manakau approach (which is being used in a number of new residential developments, such as that at Flat Bush) is tied closely with

the public ‘open space’ (networks which also includes walkways and cycleways). It encourages the establishment of green corridors (often following stream alignments) through residential areas.

In regard to the width of esplanade reserves and planted riparian margins, the majority of District Plans adopted a 20 metre standard. Two plans stated clearly that there were circumstances when this width would be increased, while the Far North District and Waitakere City adopted a formula-type approach (which, for example, took into account slope and vegetation coverage) to establishing the appropriate width of riparian reserves. North Shore City and Kawerau District did not mention esplanade reserves in their plans (though North Shore’s planning maps did show the existence of large reserves along waterways) and relied on the provision of the Resource Management Act (20 metres width on lots less than four hectares in area). Wellington took an interesting approach where all waterways with a width of three metres or more were compulsorily required to have esplanade reserves of 20 metres in width (regardless of lot size). Wanganui took a similar approach, though, only on selected waterways which were listed in an appendix of their plan.

The majority of the plans studied contained measures to assist in controlling the loss of topsoil (Indicator 6). The approaches taken by the local authorities studied varied greatly. Wanganui only limited the removal of earth and topsoil from unstable slopes, while North Shore’s plan, not only contained provisions which specified the loss of soil should be avoided, remedied or mitigated, but also suggested the means by which this could be done (see Appendix O). Some of the variability in approaches taken by the local authority plans studied is explained by the fact that some Councils (such as Western Bay of Plenty) see the control of soil loss as being, primarily, the role of Regional Councils (As defined in the Resource Management Act, see Section 30(1)(c)(i) and 30(1)(g)(i)).

While a number of plans made reference to the promotion of greater energy efficiency, or the need to allow adequate sunlight into homes, only three had provisions directly related to the orientation of lots or buildings (as per indicator 7). None of the three plans (Christchurch, Manakau or Wellington) specify the actual orientation to which buildings or lots should be aligned however.

Masterton encourages energy efficiency in building siting, but only by way of verbal advice to applicants, according to Dalhberg (*pers. comm.*). The reason for the lack of interest in solar orientation, generally, is not clear, but it is likely that Councils consider that such controls to be ‘over regulatory’ to a degree that would not be acceptable, or understood by residents (according to anecdotal evidence from staff at Porirua City Council, Wanganui District Council, and Cameron *pers. comm.*). Nevertheless, virtually every plan contained provisions which had some impact on sunlight access to residential dwellings (daylighting angles, maximum height rules, yards or a combination of the three). These were included in the plans studied, in many cases, to ‘ensure adequate levels of amenity’ for residents, rather than to promote the use of renewable forms of energy. As no explicit link is made between rules of this genre and the usability of sunlight as a renewable form of energy in most cases, it would appear that the fact that some of these rules do allow for the use of sunlight as a renewable source of energy is, as much the result of accident, as it is of design.

That terraced housing is still not common in New Zealand, is shown by the fact that, only four plans made specific provision for terraced (or attached forms) of housing in regard to their daylighting, height and yard controls (as per Indicator 8b). In regard to those four plans, the allowance for terraced housing was only made in cases where resource consent was applied for within a specific zone (it therefore was not permitted ‘as of right’).

More than half the plans studied contained provisions which related to the provision of dedicated cycleways and pedestrian paths in residential areas (as per Indicator 9). With one exception (Far North District¹⁹), the local authorities which placed such policies and rules in their plans had populations in excess of 50,000 (indicating a possible link between population size and the sophistication of alternative-transportation networks). As with vegetation clearance provisions, the provisions relating to this indicator tended to be variable in scope and effect. Most plans used policies only²⁰, while a smaller number of plans backed these up with specific rules. It was difficult to establish whether all plans actually intended cycleways and pedestrian paths to be separate from roads, though such a practice was evident in the cases of the Christchurch, Waitakere, and Manakau plans).

Wellington made provision for the use of traffic calming techniques in residential areas. The Wellington approach was to use traffic calming either as a matter of assessment, or as a condition of resource consent where subdivision was classified as a 'Discretionary Activity' (as defined under the Resource Management Act 1991). Waitakere also made provision for traffic calming in their District Plan, though, these provisions only applied to a number of select residential areas. It is possible that the Councils studied which did not provide for traffic calming measures in their plans, did not see the use of such devices as being necessary. Others may only have made provision for such features as part of a wider traffic management strategy, outside of their District Plan.

Four plans provided for higher density housing in or around areas which had, or would be likely to have, public transport routes or stops (as per indicators 12, 13 and 22). Only one plan, Waitakere, specified a distance from routes or stops, within which, high and medium-density housing was to be located (incidentally, this was marginally outside the

¹⁹ The presence of such provisions in the Far North Plan seems to reflect the backgrounds of the consultants used to write the plan rather than current issues in the small towns of Far North District.

²⁰ One of the better examples being that of Waitakere - See Appendix O.

400 metres specified, but was close enough to meet the general intent of the indicator standard). Two further plans (North Shore and Christchurch) suggested that higher density housing should be near transport routes, but did not specify a distance. Cameron (*pers comm*) says, that while the provision for medium / high-density housing around transport stops and routes is becoming more common, few local authorities are yet prepared to specify that only high density housing should be allowed in such areas. This is apparently because such an approach is seen as 'over regulatory' and anti 'free-market'.

Just two plans (North Shore and Manakau) specified density figures which were consistent with the indicator reference standard for medium or high-density residential development around transport stops or routes. Christchurch and Waitakere City gave no density figure, implying that any density was possible. In the case of the Waitakere and Christchurch, potentially, extremely high densities may result, which exceed the indicator standard. If density becomes too high, ability to use sunlight as a form of renewable energy may be compromised, or social problems may result.

All the plans studied contained provisions relating to the control of residential subdivision and development in areas prone to hazards. This, is not of any great surprise as land use control for the purpose of avoiding or mitigating hazards, is stated as a specific function of local authorities under Section 31 of the Resource Management Act. No doubt the costs associated with liability cases in the Courts when damage does occur also acts as a strong incentive for local authorities to include such provisions in their plans. The majority of plans made at least some allowance for sea level rise, either through prohibiting development within certain areas along the coast, or through imposing certain conditions (such as settling minimum floor levels) which would mitigate the effects of flooding. Kawerau, obviously, did not have such provisions in its plan because that local authority is landlocked.

Five out of the twelve plans studied placed restrictions on the removal of vegetation from unstable slopes. In a number of cases, specific areas where vegetation removal was restricted, were listed in special appendices (such as in the Masterton and Far North plans). Some plans stated the specific slope angles from which vegetation was not allowed to be removed (such as North Shore City), while the Christchurch plan had policies which encouraged the planting of vegetation on unstable slopes. No explanation is offered as to why some plans contained no provisions relating to the removal of vegetation on unstable slopes, as there seemed to be no particular pattern in which local authorities applied such provisions (for example some districts, such as Wellington, which are known to have steep topography did not appear to have any such provisions). It is possible that some local authorities relied on provisions of the Building Act 1991.

Every plan contained provisions which placed some form of restriction on development on land which had high agricultural or horticultural potential or life-supporting capacity. By far the most common approach was the use of a specific 'rural' zone. However, while most plans linked the use of a rural zone back to the conservation of soils and land which were important to local agricultural or horticultural production (amongst other objectives), the use of such a zone in Wellington appears to be (according to the objectives and policies of the plan) more for urban containment and amenity purposes. In the case of Kawerau, the use of the rural zone has been retained (from previous District Schemes) mainly to reflect existing land uses rather than the deliberate protection of rural land²¹. In addition to the use of rural zonings, four plans contained more general policies aimed at discouraging residential uses on rural land (see for examples, Appendix O).

²¹ The rate of residential development is too slow (often not more than six new houses per year - Statistics New Zealand figures) to threaten the District's rural land resource, which were also considered to be too small for the protection of them to be an issue (Coles, *pers comm*).

Eight of the twelve plans studied contained rules which controlled the amount of impermeable surfaces on a residential site (as per Indicator 17). There were two categories of control, those which deliberately sought to control the amount of impermeable surfaces on site (North Shore and Waitakere), and those which ‘accidentally’ control the amount of impermeable surfaces on site through controlling building coverage (Kawerau, Far North, Manakau, Wellington, Porirua and Hurunui). While the former sought to assist in stormwater disposal and recharging the water table, the latter were related to maintaining residential amenity (open space for residents around buildings, the control of building crowding, and the like). In a number of cases it appeared that local authorities (such as Wanganui) were intending to rely on the existence of their own drainage systems to dispose of stormwater runoff, rather than control runoff through on-site controls.

All but two plans contained rules or other provisions which restricted the location of residential activities in areas (other than those prone to natural hazards) where the health of residents may be endangered (as per Indicator 18). Similarly, all but two plans contained provisions which stopped, or restricted, the location of non-residential land uses in residential areas where the adverse effects of those land-uses could not be reduced to a level that was compatible with the surrounding residential land-uses (as per Indicator 19). Nine plans contained specialised zonings which catered for heavy industries and other activities, which, because of their effects, were not compatible with residential uses. Residential uses were excluded from these zones (except for the occasional ‘caretaker’s flat’). Only four plans contained provisions outside the use of heavy industry type-zones which discouraged residential uses from locating next to potentially harmful land -uses (such as motorways, airports or sewage treatment plants). Conversely, every plan studied contained rules in their residential zones that were designed to ensure any activities locating in them were generally compatible with the predominant, residential, land-use.

Every plan, except that of Wellington, stated a requirement that new residential development should be connected to a high quality sewage treatment system. No plan went into any great detail as to what the 'quality system' was to consist of however. There appeared to be two reasons for this. Firstly, it was often cited that the sewage system to be connected was either the 'council system' or should at least be compatible with the 'council system'. Secondly, where a reticulated system was not readily available to be connected to, effluent may be discharged to either land or water following some sort of on-site treatment. In either of the latter cases, the Regional Council, rather than the local authority has the responsibility for control (such that, in these cases it is not actually appropriate to include sewage disposal system specifications in the District Plan).

No plan exactly met the specification associated with indicator 21 (residential densities of one unit per 130-631 square metres within 400 metres of public transport stops), the closest match being Waitakere City (which uses a 500 metre radius from transport stop figure, and a density closely matched to that of the indicator standard). North Shore also had a dwelling density figure that was consistent with the indicator reference standard, but did not specify any distance to public transport stops or routes. Almost the only inference that can be drawn from the scoring recorded for this indicator (rather generously marked as two out of eight) is that, there is still a low level of acceptance or, awareness, of the benefits of having high and medium-density residential areas within close proximity of public transport stops and routes, in New Zealand.

When it came to lot size, or residential density, in areas more than 400 metres from public transport routes, or which were intended to have medium or high-density residential development, many of plans studied had minimum lot sizes of between 300 and 400 square metres (compared to the indicator standard of 500 metres or more). A small number of Plans (Kawerau and Wanganui) did not specify minimum densities at all (such that it was possible to have extremely high densities). That medium and high-density

development is still not widespread, would appear to an indication that much of the New Zealand population, in general, and the development community, do not see medium to high-density living as desirable²², or marketable.

Of the four plans that deliberately sought to create medium or high-density housing areas, three (Waitakere, Christchurch and North Shore) had provisions that were consistent with the indicator reference standard for carparking requirements in such areas. Manakau meanwhile required one more carpark per unit than the standard (which may seem minor, but it does have the effect of making car use more convenient in areas where public transport use should be encouraged).

An interesting approach adopted by North Shore was a changing carparking requirement which is dependent on actual dwelling floor area. Dwellings under 50 square metres in floor area only require one carpark, while dwellings over 50 square metres in floor area are required to provide two car parks. Such a requirement would, in theory, be able to allocate more parking spaces to those dwellings which would have a greater need for more than one motor vehicle, and, which were typically of a lower density. Whether this will be the case in practice, however, remains to be seen.

Indicator 25, related to the provision of policies and rules in District Plans which would allow for mixed land uses (residential and commercial together). Of the nine plans for which this indicator seemed applicable, eight allowed some form of mixed land-use. While some residential development was allowed in commercial land use areas in the Manakau plan, no provision appears to be made for non-residential uses (other than 'cottage industries' in residential areas). However, as with residential development densities, while the majority of plans allowed for such development, few opportunities

²² This is consistent with the findings of Gardner W & McDonald D H (1978), and more recently, but to a lesser degree, Hewetson (1994) & (1994ⁱⁱ) and Dialogue Consultants (1993).

have in fact been taken up. Anecdotal evidence from planners at a number of local authorities tends to suggest that many communities are still relatively hostile towards commercial development of any form establishing in their neighbourhoods (despite the controls already mentioned in this chapter, which, are specifically designed to maintain residential amenity through controlling the effects of all land-use activities). This makes the establishment of mixed-uses in residential areas, difficult to implement in reality.

Little regard appears to have been had to issues of ‘passive surveillance’, the benefits associated with grid network streets, or, the number dwellings that may be appropriate for an apartment block or cul-de-sac (indicators 26, 27 and 28) . Only three of the plans studied contained provisions that related to any of these. The Manakau approach to passive surveillance centred around design elements in a single, essentially experimental ‘Integrated Intensive Housing Zone’ (see Appendix O). Waitakere had two approaches towards passive surveillance, one of which was to design public and semi-public spaces in such a way to allow for such surveillance (see Appendix O). The second approach taken by Waitakere was similar to that of Wellington, the ability for passive surveillance was made a ‘matter of assessment’ in considering the design the of medium density housing (which required a resource consent before they could be built).

Only one plan (Wellington) looked at requiring a grid network street pattern, where possible (this being one of the design assessment criteria of multi-unit housing developments), while no plan looked at the number of dwellings in an apartment building or cul-de-sac.

The most plausible reason why these indicators (26, 27, and 28) were not met by most plans is that these indicators, relate to social objectives (the reduction of crime, for example). The Resource Management Act is not, generally, designed to achieve social outcomes. As a tool for implementing that the Resource Management Act, District Plans

can only control those things which the Act allows them to. Therefore, the plans studied had no real legal mandate for containing provisions which sought to achieve social or economic objectives.

Every plan studied had provisions relating to residential building height (indicator 29). Nine of the plans had a building height standard consistent with the indicator standard (that being, 9-12 metres) while the others contained standards similar to that specified (but which would not allow much flexibility in design, if three-storey buildings were to built). While three plans contained a distinct range of residential height standards dependant on zone, only two (Christchurch and Manakau) had ranges which offered significant variations in height. In these plans, the upper limit was consistent with the indicator reference standard, however, the lower limit was generally lower than that specified in the indicator (which would not be an issue, provided these limits applied to areas specifically intended to have lower densities²³). These height variations did not generally relate to the intended densities of the areas to which they applied, but, were associated more often, with the particular residential character that the local authority wished to preserve.

In Figure 17, the results from the summary table (Table 10) are placed on a continuum where 'zero per cent' represents residential subdivision and development controls which are 'unsustainable' in terms of the 'idealistic approach' expressed at the end of Chapter IV, and '100 per cent' represents 'sustainable' subdivision and development controls. From the resultant chart it can be seen that Waitakere City, North Shore City and Christchurch City recorded the highest scores (through meeting the greatest proportion of indicators that were relevant to them). This infers that the residential subdivision and development controls used by these local authorities are likely to promote a more

²³ Which is the case for Christchurch, where the six metre limit only applies to the 'Rural Village' (Riverslea Estates) area, but is not the case in Manakau.

‘sustainable’ pattern of residential subdivision and development than the plans of other local authorities which had been studied. The Far North Proposed District Plan, and Manakau City Proposed District Plan also scored over 60%. The Far North plan was however an unusual case. It contains a number of provisions which allowed it to outscore many more urbanised local authorities. Much of the Far North plan was prepared with the assistance of consultants from larger urban centres. These consultants ‘imported’ provisions into the Plan which appear to have sourced from work they have undertaken or have seen in areas with a much larger urban population.

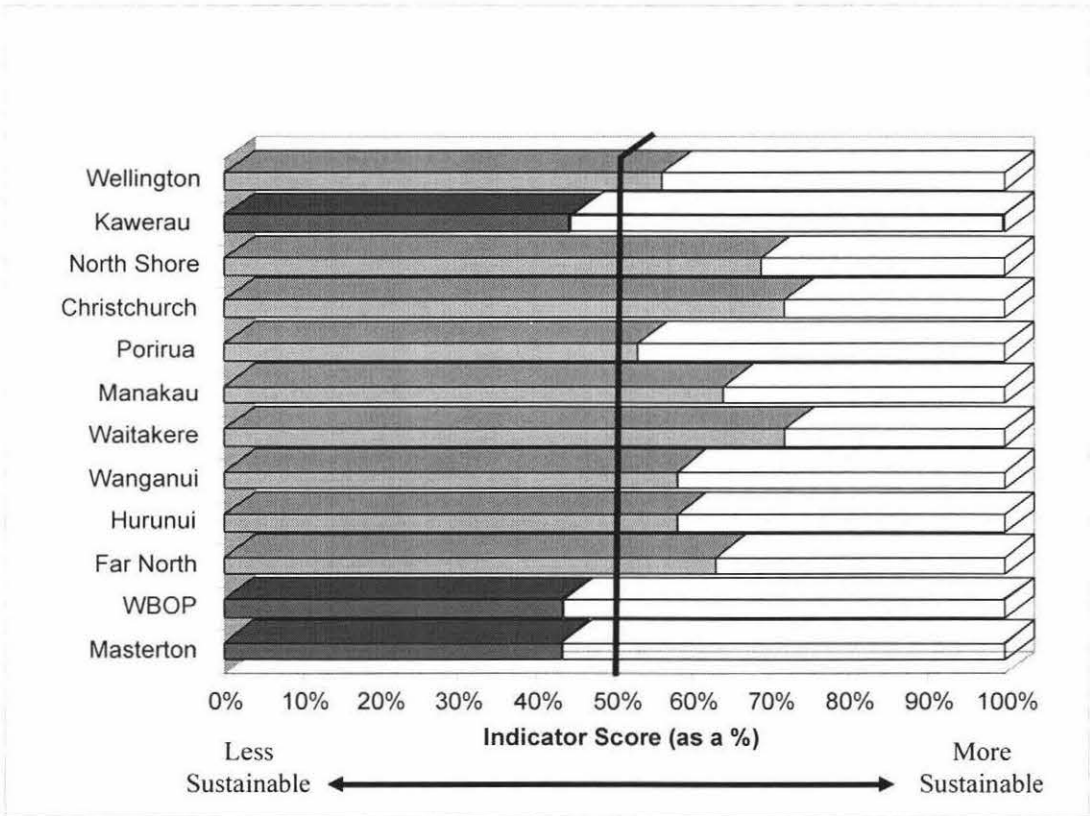


Figure 17: Extent To Which Individual District Plans Are Sustainable In Terms Of The ‘Ideal Model’

When individual Plans are placed into larger groupings it appears that, at face value, New Zealand residential subdivision and development controls are located more towards the ‘sustainable’ end of the continuum (at 59 per cent - see Figure 18).

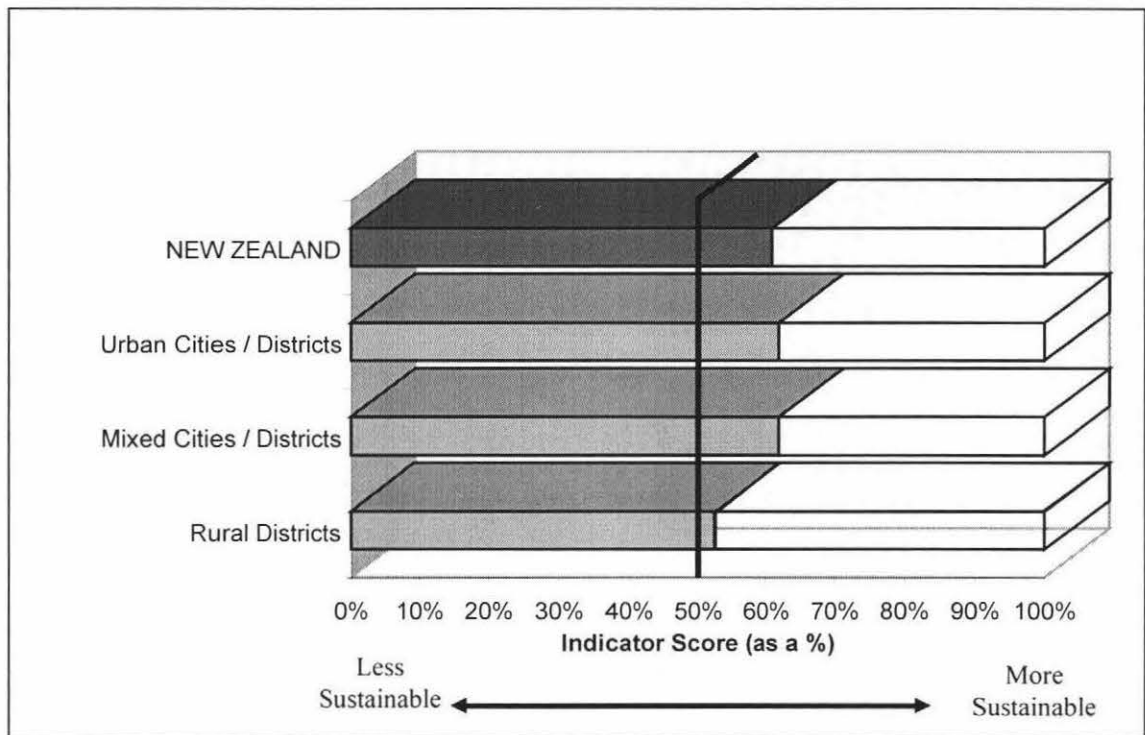


Figure 18: Extent To Which District Plan Are Sustainable In Terms Of The ‘Ideal Model’ - By Major Groupings.

Generally the mixed and urban local authorities tended to score higher than rural local authorities (61 per cent, as opposed to 52 per cent). The main reason for this appears to be the relative concentration of resources. Planning and financial resources are spread more thinly in the rural authorities than in the other local authorities. As such, the ability to collect information (for example, commission research) and formulate plan provisions, as well as implement and enforce those plan provisions, is much more limited. This perception would appear to hold true for almost all the Plans studied with the exception of the Far North District Plan (which as previously stated, appears to have ‘imported’ urban standards)²⁴. As shown in Figure 19 the relationship between population size (and therefore the resources²⁵ available) was strongest where population size increases from 10,000 to 50,000.

²⁴ Note that while Kawerau is classified as “urban” and scored relatively low, the population bases and therefore its resources are more comparable to a Rural District.

²⁵ In terms of finance from the rating base and staff

The smallness of population size and associated resources would also explain why Kawerau District scored lowest amongst the so-called urban authorities, and amongst the lowest scoring local authorities overall.

The possibility that residential development issues were not relevant to rural districts, and therefore explained the difference between rural and urban score is only a minor consideration by comparison with the issue of resourcing. The reason for this is that the scoring system allowed each district to be rated only against the indicators that appeared relevant to them (hence the use of the 'NA' or, not applicable, notations in Table 10). This ensured that in the table of results, rural districts were not penalised for not meeting indicators pertaining to features that they did not need (such as higher-density residential development around public transport stops). The line of argument that residential issues are not relevant to rural districts would also not explain why Western Bay of Plenty District, with a population of 34,000 and a growth rate of nearly 3.5 per cent, per year (and, therefore, undergoing rapid expansion of residential areas) scored lower than Wanganui (population 42,000 and a growth rate of only 0.16 per cent, per year) which has little pressure for urban expansion.

While population (and therefore the available resource base) appears to have a influence on the extent to which subdivision and development controls can be classed as 'sustainable', the relatively large number of outlying plots shown in Figure 19 suggests that there must be other variables which have an influence. Froude (1997) found in her study of local authority provisions relating to biological diversity that the following issues acted as variables :

- *Lack of Council expertise:* Local authorities had little guidance, and a lack of knowledge in how to plan for such things as, ecological processes, biological diversity, or techniques for protecting biological diversity

- *Other priorities/ lack of will:* Some local authorities had more urgent functions which they were required to attend to under other statutes, other local authorities reported a reluctance on the part of councillors to allocate resources for biological diversity or impose restrictions on land owners
- *Overlapping jurisdiction:* Overlapping functions and boundaries between regional councils and local authorities could result in provision omission, duplication or inconsistencies.

Saying therefore, that the difference in indicator scoring between rural and more urbanised local authorities was accounted for by population and perceived relevance of subdivision issues alone, would be ignoring other issues (such as those identified by Froude). Any strategy which was aimed at improving the extent to which New Zealand subdivision and development controls met the criteria of ‘sustainable development’ would need to go beyond the issue of ensuring adequate resourcing.

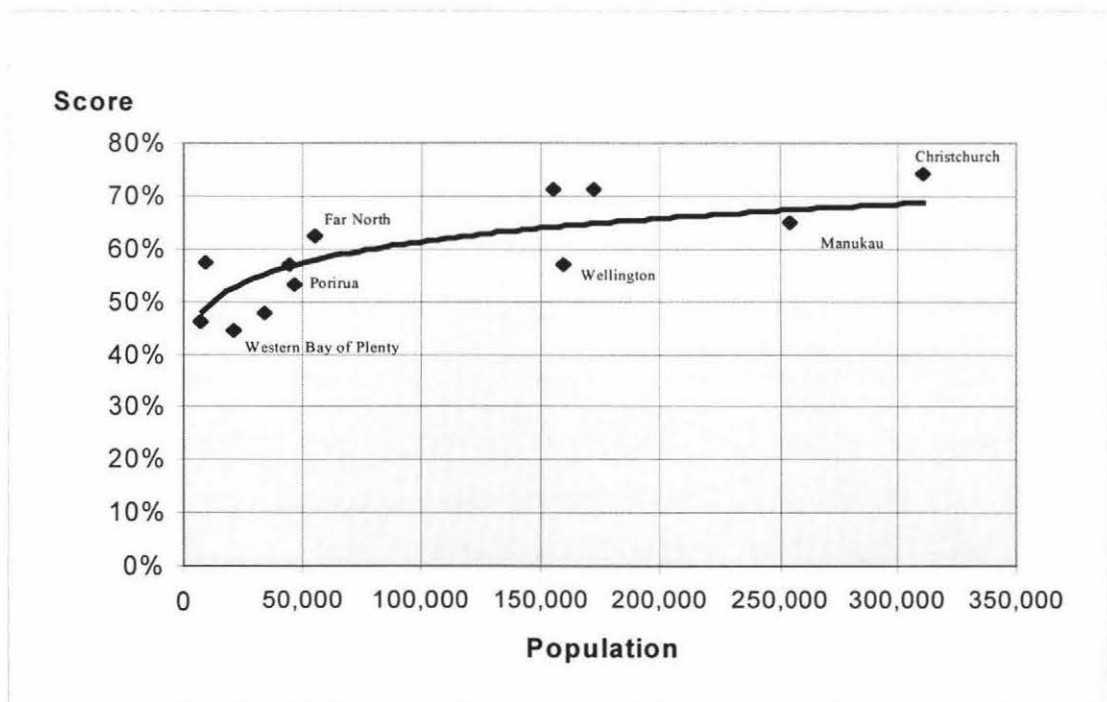


Figure 19: Correlation Between Population Size And Indicator Scoring.

The Approach Taken By The Environment Court

In the control of subdivision in New Zealand Local Authorities make most of the decisions as to whether a land owner is allowed to subdivide their land, and (to a lesser extent) the ultimate form that subdivision development may take. Where there is some dispute over the decision of the local authority, or where two authorities have a disagreement over a matter, an appeal (also called a *reference*) may be made to the Environment Court for resolution. In such cases, the fate of a subdivision, development proposal or rezoning will then rest with the decision of that Court. Other than deciding the fate of the subdivision or rezoning, a flow-on effect of Environment Court decisions is that they often provide guidance to Local Authorities in future plan drafting and interpretation. For these reasons, any evaluation of how New Zealand approaches residential subdivision needs to consider the approach taken by the Environment Court.

A search of a computer database for case law examples, located 64 appeals lodged with the Environment Court pertaining to residential subdivision. This work has selected a sample of 20 of these appeals at random to obtain an indication of current thinking by the Court (brief summaries of these cases can be found in Appendix P).

In general the Environment Court cases on residential subdivision studied, focused only on a few key issues. Most of the cases studied related to subdivision of land on urban fringes, often for rural-residential²⁶ purposes.

The Environment Court encourages protection of areas which have ecological significance, particularly where these are in close proximity to water (a number of the

²⁶ Also referred to as 'life-style blocks' or 'large-lot residential' developments.

cases studied seemed to have the protection of coastal vegetation as an issue). It is worth noting however, that the Court does not protect all vegetation. In the case *Minister of Conservation vs Whangarei District Council (1994)* the court disagreed with the applicant, saying that the areas of vegetation that the applicant was planning to subdivide out for protection were not significant, but decided that the coastal fringe onto which the subdivision was to front, was (the appeal was declined to protect these latter areas).

It is difficult to determine from the sample studied, whether the Environment Court places any value on the establishment of green networks as none of the cases touched on the issue. It does appear though that the Court recognises and appreciates the values of planted riparian margins as a filter for contaminants (*Stillwater Ratepayers Association and Others vs Rodney District Council 1997*).

The Environment Court appears aware of the benefits of urban consolidation but appears only willing to use it in decision making where the protection of soils, the efficient use of resources, or the protection of ecosystems is an issue (see for example *Hunt vs Palmerston North City 1993*, and *Canterbury Regional Council vs Selwyn District Council 1996*). In the case of *North Shore City and Others vs Auckland Regional Council 1996*, the Court made a decision on urban expansion deliberately excluding considerations on the extent of urbanisation and regional transport (despite these considerations being included in evidence).

The Environment Court appears to be supportive of higher residential densities where any adverse effects of the development on its surrounding environment are satisfactorily avoided or mitigated. In *Mitchell vs Auckland City Council (1993)* the Court was faced with the issue where a local development would exceed the local residential requirements specified in the Auckland City Plan. Effects on the environment were

considered minor and the development allowed, subject to the proposal being issued with subdivision consent (the matter was over a land-use consent). In *North Shore City and Others vs Auckland Regional Council 1996*, the Court looked closely at the issue of urban intensification to see if it offered an alternative to the expansion of the urban boundary. The Court did not dismiss urban intensification but noted that current community feeling was against the possible widespread use of it as a planning tool.

In regard to the subdivision of rural land for residential use, the Environment Court has generally taken a protective approach in that, where land is still suitable for horticultural or agricultural production, either by itself (as in *Armstrong vs Waimakariri District Council*) or through amalgamation with neighbouring rural lots (as in *Bos vs Hamilton City Council*), appeals which would have seen the land subdivided have been declined. This approach still appears to be current despite the fact that the Resource Management Act does not list the protection of productive soils as an individual matter of 'National Importance' (as the former Town and Country Planning Act, 1977 did). However where land is of high versatility and fertility, but can not be practicably used (because of location), where there was a need for land to accommodate urban growth and the fertile land was relatively abundant, the Environment Court approved subdivision for residential purposes (*Becmead Investments vs Christchurch City Council*). However, the Environment Court appears only willing to grant subdivision consent for residential development in the afore mentions circumstances where such development it unlikely to set a precedent (*Burnett vs Tasman District Council 1995* and *Canterbury Regional Council vs Selwyn District Council 1996*).

Only in one of the cases studied did the Environment Court specifically look at proposed residential development in terms of whether its location may have adverse effects on residents (*Becmead Investments Ltd vs Christchurch City Council 1996*). In this particular case the Court decided that there would be no hazard to residents as the

location of the development lay outside the main noise contour area of the airport. In the case of *Hodson vs Wanganui District Council (1994)* the Environment Court also looked at the issue of effects on the health and well-being of residents, but from the point of view of a non-residential activity with significant adverse effects locating in an area which was to be used for residential purposes. In this latter case, the Court disallowed the development. While these constitute only two cases out of twenty studied, it does suggest that where circumstances dictate there is an issue, the Environment Court does see the protection of the health and well-being of residents (present and future) as being important.

Connection to a quality sewerage disposal system is an issue which the Environment Court pay attention to in many subdivision cases on which it is asked to make a decision. Where adequate sewerage disposal is not available, it would appear likely development would not be allowed to proceed. Generally however the issue is considered in passing and has relatively little influence on the outcome of most cases (as many subdivisions do provide a means of disposal which satisfies the Court, or else, the appeal relates to another issue). In the case *Canterbury Health Board vs Selwyn District Council (1993)* the appeal was directly related to sewerage disposal, however the Court did not have an opportunity to make a decision as the appeal was settled by a consent condition. In *McIntyre vs Tasman District Council (1994)* the Court refused to allow full residential development to proceed until a reticulated sewerage system was available, and consequently zoned the appeal site for low-density residential development only.

Only in the case *Mitchell vs Auckland City Council (1993)* did the Environment Court consider issues directly related to dwelling density. The case has circumstances, however, which make reaching a conclusion on the Environment Court's approach to the matter difficult (the conversion of an existing motel to residential units). It could be

assumed however that the Environment Court is not averse to pockets of high density development (even where a District Plan specifies a lower density) provided the effects on the surrounding environment are made no worse than what already exists.

The Environment Court appeared to have a distinct approach of declining appeals in relation to the rezoning of land for residential purposes, where the provision of infrastructure was an issue. In *Hunt vs Palmerston North City Council (1993)*, the Environment Court decided not to allow the rezoning of land because ‘although services had been extended very close to the periphery of urban development leaving areas closer to the city undeveloped, it was decided that allowing the rezoning (and consequential residential development) would only exacerbate the situation’. In *McIntyre vs Tasman District Council (1994)* the Court refused to allow full residential development to proceed until a reticulated sewerage system was available. The Court found that, ‘the extension of services should be carried out in a co-ordinated progression. If development proceeded on an ad hoc basis they [the services] could not be sustainably managed by the Council’.

None of the Environment Court decisions contained within the sample related to the use of mixed land use zones. Even outside the sample there appears to be only one or two which relate directly to zones that are intended to have mixed uses (none of these related directly to subdivision however). In these cases *McLeod European Ltd vs Hamilton City Council (1995)*, and *Warbrick and Others; and McDonald’s System of New Zealand Ltd, vs Whakatane District Council (1995)*, the Environment Court’s decision was related, primarily, to the issue of likely effects of non-residential activities on the amenity of adjacent residential uses. In both these cases the Court appeared to take a neutral stance as to the desirability and practicality of mixed-use zoning.

In the cases studied, the Environment Court was not presented with, or did not have an opinion on, matters relating to:

- The appropriate width for reserves along riparian margins
- The use of traffic calming measures in residential streets
- Higher density development near key transportation corridors
- The amount of land that can be covered by impermeable surfaces
- The number of car parks required in residential areas
- Windows overlooking public space
- The layout of subdivision roading
- The number of lots/ dwellings in a cul-de-sac or apartment building.

The Environment Court can, of course, only make decisions on those issues which are put before it, and the evidence which is provided. The absence of a decision or opinion on a particular aspect of planning, therefore, cannot be taken as meaning that the Court does not see that aspect as important.

In regard to those aspects which the Environment Court has commented and made decisions on, the findings of the Court are consistent with the indicator references. The reason for the relative consistency between the Environment Court and the indicators is quite obvious when the cases looked at, or are studied, in any detail. Within each case, the Court refers back to the purposes and principles of the Resource Management Act to guide them in making their decision. The purpose of the Resource Management Act is 'to promote the sustainable management of natural and physical resources'. It will be remembered that sustainable management is similar to sustainable development, but, is somewhat narrower in its scope. It is the similarity between the two terms which, therefore, helps explain much of the consistency between the Environment Court and the indicator standards in this work. At the same time, the limited scope of both the term 'sustainable management' and the Resource Management Act, may partly explain

why some indicator issues (such as windows overlooking public space to enable passive surveillance) were not considered by the Environment Court.

CHAPTER VII: NEW ZEALAND RESIDENTIAL SUBDIVISION AND DEVELOPMENT CONTROLS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT - CONCLUSIONS

This chapter provides an overview of the findings of this work in the context of the Research Goal and its associated objectives. A number of limitations arising out of the research and its design are also discussed, these providing the basis for suggestions for future research.

Sustainable Development In Residential Subdivision Development Design.

It was found impossible to limit the study of residential subdivision and development controls, purely, to the drawing of lines on a plan and the surveying of boundaries on land, as had been the stereotypical view of subdivision. To take into account the realities of sustainable development (in particular the inter-relatedness of causes and effects) and the modern definition of subdivision under the Resource Management Act (which includes the subdivision of a building) means subdivision controls have to be looked at which relate, not just to a lot, or series of lots, but also in of the wider issues of urban form.

In studying what various experts had to say on residential and urban sustainability, and sustainable development it became apparent that residential subdivision controls which were likely to achieve higher levels of ‘sustainability’ were those which:

- Encouraged the location and design of new residential development in such a way as to preserve local biodiversity and avoid the destruction of areas of high ecological value
- Avoided destruction of the life-supporting capacity of ecosystems
- Avoided the pollution of air and water
- Minimised risks to life and property from natural hazards
- Avoided the loss of land which has soils of high fertility, life-supporting capability or versatility for agricultural/horticultural use
- Minimised the use of non-renewable resources such as fossil fuels
- Promoted and enabled the use of renewable resources and energy sources such as sunlight.
- Allowed the recharge of groundwater and reduce the volume and velocity of surface water runoff
- Ensured development avoided exacerbating the erosion of stream and river banks
- Promoted designs which decreased reliance solely on private motor vehicles to meet the transport needs of the community
- Ensured the effects of activities which jeopardise health of residents are avoided
- Ensured the most efficient use of social and physical infrastructure
- Helped keep final housing prices affordable (through allowing flexibility in design and minimising unnecessary controls)
- Minimised the opportunities for crime.

Review Of Indicators

In reviewing indicators by which to measure New Zealand residential subdivision and development controls, it became apparent that much work still has to be undertaken in the field of indicators of urban sustainability. The New Zealand Ministry for the Environment is still some way off completing a set of indicators for urban sustainability, while most other indicators found did not specifically address residential subdivision *per*

se, or, were not directed at measuring policy responses relating to issues of urban sustainability. Generally, the most helpful sources of indicators were from overseas.

Analysis of New Zealand District Plans

The results from the study of New Zealand District Plans, when placed on the un-weighted sustainable development continuum have shown that these plans contain controls, that, if given effect to, would promote a form of residential subdivision and development which is a little closer to the 'sustainable' end of the continuum than the 'unsustainable'. However, an overall score of 59 per cent tends to suggest that there is still a lot of room for improvement. It should be noted too, that as no weighting system had been used the results may in fact be optimistic (in that if, for example, indicators relating to green networks had been accorded greater importance the overall score for New Zealand would have been lower as few plans provided for such networks).

That the Resource Management was, at least in part, responsible for the gap between the New Zealand score of 59 per cent, and the ideal score of 100 per cent, was evidenced by the pattern of scoring in relation to the indicator set. Where there was a mandate under the Resource Management Act 1991 to plan for a particular issue (such as the avoidance of hazards, or the avoidance of adverse effects of activities on residents) all the plans met the indicator standard. Where there was no mandate to provide for an issue (such as for the social outcome orientated indicators related to passive surveillance, or the number of dwellings appropriate for an apartment building) the scoring was poor. This pattern is consistent with the overall pattern of the Resource Management Act, and its purpose of 'sustainable management' (focused primarily on natural and physical resources of the environment) which does not promote the integrated approach to planning which the United Nations' 'sustainable development' implies (planning for social, economic and environmental outcomes simultaneously).

When the results of the plans were aggregated into groups, local authorities with a large urban component scored better than rural-based local authorities (61 per cent, as opposed to 52 per cent). The main reason for the difference appears to be the availability and distribution of resources (for example, funding, or the number and quality of skilled staff) which are more plentiful and concentrated in urban areas than rural areas. The argument that subdivision and development controls were not an issue for rural districts played only a secondary role in explaining the differences between rural and mixed and urban areas as, the scoring of the plans against the indicators made provision for the fact that not all indicators were relevant to all local authorities.

In plotting how individual plans scored against the population of the local authority from which they came, the amount of deviation from the overall trend line shown by outlying plots suggested that there must also be other issues which influence how well planning controls assist in producing sustainable forms of residential subdivision and development. It was suggested that these issues may be the same as those which Froude (1997) found in her work (being, lack of expertise, lack of political will, the need to meet other priorities and confusion over jurisdiction).

Analysis of Environment Court Decisions

The Environment Court has the potential to have a major influence on New Zealand subdivision through its rulings. The Court can however only make decisions on the cases and the evidence before them. Often the issue of dispute will be relatively narrow in focus. The absence of a decision or opinion on a particular aspect of planning, therefore, cannot be taken as meaning that the Court does not see that aspect as important.

In regard to those aspects which the Environment Court has commented and made decisions on, the findings of the Court are consistent with the indicator references. This

appears to be due to the Court often making decisions on the basis of what action best met the purpose of the Resource Management Act [the sustainable management of natural and physical resources]. The underlying basis of sustainable management contains many elements in common with sustainable development.

In general the Court takes the following approach:

- Ecological areas are to be protected where the Court agrees that they are of such significance that they warrant protection.
- Land of high life supporting capacity or versatility of use is protected except where circumstances dictate that future agricultural or horticultural activity will be impracticable.
- Where new residential subdivision was unlikely to result in the efficient use of infrastructure, or where there were likely to be problems in providing services, the approach has been to prevent intensive residential development either by refusing to allow the rezoning of land (to residential) to proceed, or only allowing development to take place at a lower density.
- Development is required to be connected to a suitable sewage disposal system before it is allowed to proceed.
- Non-residential land-uses are not allowed to establish amongst residential uses where they have adverse effects which cannot be satisfactorily avoided or mitigated.

Establishing the Court's view on higher residential density was inconclusive. However, where adverse effects are minor, it appears the Environment Court is not averse to higher-density residential development.

Directions For Further Study

One of the key aspects to come out of Chapter V of this work was the relative lack of indicator standards and references relating to urban sustainability and controls of subdivision and development in New Zealand. Many indicators had to be adapted from overseas work, simplified to a level whereby measurement was by a simple ‘yes or no’ type answer, or discarded because information was too costly to obtain. The refinement of indicators and the development of more quantifiable indicator standards is thus an area suggested for further research.

Establishing the importance of indicators relative to each other was also problematical. Few of the works by the authors studied provided anything that resembled a list of items which could be adapted for use as indicators, and none appeared to state conclusively that one possible indicator or topic area was any more important than another. To take the indicator set one step further, and perhaps make it model the environment more closely, additional work on establishing a defensible weighting system is recommended.

Another area in which the establishment of indicators proved problematic was in relation to the ‘economic’ sphere of residential subdivision and design. Little work appears to have been carried out in New Zealand which links planning and design of residential subdivision and development with the affordability of property and housing. As such there was little to base possible indicators on. The relationship between planning, design, and the cost of housing is suggested as another area for possible research (as is the development of indicators against which to benchmark planning and development controls).

This work has established that New Zealand subdivision and development controls (as contained in local authority District Plans) fall short of the ‘ideal model’ which concluded Chapter IV. An important further topic for further study would be to investigate how local authorities could improve their planning documents to be more

consistent with the sustainable development ideal. Any such study could explain what problems local authorities had in trying to achieve sustainable development, and ways in which these problems could be overcome.

As a final comment, this study focused on residential subdivision and development controls as they were provided for in District Plans. It became apparent during the study that a number of planning tools (both those which had a statutory basis, and those that did not) which influenced residential subdivision and development were being implemented outside of the District Plans. Further studies should investigate the influence these tools (which may include, for example Asset Management Plans, Transportation Plans and the Building Act, 1991) have on residential subdivision design.

APPENDICES

APPENDIX A

Effects Associated With Subdivision as Cited By Authors

EFFECT	TYPE OF EFFECT	CITED BY:
<u>ECOLOGICAL</u>		
<ul style="list-style-type: none"> Pressure on or loss of natural ecosystems 	<ul style="list-style-type: none"> Adverse, ecological, may be any combination of permanent, future, past or cumulative. 	<ul style="list-style-type: none"> Ministry for the Environment 1992 Upton 1995 Mitlin and Satterthwaite 1990 Rotorua District Council 1993 Green 1981 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Protection of indigenous habitats and vegetation 	<ul style="list-style-type: none"> Positive, ecological, future 	<ul style="list-style-type: none"> McDermott Fairgray 1994 Menzies and Bell 1981.
<ul style="list-style-type: none"> Pollution of water via surface runoff point surface discharges and chemicals leaching into groundwater. 	<ul style="list-style-type: none"> Adverse, ecological, duration depends on the scale and type of the development and the nature of the receiving water body. 	<ul style="list-style-type: none"> Elkin et al 1991 Rotorua District Council 1993 Mitlin and Satterthwaite 1991 Haughton and Hunter 1994 Palmerston North City Council 1995 Wolff 1975 American Society Of Planning Officials 1976 Melville 1991 Stanley 1996
<ul style="list-style-type: none"> Aggravation of natural hazards resulting from the clearance of vegetation 	<ul style="list-style-type: none"> Adverse, ecological, may be future or temporary 	<ul style="list-style-type: none"> Lower Hutt City Council 1994 Rotorua District Council 1993 Palmerston North City Council 1995 American Society Of Planning Officials 1976 Mitlin and Satterthwaite 1991.

<ul style="list-style-type: none"> Reduced flexibility for future land uses (including the taking of land that may otherwise have been used for recreational, or conservation purposes) 	<ul style="list-style-type: none"> Adverse, economic, ecological or social, future (may be permanent in many cases) 	<ul style="list-style-type: none"> Western Bay of Plenty District Council 1992 Lower Hutt City Council 1994 McAlley and McQuoid 1982 Palmerston North City Council 1995 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Increased or altered water (including stormwater) run off 	<ul style="list-style-type: none"> Adverse, cumulative, ecological and infrastructural 	<ul style="list-style-type: none"> Elkin et al 1991 Palmerston North City Council 1995 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Increased energy use (this can be the use of both renewable and renewable resources) 	<ul style="list-style-type: none"> Adverse, economic (and can also have ecological implications), future may become cumulative. 	<ul style="list-style-type: none"> McAlley and McQuoid 1982.
<ul style="list-style-type: none"> Greater energy efficiency/ reduced energy use 	<ul style="list-style-type: none"> Positive, where efficiencies can be increased without adverse side effects 	<ul style="list-style-type: none"> McDermott Fairgray 1994 Owens 1992 Mitlin and Satterthwaite 1990 Elkin et al 1991 Haughton and Hunter 1994 Wolff 1975.
<ul style="list-style-type: none"> Increasing diversity of land use mix. 	<ul style="list-style-type: none"> Positive or Negative, ecological, or economic, or social, may be cumulative 	<ul style="list-style-type: none"> Abbey 1993 Haughton and Hunter 1994
<ul style="list-style-type: none"> Pollution of air (e.g.. CO₂ and SO₂ emissions) 	<ul style="list-style-type: none"> Adverse, ecological, duration of effects depends on the type of activity likely to be developed on the subdivided land. 	<ul style="list-style-type: none"> Elkin et al 1991 Haughton and Hunter 1994 Mitlin and Satterthwaite 1991 American Society Of Planning Officials 1976.

ENVIRONMENTAL QUALITY

<ul style="list-style-type: none"> Noise and dust associated with construction 	<ul style="list-style-type: none"> Adverse, temporary, Environmental Quality 	<ul style="list-style-type: none"> Ministry for the Environment 1992² Taupo District Council 1994
<ul style="list-style-type: none"> Protection of landscape character 	<ul style="list-style-type: none"> Positive, environmental quality. 	<ul style="list-style-type: none"> Palmerston North City Council 1995 McAlley and McQuoid 1982

<ul style="list-style-type: none"> Increased range of nuisances (noise, spray drift, odours etc.) 	<ul style="list-style-type: none"> Adverse, environmental quality, ecological, may become cumulative, 	<ul style="list-style-type: none"> Upton 1995 Rotorua District Council 1993 Palmerston North City Council 1995.
<ul style="list-style-type: none"> Loss of landscape character and amenity 	<ul style="list-style-type: none"> Adverse, environmental quality, Permanent. 	<ul style="list-style-type: none"> Ministry for the Environment 1992 Lower Hutt City Council 1994 Upton 1995 Palmerston North City Council 1995 American Society Of Planning Officials 1976.

ECONOMIC

<ul style="list-style-type: none"> increased land prices/ values 	<ul style="list-style-type: none"> May be adverse or positive, Economic 	<ul style="list-style-type: none"> Haughton and Hunter 1994 McAlley and McQuoid 1982 Palmerston North City Council 1995 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Reduced flexibility for future land uses (including the taking of land that may otherwise have been used for recreational, or conservation purposes) 	<ul style="list-style-type: none"> Adverse, economic, ecological or social, future (may be permanent in many cases). 	<ul style="list-style-type: none"> Western Bay of Plenty District Council 1992 Lower Hutt City Council 1994 McAlley and McQuoid 1982 Palmerston North City Council 1995 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Expenses incurred by local government funding of capital/infrastructural works 	<ul style="list-style-type: none"> Adverse, infrastructural and Economic, may be cumulative, or temporary. 	<ul style="list-style-type: none"> American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Loss of high-quality agricultural land 	<ul style="list-style-type: none"> Adverse, Economic, Permanent. 	<ul style="list-style-type: none"> Ministry for the Environment 1992 Mitlin and Satterthwaite 1990 Rotorua District Council 1993 Palmerston North City Council 1995 Haughton and Hunter 1994 Elkin et al 1991 Menzies and Bell 1981 Green 1981.

<ul style="list-style-type: none"> Changes in the number of employment opportunities (including the loss of some jobs such as when suburban development takes over horticultural land). 	<ul style="list-style-type: none"> May be positive or adverse (depending on circumstances), social and economic, tends to be cumulative and/or permanent 	<ul style="list-style-type: none"> McAlley and McQuoid 1982 Palmerston North City Council 1995 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Increasing diversity of land use mix. 	<ul style="list-style-type: none"> Positive or adverse, ecological, or economic, or Social, may be cumulative 	<ul style="list-style-type: none"> Abbey 1993 Haughton and Hunter 1994.
<ul style="list-style-type: none"> Expenses incurred by local government funding of capital/infrastructural works 	<ul style="list-style-type: none"> Adverse, infrastructural and economic, may be cumulative, or temporary. 	<ul style="list-style-type: none"> American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Increased energy use. 	<ul style="list-style-type: none"> Adverse, Economic (and can also have ecological implications), future, may become cumulative. 	<ul style="list-style-type: none"> McAlley and McQuoid 1982.
<ul style="list-style-type: none"> Greater energy efficiency/ Reduced energy use 	<ul style="list-style-type: none"> Positive, where efficiencies can be increased without adverse side effects. 	<ul style="list-style-type: none"> McDermott Fairgray 1994 Owens 1992 Mitlin and Satterthwaite 1990 Elkin et al 1991 Haughton and Hunter 1994 Wolff 1975.
<ul style="list-style-type: none"> Opportunity to protect high-quality agricultural land 	<ul style="list-style-type: none"> Positive, economic. 	<ul style="list-style-type: none"> Palmerston North City Council 1995.

SOCIAL

<ul style="list-style-type: none"> Reduced flexibility for future land uses (including the taking of land that may otherwise have been used for recreational, or conservation purposes) 	<ul style="list-style-type: none"> Adverse, economic, ecological or social, future (may be permanent in many cases). 	<ul style="list-style-type: none"> Western Bay of Plenty District Council 1992 Lower Hutt City Council 1994 McAlley and McQuoid 1982 Palmerston North City Council 1995 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Protection heritage, cultural values and treasures 	<ul style="list-style-type: none"> Positive, social, future. 	<ul style="list-style-type: none"> McDermott Fairgray 1994 McAlley and McQuoid 1982.
<ul style="list-style-type: none"> Destruction or alteration of heritage, areas of cultural significance and treasures 	<ul style="list-style-type: none"> Adverse, social, past. 	<ul style="list-style-type: none"> Palmerston North City Council 1995 American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> Social Problems associated with increasing population density. 	<ul style="list-style-type: none"> Adverse, social, cumulative. 	<ul style="list-style-type: none"> Elkin et al 1991 Coleman 1990.

<ul style="list-style-type: none"> • Survival of local facilities and public transport 	<ul style="list-style-type: none"> • Positive, social, type depends on many factors not necessarily related to subdivision. 	<ul style="list-style-type: none"> • Elkin et al 1991.
<ul style="list-style-type: none"> • Changes in the number of employment opportunities (including the loss of some jobs such as when suburban development takes over horticultural land) 	<ul style="list-style-type: none"> • May be positive or adverse, social and economic, tends to be cumulative and/or permanent. 	<ul style="list-style-type: none"> • McAlley and McQuoid 1982 • Palmerston North City Council 1995 • American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> • Increased diversity and frequency of social and cultural experiences . 	<ul style="list-style-type: none"> • Positive, Social, cumulative (as development increases) 	<ul style="list-style-type: none"> • Haughton and Hunter 1994 • McAlley and McQuoid 1982
<ul style="list-style-type: none"> • Increased health risks associated high density populations 	<ul style="list-style-type: none"> • Adverse, social, may be temporary or cumulative. 	<ul style="list-style-type: none"> • Haughton and Hunter 1994 • Mitlin and Satterthwaite 1991.
<ul style="list-style-type: none"> • Grouping together of incompatible land uses 	<ul style="list-style-type: none"> • Adverse, social, economic or ecological, duration may be temporary, permanent or a mix of both. 	<ul style="list-style-type: none"> • Upton 1995 • McAlley and McQuoid 1982 • American Society Of Planning Officials 1976.
<ul style="list-style-type: none"> • Increasing diversity of land use mix. 	<ul style="list-style-type: none"> • Positive or adverse, ecological, or economic, or social, may be cumulative 	<ul style="list-style-type: none"> • Abbey 1993 • Haughton and Hunter 1994
<ul style="list-style-type: none"> • Migration of the population 	<ul style="list-style-type: none"> • May be positive or adverse, social and economic, tends to be cumulative or permanent. 	<ul style="list-style-type: none"> • McAlley and McQuoid 1982.

INFRASTRUCTURAL

<ul style="list-style-type: none"> • Increased traffic congestion 	<ul style="list-style-type: none"> • Adverse, Infrastructural, cumulative 	<ul style="list-style-type: none"> • Western Bay of Plenty District Council 1992 • Elkin et al 1991 • Palmerston North City Council 1995.
--	--	--

<ul style="list-style-type: none"> • Increased demand on infrastructural services 	<ul style="list-style-type: none"> • Adverse or positive (depends on the use of facilities - positive if demand makes more efficient use, negative if demand exceeds system capacity), infrastructural, cumulative. 	<ul style="list-style-type: none"> • Western Bay of Plenty District Council 1992 • Upton 1995 • Rotorua District Council 1993 • Elkin et al 1991 • McAlley and McQuoid 1982 • Palmerston North City Council 1995 • Wolff 1975 • Collie 1990.
<ul style="list-style-type: none"> • Expenses incurred by local government funding of capital/infrastructural works 	<ul style="list-style-type: none"> • Adverse, infrastructural and economic, may be cumulative, or temporary. 	<ul style="list-style-type: none"> • American Society Of Planning Officials 1976 • Collie 1990.
<ul style="list-style-type: none"> • Increased or altered water run off 	<ul style="list-style-type: none"> • Adverse, cumulative, ecological and infrastructural 	<ul style="list-style-type: none"> • Elkin et al 1991 • Palmerston North City Council 1995 • American Society Of Planning Officials 1976 • Melville 1991.

APPENDIX B

Planning Balance Sheet of the Benefits and Costs of Urban Consolidation in Melbourne

<u>A PRODUCERS/ OPERATORS</u>	<u>HOUSEHOLDS A (8000)</u>
<u>MELBOURNE CITY COUNCIL</u>	
<ul style="list-style-type: none"> Increased rates revenue 	B++
<ul style="list-style-type: none"> Foregone revenue through support or urban consolidation initiatives 	C-
<ul style="list-style-type: none"> Increase in expenditure for services to larger population 	C-
<ul style="list-style-type: none"> Support for under-utilised social and community facilities 	B++
<ul style="list-style-type: none"> Delays and costs associated with reactions from locals 	C-
<u>MMBW</u>	
<ul style="list-style-type: none"> Capital cost savings though use of excess capacity - water supply, sewerage and drainage networks 	\$12,269 B
<ul style="list-style-type: none"> Increased Maintenance costs 	
Electricity Authority	
<ul style="list-style-type: none"> Savings through lower capital costs in network expansion 	\$650 B
Telecom	
<ul style="list-style-type: none"> Capital cost savings 	\$1,345 B
Road Construction Authority	
<ul style="list-style-type: none"> Capital cost savings in provision of arterial roads in fringe areas 	\$1,786 B
<ul style="list-style-type: none"> Cost savings for urban freeways will be needed anyway 	B+
Other Road Providers (Developers)	
<ul style="list-style-type: none"> Capital cost and maintenance savings on local subdivision roads 	\$13,513 B
Metropolitan Transit Authority	
<ul style="list-style-type: none"> Reduced operating deficits - higher demand, more concentrated population 	B+
<ul style="list-style-type: none"> Possible need for additional capital investment to serve inner areas (as a result of a higher modal split) 	C-

Ministry of Housing

- Relative reductions in cost of spot purchases in inner areas and increased opportunity for joint ventures to develop new housing B++
- Able to offer clients housing with improved access to jobs, services B++
- Increased availability of private rental housing B++

Ministry of Education

- Reduced capital cost through utilisation of excess capacity in MCC area Schools \$13,914
- Reduces need for school closures, and decreased per capita costs of provision B++
- Increase in upgrading and maintenance costs for inner area schools C-

Department of Health

- Postponed need to build new hospitals in fringe areas B+
- Increased maintenance, renovation and modernisation costs C-
- Allowance for inner city hospitals

Community Services Victoria

- Reduced establishment capital costs and reduced maintenance overall \$4,820
- Economies of scale and operation cost savings per client place B+

Local Business (Shops, etc.)

- Increased trade, sales, profit through enlarged catchment area population. B++

SUB-TOTAL PRODUCERS

\$48,297

CONSUMER GROUPS

Residents (Existing)

- Increased traffic and parking in local streets , increased noise C-
- Reduction per household in access to public open space and other leisure facilities (increased possible) N
- Increased viability of local schools and other facilities, including commercial services B++
- Decreased rate burden on existing households to support Council services B++
- Possible reduction in property values (increased supply reduces scarcity) C-
- Negative externalities from new development (loss of privacy, loss of amenity, social disruption) C-
- Existing private tenants may have more opportunity to achieve home ownership in the area B+

Residents (New)	
• More mature and attractive physical environment compared with fringe	B+
• Increased access to a wider range of social, sporting and leisure facilities	B+
Travellers (Private Transport)	
• Reduced journey to work and other travel time, reduced travel costs	\$95,148
Travellers (Public Transport)	
• Increased service level due to additional population	B+
Owners of Private Rental Housing	
• Possible slow down in capital gains and stabilisation of rentals	C-
• Investment in property made more affordable	B+
<hr/> SUB-TOTAL CONSUMERS <hr/>	
	\$95,148
<hr/>	
TOTAL NET BENEFITS	\$143,445
<hr/>	

Note: A dollar figure is taken to be the nett benefit or cost.

For Intangible Costs and Benefits the following scale is used.

“B” means there is perceived to be a benefit

“B+” There is perceived to be a significant benefit

“B++” There is perceived to be a very significant benefit

C means there is perceived to a cost

C- There is perceived to be a significant cost

APPENDIX C

Runoff Coefficients For Differing Types of Surfaces

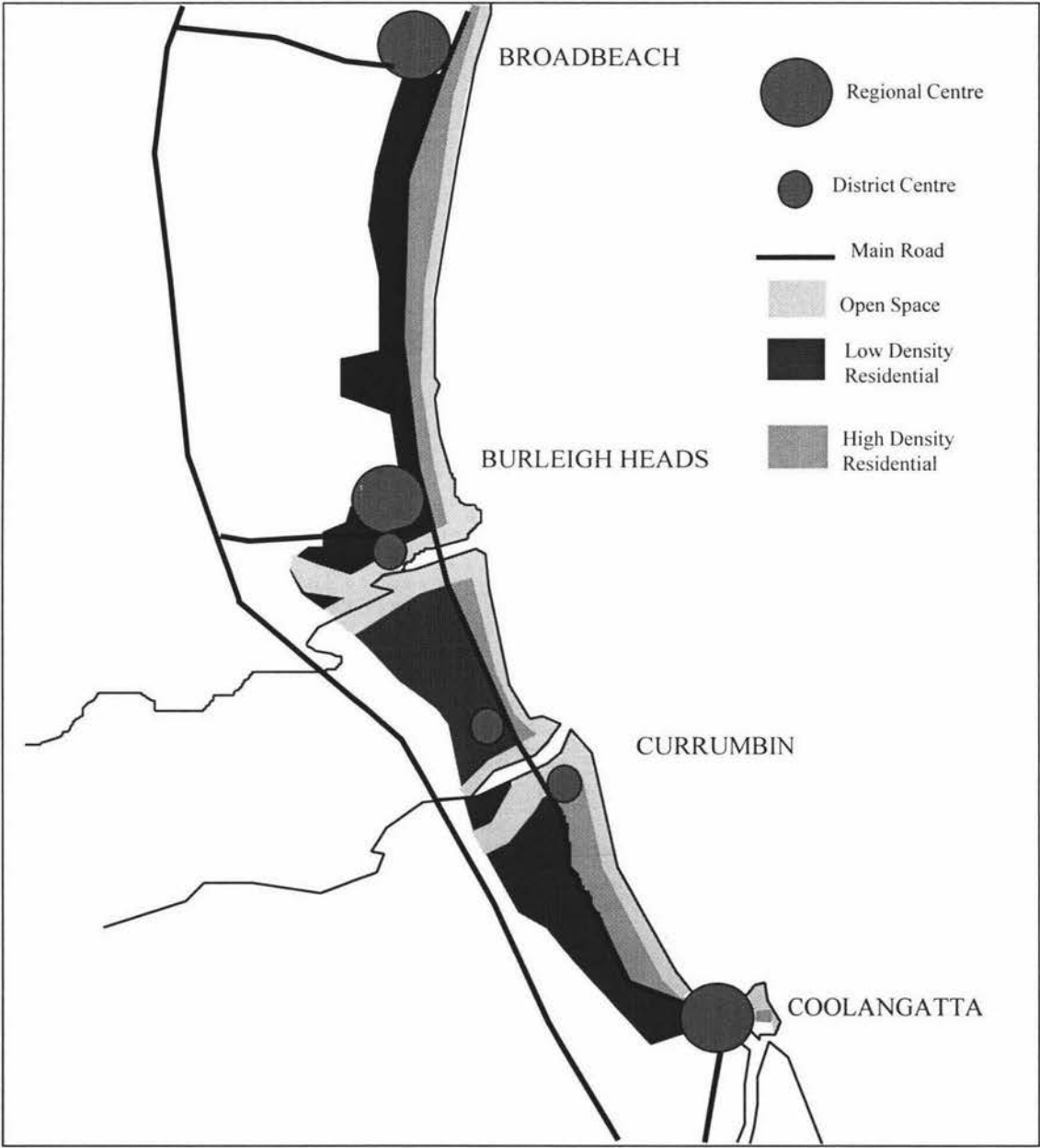
Description of Surface	Coefficient
NATURAL SURFACE TYPES	
Bare impermeable clay with no interception channels or runoff control	0.70
Bare uncultivated soil of medium soakage	0.60
Heavy clay soil types:	
• Pasture and grass cover	0.40
• Bush and scrub cover	0.35
• Cultivated	0.30
Medium soakage soil types:	
• Pasture and grass cover	0.30
• Bush and scrub cover	0.25
• cultivated	0.20
High soakage gravel, sandy and volcanic soil types	
• Pasture and grass cover	0.20
• Bush and scrub cover	0.15
• Cultivated	0.10
Parks, Playgrounds and Reserves	
• Mainly grassed	0.30
• Predominantly Bush	0.25
Gardens, lawns, etc.	0.25
DEVELOPED SURFACE TYPES	
Steel and non-absorbent roof surfaces	0.90
Asphalt and concrete paved surfaces	0.85
Near flat and slightly absorbent roof surfaces	0.80
Stone, brick and pre-cast concrete paving:	
• With sealed joints	0.80
• With open joints	0.60
Unsealed roads	0.50
Railway and unsealed yards and similar surfaces	0.35

LAND -USE TYPES	
Fully roofed and/or sealed developments	0.90
Industrial, commercial, shopping areas and townhouse developments	0.65
Residential areas in which impervious area exceeds 35% of gross area (this includes most modern subdivisions)	0.45

Source: Building Industry Authority 1992.

APPENDIX D

EXAMPLE OF A STRUCTURE PLAN - GOLD COAST CITY,
AUSTRALIA



Source: Gold Coast City Council, 1990

APPENDIX E

MAJOR CLASSES OF WATER POLLUTION

CLASS OF POLLUTANT	MAJOR SOURCES	EFFECTS
Organic Wastes	Human domestic sewage; animal and plant wastes; industrial wastes (e.g. pulp and paper wastes, waste from food processing plants and refineries)	Main effects associated with depletion of dissolved oxygen in the water by excessive growth of oxygen consuming bacterial populations. Death of fish and other higher aquatic organisms; destruction of plant life; poisoning of livestock; water may develop a foul smell.
Pathogenic Micro-organisms	Human sewage and animal wastes	Outbreaks of water-borne diseases such as hepatitis, poliomyelitis, typhoid, dysentery and cholera; infected livestock.
Heat	Cooling water from industrial and power generating installations.	Decreasing solubility of oxygen in water; can kill some fish; increases susceptibility of some aquatic organisms to parasites, disease and chemical toxins; disrupts and changes composition of aquatic ecosystems.
Inorganic Chemicals and minerals		
Plant Nutrients (nitrates, Phosphates and Ammonia)	Agricultural run off; sewage and animal wastes; mining; food processing industries; fertiliser plants; phosphates in detergents	May cause an excessive enrichment of water (accelerated eutrophication) leading to algal blooms (which can produce toxins) and a reduction in dissolved oxygen levels. Fish kills and disruption of aquatic ecosystems. High nitrate concentrations in drinking water can be dangerous to infants and have been linked to stomach cancer.
Metals	Vehicle exhausts; some pesticides; mining; smelting; large range of industrial activities	Can be very persistent in the environment and accumulate in the tissues of organisms along food chains(bio-accumulative) toxic to many organisms including humans.

Acids and Alkalis	Wide range of industrial activities; mine drainage, acid deposition	Toxic to many organisms; disruption of aquatic ecosystems; acids may increase the solubility of some potentially harmful minerals.
Salts	Industrial wastes, mining, urban stormwater runoff	Can kill freshwater organisms; can make water unfit for human consumption, irrigation and many industrial uses.
Sediments	Agricultural run off; urban stormwater run off; dredging activity; mining; forestry; construction activities	Disrupts aquatic ecosystems; reduces shellfish and fish populations; reduces ability of water to assimilate oxygen demanding wastes; fills in water bodies.
Organic Chemicals	This grouping includes a wide range of chemical substances with varying effects. Sub-groupings in this class could include oil, detergents, petrochemicals (e.g plastics and plastic intermediates and by-products); chlorine compounds and industrial bleaching agents; pesticides and herbicides; solvent; phenols, etc.	

Source: Haughton and Hunter, 1994

APPENDIX F

MAJOR POTENTIAL HEALTH AND ECOLOGICAL EFFECTS OF “TRADITIONAL” AIR POLLUTANTS

POLLUTANT	EFFECTS ON HUMAN HEALTH	EFFECTS ON THE NATURAL ENVIRONMENT
Carbon Monoxide	Can affect the cardiovascular system, exacerbating cardiovascular disease symptoms, particularly angina; may also particularly affect foetuses, sickle cell anaemics and young children. Can affect the central nervous system, impairing physical co-ordination, vision and judgement, creating nausea and headaches, reducing worker productivity and increasing personal discomfort.	
Nitrogen Oxides	Nitrogen dioxide can affect the respiratory system. Nitrogen monoxide and nitrogen dioxide, where they play a part in photochemical smog formation, may contribute indirectly to increased susceptibility to infections, pulmonary disease, impairment of lung function and eye, nose and throat irritations.	Nitrogen monoxide and nitrogen dioxide can add significantly to acid deposition, damaging aquatic ecosystems and possibly other ecosystems such as forests; nitrogen oxide can also have a fertilising effect on forests.
Sulphur Oxides	Sulphur dioxide can affect lung function.	Sulphur dioxides and other sulphur oxides can contribute significantly to acid deposition causing impairment of aquatic and possibly other ecosystems.
Particulate Matter	Fine particulate matter may be toxic in itself or may carry toxic (including carcinogenic) trace substances, and can alter the immune system. Fine particulates can penetrate deep into the respiratory system irritating lung tissue and causing long term disorders).	High dust and soot levels are associated with a general perception of dustiness in the environment. Fine particulates can significantly reduce visibility.

APPENDIX G

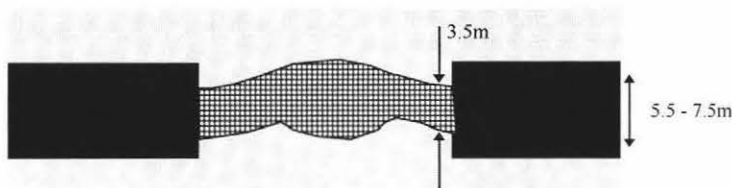
DEFINITIONS OF HIGH CLASS LAND - PROPERTIES

ATTRIBUTE	MINIMUM REQUIREMENT
TOPOGRAPHIC FEATURES	
Slope	Less than or equal to 11 degrees
CLIMATIC PROPERTIES	
Annual rainfall	Less than or equal to 1800mm per year
Temperature	Greater than 9°C
SOIL PROPERTIES	
Texture	Sand and loamy excluded
Topsoil gravel content	<15% by volume
Rock outcrops	<10% area
Natural drainage	not poor (or is readily 'drainable')
Potential rooting depth	>45cm
Depth to slow permeability	>45cm
Macropores	>7.5% (over depth of 0-45cm)
Profile available water	>60mm
Profile readily available water	>50mm
pH minimum	<7.5 and >4.8 (over depth of 0-45 cm)

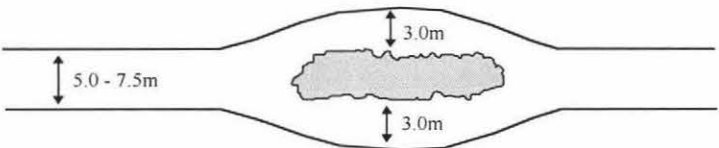
Source: Webb, Jessen, McLeod and Wilde (1995)

APPENDIX H

TRAFFIC CALMING MEASURES



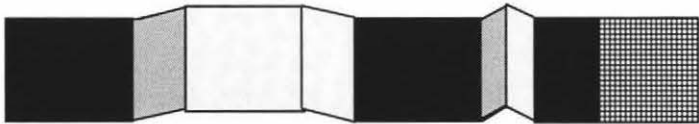
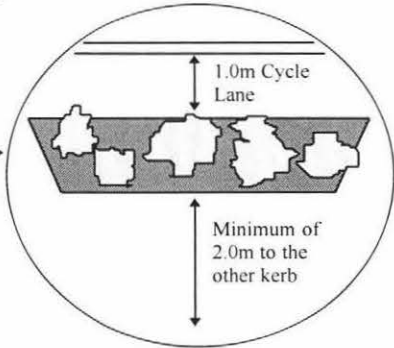
Local street width restriction - may include a passing bay if the visibility through the link is restricted.



Localised control on a straight street - use of traffic islands

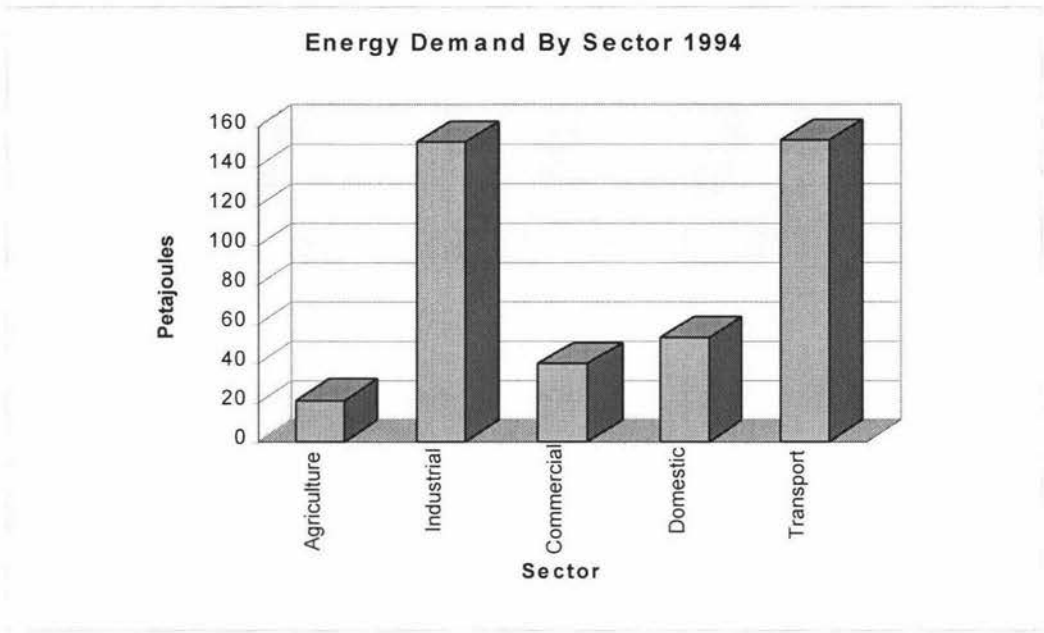


Kerbed protuberances reduce the width of carriageway available to moving vehicles. Note space allocated to cycleways.



Use of speed humps, "judder bars" or changes in road surface (such as paving) to slow traffic and indicate a pedestrian environment

APPENDIX I
SELECTED STATISTICS FOR NEW ZEALAND

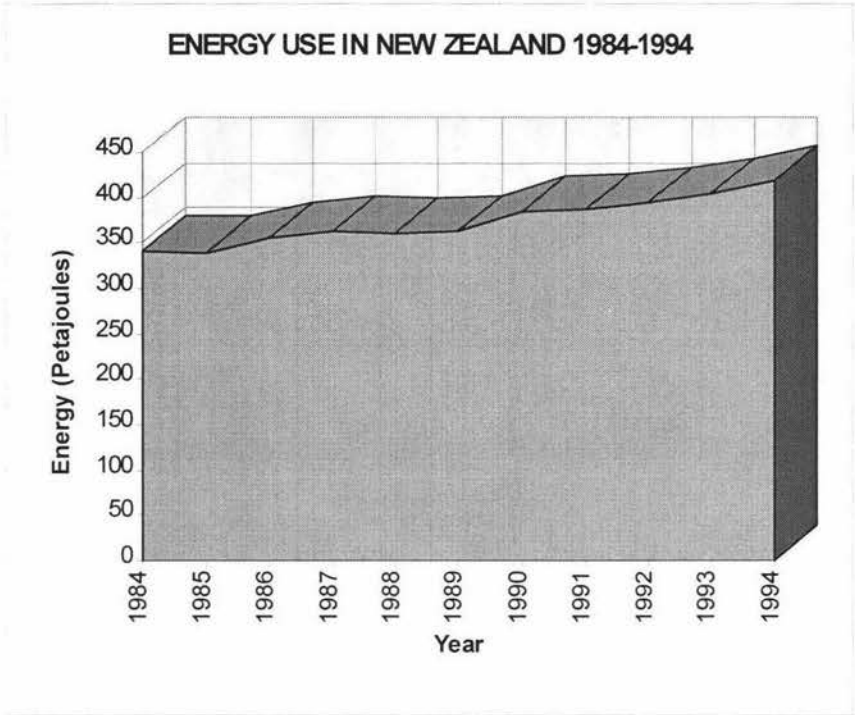


Source: Statistics New Zealand, 1996

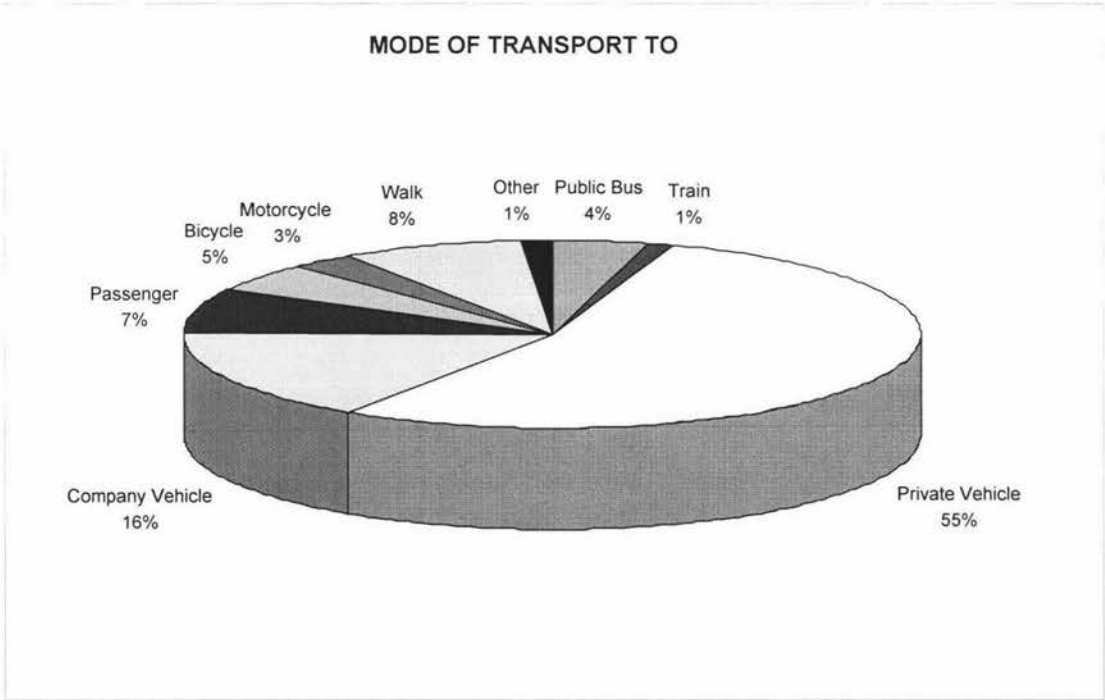
NEW ZEALAND ENERGY USE BY SECTOR (Petajoules)

Demand Sector	Solid Fuel	Gas	Geothermal	Electricity	Oil	TOTAL
Agriculture	0.7	-	-	3.9	16.2	20.8
Industry	57.0	29.5	10.4	45.1	10.2	152.2
Commerce	6.3	5.4	-	20.2	7.5	39.4
Domestic	7.6	4.4	2.6	37.2	0.8	52.6
Transport	0.1	1.8	-	0.2	150.9	153.0

Source: Statistics New Zealand, 1996



Source: Statistics New Zealand, 1996



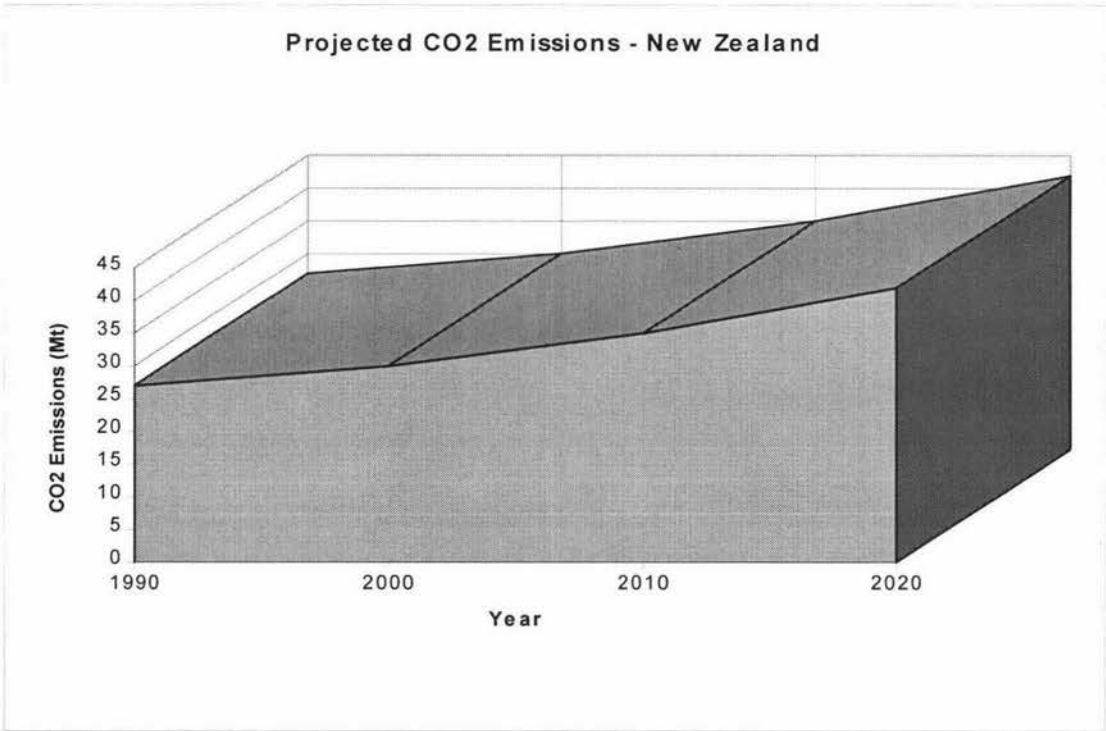
Source: Statistics New Zealand, 1996

LAND-USE CHANGES 1970 - 1988

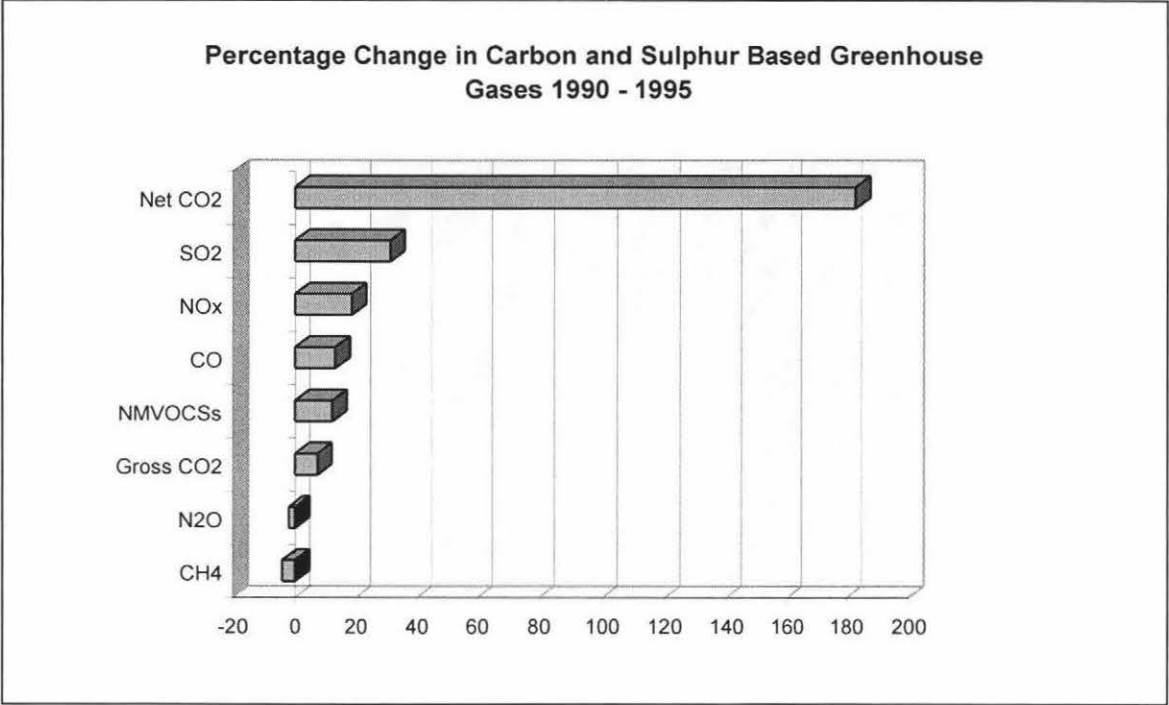
LAND USE	Land Area (NZ)	Area of Land Use	% of Total Area	Change 1970 - 88
Arable Land	268,000 Km ²	5,000 km ²	2%	-12.3%
Wooded Areas	268,000 Km ²	73,000 km ²	27%	+1.3%

Source: OECD, 1991

PROJECTED CARBON DIOXIDE EMISSIONS FOR NEW ZEALAND 1990 - 2020



Source: ABARE, 1995



Source : Taylor and Smith 1997

APPENDIX J

OBLIGATIONS FOR SIGNATORIES TO THE UNITED NATIONS

CONVENTION ON BIOLOGICAL DIVERSITY, 1992

(Ratified by New Zealand 16 September, 1993)

General Measures for Conservation and Sustainable Use

National strategies, plans, or programmes for the conservation and sustainable use biological diversity are to be developed reflecting as far as possible the provision of this convention.

These strategies, plans or programmes shall as far as possible be integrated into the relevant cross-sectoral plans to meet the objective of this convention.

Identification and Monitoring

Components of biological diversity important for its conservation and sustainable use are to be identified, and monitored as far as possible and as appropriate (through sampling and other techniques), paying particular attention to those components requiring urgent conservation measures and those which offer the greatest potential for sustainable use such as:

1. Ecosystems and habitats: containing high diversity, large numbers of endemic or threatened species, or wilderness; required by migratory species; of social, economic, cultural or scientific importance; or which are representative, unique or associated with key evolutionary or other biological processes;
2. Species and communities which are; threatened; wild relatives of domesticated or cultivated species; of medicinal, agricultural or other economic value; or social, scientific or cultural importance; or importance for research into the conservation and sustainable use of biological diversity, such as indicator species; and
3. Described genomes and genes of social, scientific or economic importance.

Any processes or activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity are also to be identified and monitored. Where a significant adverse effect has been determined, the activity or process is to be regulated or managed.

Information gathered from the identification and monitoring of biological diversity or activities is to be maintained and organised.

In-situ Conservation

In-situ conservation means “the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties”.

A programme of in-situ conservation of biological diversity shall be instituted, as far as possible and as appropriate, by:

- establishing a system of protected areas where special measures are taken to conserve biological diversity;
- developing guidelines for the selection, establishment and management of protected areas;
- managing biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;
- promoting the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;
- promoting environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering the protection of these areas;

- rehabilitating and restoring degraded ecosystems and promoting the recovery of threatened species;
- establishing or maintaining means to control the risks associated with the release of living bio-technically modified organisms;
- preventing the introduction of, controlling or eradicating alien species which threaten ecosystems, habitats or species;
- providing the conditions needed for compatibility between present uses and the conservation of biological diversity and the sustainable use of its components;
- respecting, preserving or maintaining the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promoting their wider application (with the approval and involvement of the holders of such knowledge, innovations and practices) and encouraging the equitable sharing of the benefits arising from the utilisation of such knowledge, innovations and practices;
- developing or maintaining necessary legislation and/or other regulatory provisions for the protection of threatened species or populations.

Ex- Situ Conservation

Ex-situ conservation means the conservation of components of biological diversity outside their natural habitats.

A programme of sustainable use of components is to be instituted as far as possible and as appropriate, by:

- adopting measures for the ex-situ conservation of components of biological diversity, preferable in the country of origin of such components;
- establishing and maintaining facilities for ex-situ conservation of and research on plants, animals and micro-organisms, preferably in the country of origin of those genetic resources.

- adopting measures for the recovery and rehabilitation of threatened species and for reintroduction into their natural habitats;

Sustainable Use of Components of Biological Diversity

A programme of sustainable use of components of biological diversity is to be instituted, as far as possible and as appropriate by;

- integrating consideration of the conservation and sustainable use of biological resources into national decision-making;
- adopting measures relating to the use of biological resources to avoid or minimise adverse impacts on biological diversity;
- protecting and encouraging customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements;
- supporting local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced;
- encouraging co-operation between governmental authorities and the private sector in developing methods for sustainable use of biological resources.

Incentive Measures

Economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity are to be adopted as far possible and as appropriate.

Impact Assessment and Minimising Adverse Effects

Environmental impact assessment (incorporating public participation) of proposed projects that are likely to have significant adverse effects on biological diversity are to be established with a view to avoiding or minimising such effects.

Account is to be taken of the environmental consequences of government programmes and policies that are likely to have adverse impacts on biological diversity.

National agreements are to be promoted for making emergency responses to activities or events which present grave or imminent danger or damage to biological diversity.

Research and Training

Programmes for scientific and technical education, research, and training in measures for the identification, conservation and sustainable use of biological diversity and its components are to be established.

Public Education and Awareness

Public understanding of the importance of, and measures required for, the conservation of biological diversity is to be promoted and encouraged.

From: Hewison, 1994

APPENDIX K

OBLIGATIONS FOR SIGNATORIES TO THE UNITED NATIONS

FRAMEWORK ON CLIMATE CHANGE, 1992

(Ratified by New Zealand 16 September, 1993)

Commitments

National inventories of anthropogenic emissions by sources and removal by sinks of all greenhouse gases should be developed and published.

National programmes are to be established with measures to mitigate climate change by addressing anthropogenic emissions by sources and removal by sinks of all greenhouse gases, and measures to facilitate adequate adaptation to climate change.

The Parties shall promote and co-operate in the development and transfer of technologies and practices that control, reduce or prevent anthropogenic emissions on all relevant sectors, including energy, transport, industry, agriculture, forestry and waste management.

Sustainable management of resources is to be promoted, as is the conservation and enhancement of sinks and reservoirs of all greenhouse gases including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems.

The Parties shall co-operate in preparing for adaptation to the impacts of climate change. Integrated plans shall be developed for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas affected by drought and desertification, as well as floods.

Climate change considerations are to be taken into account in social, economic and environmental policies and actions.

Appropriate methods (for example, impact assessment) shall be employed to minimise adverse effects on the economy, on public health and on the quality of the environment of projects or measures undertaken to mitigate or adapt to climate change.

Education, training, and public awareness shall be promoted, and in particular educational and public awareness programmes. Public access to information, public participation, and the training of scientific, technical and managerial personnel on climate change and its effects is to be encouraged.

Parties shall encourage the widest participation in this process, including the participation of non-governmental organisations.

From: Hewison, 1994

APPENDIX L

COST SAVINGS OF CYCLE USE OVER CAR USE

(From Parker 1995)

<u>SOCIAL COSTS OF THE AVERAGE URBAN CAR (per km Travelled)</u>		<u>SOCIAL SAVINGS OF BICYCLE TRIPS REPLACING DRIVER ONLY CAR TRIPS (per km Travelled)</u>	
<i>Social = Hidden + Running Costs</i>			
Casualty Accidents	6.2c	Car External Costs	25.9c
Property Accidents	7.8c	Car Running Costs	47.5c
Arterial Road Noise	0.3c	Total Social Cost	73.4c
Pollution, Cancer / Health Effects	0.5c	Bicycle Depreciation	5.2c
Time Lost due to Congestion	10.0c	Bicycle repairs, etc.	8.6c
Carbon Dioxide Emissions	1.1c	Health Benefits Less Costs	0.0c
Total Hidden (External) Cost	25.9c	Bicycle Total Cost	13.8c
Depreciation, Interest, Insurance and License Costs	34.28	SOCIAL COSTS SAVINGS	59.6c
Operational Costs (Tyres, Repairs, Servicing)	6.02c		
Petrol and Oil	7.20c		
Total Running Costs	47.5c		
TOTAL SOCIAL COST	73.4c		

Assumptions:

- Pricing is based on Victorian (Australia) data and prices are in 1994 Australian currency.
- Data for car are based on a 2000cc Toyota Camry car travelling 15,000 km over the course of a year for five years.
- Carbon Dioxide was priced at \$30 per tonne which the author notes is a low-side estimate.
- Bicycle figures assume the equivalent of 1,500 km are travelled each year and assumes the use of the bicycle enables a car to be dispensed with in a multi-car household.

APPENDIX M

LISTING OF PROPOSED DISTRICT PLANS BY LOCAL AUTHORITY

(NAME, NATURE, POPULATION)

Name of Council	Population	Nature (Rural / Urban)	Status of Plan
Dunedin City	118,143	Mixed	Proposed
Hastings District	66,280	Mixed	Draft
Hutt City	95,872	Mixed	Proposed
Invercargill City	53,209	Mixed	Unknown
Manukau City	254,278	Mixed	Proposed
Napier City	53,462	Mixed	Proposed
Nelson City	40,240	Mixed	Proposed
New Plymouth District	68,111	Mixed	Draft
Palmerston North City	73,095	Mixed	Proposed
Papakura District	39,627	Mixed	Proposed
Porirua City	46,626	Mixed	Proposed
Upper Hutt City	36,716	Mixed	Unknown
Waitakere City	155,565	Mixed	Proposed
Wanganui District	45,042	Mixed	Proposed
Ashburton District	25,177	Predominantly Rural	Proposed
Banks Peninsula District	7,581	Predominantly Rural	Proposed
Buller District	10,513	Predominantly Rural	Proposed
Carterton District	6,812	Predominantly Rural	Proposed
Central Hawkes Bay	13,037	Predominantly Rural	Proposed
Central Otago	14,954	Predominantly Rural	Unknown
Chatham Islands District	730	Predominantly Rural	Unknown
Clutha District	18,006	Predominantly Rural	Proposed
Far North District	53,935	Predominantly Rural	Proposed
Franklin District	47,826	Predominantly Rural	Proposed
Gisborne District	45,780	Predominantly Rural	Draft
Gore District	13,279	Predominantly Rural	Proposed
Grey District	13,700	Predominantly Rural	Proposed
Hauraki District	17,320	Predominantly Rural	Operative
Horowhenua	30,148	Predominantly Rural	Proposed
Hurunui District	9,403	Predominantly Rural	Proposed
Kaikoura District	3,516	Predominantly Rural	Proposed
Kaipara District	17,369	Predominantly Rural	Proposed
Kapiti District	38,584	Predominantly Rural	Proposed
MacKenzie District	4,077	Predominantly Rural	Proposed
Manawatu District	28,078	Predominantly Rural	Draft

Marlborough District	38,397	Predominantly Rural	Unknown
Masterton District	22,756	Predominantly Rural	Operative
Matamata-Piako District	29,663	Predominantly Rural	Proposed
Opotiki District	9,375	Predominantly Rural	Draft
Otorohanga District	9,662	Predominantly Rural	Proposed
Queenstown Lakes District	14,285	Predominantly Rural	Proposed
Rangitikei District	16,356	Predominantly Rural	Proposed
Rodney District	66,485	Predominantly Rural	Unknown
Rotorua District	64,509	Predominantly Rural	Proposed
Ruaapehu District	16,742	Predominantly Rural	Proposed
Selwyn District	24,783	Predominantly Rural	Withdrawn
South Taranaki District	29,135	Predominantly Rural	Proposed
South Waikato District	25,010	Predominantly Rural	Proposed
South Wairarapa District	8,938	Predominantly Rural	Proposed
Southland District	30,562	Predominantly Rural	Proposed
Stratford District	9,544	Predominantly Rural	Proposed
Tararua District	19,068	Predominantly Rural	Proposed
Tasman District	37,973	Predominantly Rural	Unknown
Taupo District	30,691	Predominantly Rural	Draft
Thames Coromandel District	24,820	Predominantly Rural	Proposed
Timaru District	42,631	Predominantly Rural	Proposed
Waikato District	39,139	Predominantly Rural	Proposed
Waimakariri District	32,347	Predominantly Rural	Draft
Waimate District	7,619	Predominantly Rural	Proposed
Waipa District	38,853	Predominantly Rural	Proposed
Wairoa District	9,900	Predominantly Rural	Unknown
Waitaki District	21,573	Predominantly Rural	Proposed
Waitomo District	9,731	Predominantly Rural	Unknown
Western Bay of Plenty District	34,971	Predominantly Rural	Proposed
Westland District	8,280	Predominantly Rural	Proposed
Whakatane District	33,125	Predominantly Rural	Proposed
Whangarei District.	66,748	Predominantly Rural	Draft
Auckland City	354,768	Predominantly Urban	Proposed
Christchurch City	309,028	Predominantly Urban	Proposed
Hamilton City	108,428	Predominantly Urban	Unknown
Kawerau District	7,829	Predominantly Urban	Proposed
North Shore City	172,164	Predominantly Urban	Proposed
Tauranga District	77,775	Predominantly Urban	Proposed
Wellington City	157,646	Predominantly Urban	Proposed

KEY

Draft: A draft District Plan is being prepared or, a non-statutory Draft District Plan has been prepared but the Proposed Plan as not been notified yet.

Operative: The District Plan has been through hearings and all appeals have been resolved

Proposed: The District Plan has been notified, is open for submission, open for further submissions, submissions on the Plan are being heard, or decisions have been released on the Plan and Appeals are being dealt with.

Unknown: Status of the District Plan is unknown, or does not fit into any of the above categories.

APPENDIX N

RECORDING SHEETS FOR PROPOSED DISTRICT PLANS

MASTERTON DISTRICT COUNCIL PROPOSED DISTRICT PLAN 1995

Masterton District is a largely rural district of 23,000 people in the southern half of the North Island. The population growth and associated residential development rates are relatively slow. The principal urban areas are Masterton and Castlepoint, the latter being a coastal settlement on the erosion-prone Wairarapa Coast.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan? <i>Register of Sites</i> <i>Identification on maps</i>	Yes	NO ¹ <i>Proposed</i> <i>Proposed</i>	<i>Policy 11.1</i> <i>Policy 13.1</i> -
	(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation? <i>Conservation Zone</i> <i>Reserves</i> <i>Recognised as "Special Policy Areas"</i> <i>Protection through General Rules</i>	Yes	YES - - - -	<i>Appendix F1</i> <i>Policy 11.2</i>
2	Policies and rules which restrict the amount of vegetation that can be cleared. <i>Hazard areas</i> <i>In reserves</i> <i>Adjacent to reserves / riparian margins</i>	Yes.	NO <i>Yes</i> - -	<i>6.2</i> - -
3	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	NO	-
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	<i>5.1</i>
5	Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules. <i>Use esplanade reserves, strips, margins</i> <i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i> <i>Criteria for lots greater than 4ha</i> <i>Required on all water margins</i> <i>Special criteria where lots adjoin sensitive areas</i>	20m + formula for slope and vegetation	20 metres but can vary <i>Yes</i> <i>Yes</i> <i>Yes</i> - <i>Yes</i>	<i>5.1.1(b)</i> <i>Policy 9.2²</i> <i>5.2.1</i> <i>5.1.1</i> - <i>5.1.1(a)³</i>
6	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	NO	

¹ Still awaiting funding in Annual Plan as at end of 1997 (Dahlberg *pers. Comm.*).

² Related to public access

³ Schedule of significant waterbodies to be protected by esplanade reserves.

7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	NO ⁴	
8	<p>(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?</p> <p style="text-align: right;"><i>Maximum height limits</i></p> <p style="text-align: right;"><i>Overshadowing / daylighting Rules (such as angles)</i></p> <p style="text-align: right;"><i>Yards</i></p> <p>(b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.</p>	<p>Yes</p> <p>Yes</p>	<p>YES</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>NO</p>	<p>7.4.3</p> <p>7.3.1</p> <p>7.4.4</p>
9	<p>Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.</p> <p style="text-align: right;"><i>Permitted Activities in zones only</i></p> <p style="text-align: right;"><i>Rules requiring establishment of cycleways and pedestrian paths</i></p> <p style="text-align: right;"><i>Methods outside Plan</i></p>	<p>Yes</p>	<p>NO</p> <p>Yes</p> <p>-</p> <p>-</p>	<p>2.2.2</p> <p>-</p> <p>-</p>
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	<p>The Policies and rules directed and promoting urban consolidation.</p> <p style="text-align: right;"><i>Related to the utilisation of infrastructure</i></p> <p style="text-align: right;"><i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i></p> <p style="text-align: right;"><i>Related to energy efficiency / pollution abatement</i></p>	<p>Yes</p>	<p>YES</p> <p>Yes</p> <p>Yes</p> <p>-</p>	<p>Policy 6.4</p> <p>Policy 1.2</p> <p>-</p>
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	NO	-
13	<p>(a) The Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or</p> <p>(b) The Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.</p>	<p>Yes, 0 - 400 metres</p> <p>Yes, 0 - 400 metres</p>	<p>NO</p> <p>NO</p>	<p>-</p> <p>-</p>
14	<p>(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.</p> <p style="text-align: right;"><i>Development prohibited in these areas</i></p> <p style="text-align: right;"><i>Development Dependent on consent of Council (Council able to decline applications)</i></p> <p style="text-align: right;"><i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i></p>	<p>Yes</p>	<p>YES</p> <p>No</p> <p>Yes</p> <p>No</p>	<p>-</p> <p>6.2</p> <p>6.2.2</p> <p>-</p>

⁴ Policy 5.4 promotes energy conservation through siting and operation of buildings and activities but is not specific and is not backed up through rules.

	(b)Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes	YES	-
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	YES ⁵	6.2.2
16	<p>Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.</p> <p><i>Rural Zones with rules which restrict the amount of residential development</i></p> <p><i>Rules or Policies which guide new development on to land with less productive potential</i></p>	Yes	<p>Yes</p> <p>Yes</p> <p>Yes</p>	<p>Part C Section 1</p> <p>Policy 1.2</p> <p>Policy 1.4</p> <p>Policy 1.6</p>
17	The Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	NO ⁶	Rule 1.1.1
18	<p>The Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental the health and wellbeing of residents.</p> <p><i>Special Zones for heavy industry and offensive trades which exclude residential use</i></p> <p><i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i></p>	Yes	<p>Yes</p> <p>Yes</p> <p>No</p>	<p>1.5 Industrial Areas</p> <p>-</p>
19	<p>(a)Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i></p> <p><i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b)Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	<p>Yes</p> <p>Yes.</p>	<p>YES</p> <p>No</p> <p>Yes</p> <p>YES</p>	<p>-</p> <p>1.3.1</p> <p>Policy 17.3</p> <p>Policy 17.4</p>
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	Policy 18.3 4.2.3
21	Minimum lot size in high density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	NONE	-
22	Minimum lot size for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	Min. 300 Av. 350	4.2.4

⁵ On sites identified in Appendix F2 (Hazards).

⁶ Rules are however present which limit the amount of building coverage on side yards.

23	Number of car parks required per residential unit in medium and high-density residential areas.	0 - 1	1	2.3.1(e)
24	<p>Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.</p> <p><i>Based on efficient utilisation of infrastructure</i></p>	Yes	<p>YES</p> <p><i>Yes</i></p>	<p>Policy 6.3</p> <p>Policy 6.4</p>
25	<p>Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.</p> <p><i>Defined mixed-use zones</i></p> <p><i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i></p> <p><i>Some residential development allowed In commercially zoned areas</i></p>	Yes	<p>NO</p> <p><i>No</i></p> <p><i>No</i></p> <p><i>Yes</i></p>	<p>-</p> <p>-</p> <p><i>C1.4.1</i></p>
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	<p>(a) The Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac.</p> <p>(b) Maximum number restriction(threshold).</p>	<p>Yes</p> <p>20</p>	<p>NO</p> <p>-</p>	<p>-</p> <p>-</p>
29	Maximum height of residential buildings	9-12m	10m	7.4.3

WESTERN BAY OF PLENTY DISTRICT COUNCIL PROPOSED DISTRICT PLAN 1995

Western Bay of Plenty is a predominantly rural district with a population of nearly 35,000. The District surrounds (but does not include) the fast-growing urban area of Tauranga and shares a similar fast rate of growth. While the Council office is based in Tauranga, the main urban areas for the District comprise of the towns of Te Puke and Katikati. Largely un-serviced residential settlements also exist at Omokoroa, Waihi Beach and Te Puna. The District contains a number of rivers and has a substantial area of coast (including much of Tauranga Harbour).

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	<p>(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?</p> <p style="text-align: right;"><i>Register of Sites</i> <i>Identification on maps</i></p> <p>(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?</p> <p style="text-align: right;"><i>Conservation Zone</i> <i>Reserves</i> <i>Recognised as "Special Policy Areas"</i> <i>Protection through General Rules</i></p>	<p>Yes</p> <p>Yes</p>	<p>YES <i>Yes</i> <i>Yes</i></p> <p>YES - <i>Yes</i> <i>Yes</i> <i>Yes</i></p>	<p><i>Appendix I & II</i> <i>See Maps</i></p> <p><i>10.2.2</i> <i>Chapter 9</i> <i>15.3.5.2</i></p>
2	<p>Policies and rules which restrict the amount of vegetation that can be cleared.</p> <p style="text-align: right;"><i>Hazard areas</i> <i>In reserves</i></p> <p style="text-align: right;"><i>Adjacent to reserves / riparian margins</i></p>	<p>Yes.</p>	<p>YES <i>Yes</i> <i>Yes</i> <i>Yes</i></p>	<p><i>12.3.1</i> <i>9.3</i> <i>10.3.3⁷</i></p>
3	<p>Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.</p>	<p>Yes</p>	<p>NO</p>	<p>-</p>
4	<p>Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).</p>	<p>Yes</p>	<p>YES</p>	
5	<p>Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.</p> <p style="text-align: right;"><i>Use esplanade reserves, strips, margins</i> <i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i> <i>Criteria for lots greater than 4ha</i> <i>Required on all water margins</i> <i>Special criteria where lots adjoin sensitive areas</i></p>	<p>20m + formula for slope and vegetation</p>	<p>20m but Variable <i>Yes</i> <i>Yes</i> <i>Yes</i> <i>No</i> <i>Yes</i></p>	<p><i>16.4</i> <i>16.4.3.1</i> <i>16.4.3.1</i> - <i>16.4.3.1</i></p>
6	<p>Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.</p>	<p>Yes.</p>	<p>Yes</p>	

⁷ In areas identified in Appendix II of the Western Bay of Plenty Plan (landscapes)

7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	NO	
8	<p>(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?</p> <p style="text-align: right;"><i>Maximum height limits</i></p> <p style="text-align: right;"><i>Overshadowing / daylighting Rules (such as angles)</i></p> <p style="text-align: right;"><i>Yards</i></p> <p>(b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.</p>	<p>Yes</p> <p>Yes</p>	<p>YES</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>NO</p>	<p>5.4.3(a)</p> <p>5.4.3(b)</p> <p>5.4.3(c)</p>
9	<p>Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.</p> <p style="text-align: right;"><i>Permitted Activities in zones only</i></p> <p style="text-align: right;"><i>Rules requiring establishment of cycleways and pedestrian paths</i></p> <p style="text-align: right;"><i>Methods outside Plan</i></p>	<p>Yes</p>	<p>NO</p> <p>Yes</p> <p>No</p> <p>-</p>	
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	<p>Policies and rules directed and promoting urban consolidation.</p> <p style="text-align: right;"><i>Related to the utilisation of infrastructure</i></p> <p style="text-align: right;"><i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i></p> <p style="text-align: right;"><i>Related to energy efficiency / pollution abatement</i></p>	<p>Yes</p>	<p>NO</p> <p>-</p> <p>-</p> <p>-</p>	<p>-</p> <p>-</p> <p>-</p> <p>-</p>
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	NO	-
13	<p>(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or</p> <p>(b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.</p>	<p>Yes, 0 - 400 metres</p> <p>Yes, 0 - 400 metres</p>	<p>NO</p> <p>NO</p>	<p>-</p> <p>-</p>
14	<p>(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.</p> <p style="text-align: right;"><i>Development prohibited in these areas</i></p> <p style="text-align: right;"><i>Development Dependent on consent of Council (Council able to decline applications)</i></p> <p style="text-align: right;"><i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i></p> <p>(b) Provision made for future sea level rise in controlling subdivision in coastal areas?</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>	<p>YES</p> <p>-</p> <p>Yes</p> <p>-</p> <p>Yes</p>	<p>-</p> <p>12.3.1</p> <p>15.3.5.3</p> <p>12.4.2</p> <p>-</p>

15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	NO	-
16	<p>Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.</p> <p><i>Rural Zones with rules which restrict the amount of residential development</i></p> <p><i>Rules or Policies which guide new development on to land with less productive potential</i></p>	Yes	<p>YES</p> <p>Yes</p> <p>-</p>	<p>2.2.2.2</p> <p>2.3.3(b)</p> <p>2.4.3(b)</p> <p>-</p>
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	NO	-
18	<p>Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents.</p> <p><i>Special Zones for heavy industry and offensive trades which exclude residential use</i></p> <p><i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i></p>	Yes	<p>Yes</p> <p>Yes</p> <p>-</p>	<p>Industrial Zone</p> <p>-</p>
19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigated excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i></p> <p><i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	<p>Yes</p> <p>Yes</p>	<p>YES</p> <p>-</p> <p>No</p> <p>YES</p>	<p>Not listed such that they are Non Complying in Residential Zones</p> <p>-</p> <p>Not listed such that they are Non Complying in Residential Zones</p> <p>13.1</p> <p>13.2</p> <p>13.3</p> <p>13.4</p> <p>13.5</p>
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	<p>5.2.2.3</p> <p>15.3.5.5</p>
21	Minimum lot size in high density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	NONE	-
22	Minimum lot size for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	Av. 350	5.3.4(p)
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	2	18.3.1(h)

24	Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.	Yes	NO	-
	<i>Based on efficient utilisation of infrastructure</i>		-	-
25	Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.	Yes	NO	-
	<i>Defined mixed-use zones</i>		-	-
	<i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i>		-	-
	<i>Some residential development allowed In commercially zoned areas</i>		-	-
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac.	Yes	NO	-
	(b) Maximum number restriction(threshold).	20	-	-
29	Maximum height of residential buildings	9-12m	8m	5.3.4(a)

WANGANUI DISTRICT COUNCIL PROPOSED DISTRICT PLAN 1996

Wanganui District is on the west coast of the southern North Island. The District follows the medium and lower reaches of the Whanganui River. Population growth in the District was virtually static in the period 1991 - 1996, and 90% of the population lives in the main urban area of Wanganui City. There are also numerous other small residential settlements in the District located mainly along State Highway 3 and the Wanganui River Road. The District contains a large National Park administered by the Department of Conservation, and which comprises a substantial area of native vegetation. The rural areas of the District are quite hilly and erosion prone, especially where land has been cleared for farming.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?	Yes	YES	
	<i>Register of Sites</i>		<i>Yes</i>	<i>6.6.2 Policy 1</i>
	<i>Identification on maps</i>		<i>Yes</i>	<i>6.7.1 Policy 4</i>
	<i>As Reserves</i>			
	(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?	Yes	YES	
	<i>Conservation Zone</i>		-	-
	<i>Reserves</i>		<i>Yes</i>	<i>6.8.1⁸</i>
	<i>Recognised as "Special Policy Areas"</i>		<i>Yes</i>	<i>11.8.1⁹</i>
	<i>Protection through General Rules</i>		<i>Yes</i>	<i>11.8.3¹⁰</i>
				<i>See Esplanade Reserves</i>
2	Policies and rules which restrict the amount of vegetation that can be cleared.	Yes.	YES	
	<i>Hazard areas</i>			
	<i>In reserves</i>		<i>Yes</i>	<i>27.6</i>
	<i>Adjacent to reserves / riparian margins</i>		<i>Yes</i>	<i>27.6</i>
3	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	NO	
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	23.5
				27.9

⁸ Linked to heritage resources (natural heritage - also Appendix 1 of the Plan).

⁹ Linked to the protection of amenity values.

¹⁰ Linked to the protection of access to waterways.

5	Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules. <i>Use esplanade reserves, strips, margins</i> <i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i> <i>Criteria for lots greater than 4ha</i> <i>Required on all water margins</i> <i>Special criteria where lots adjoin sensitive areas</i>	20m + formula for slope and vegetation	20m + on selected waterways <i>Yes</i> <i>Yes</i> <i>Yes</i> <i>-</i> <i>Yes</i>	23.5 27.9 28.5 28.6 28.6 28.5 28.5 28.6 - 28.5 ¹¹
6	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	Yes	22.7 ¹²
7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	NO	-
8	(a)Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings? <i>Maximum height limits</i> <i>Overshadowing / daylighting Rules (such as angles)</i> <i>Yards</i> (b)Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.	Yes Yes	YES <i>Yes</i> <i>Yes</i> <i>Yes</i> NO	 <i>13.4.6(d)</i> <i>13.4.6</i> <i>13.4.6¹³</i> -
9	Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas. <i>Permitted Activities in zones only</i> <i>Rules requiring establishment of cycleways and pedestrian paths</i> <i>Methods outside Plan</i>	Yes	NO <i>-</i> <i>-</i> <i>-</i>	- <i>-</i> <i>-</i> <i>-</i>
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	Policies and rules directed and promoting urban consolidation. <i>Related to the utilisation of infrastructure</i> <i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i>	Yes	YES <i>Yes</i> <i>Yes</i>	- <i>11.6.3</i> <i>11.6.1</i> <i>9.6.1</i> <i>11.6.5</i>
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	NO	-

¹¹ 20+ metres wide esplanade reserve required on all lots irrespective of size on selected rivers and streams.

¹² On unstable slopes.

¹³ Governed by formula.

13	(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or	Yes, 0 - 400 metres	NO	-
	(b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.	Yes, 0 - 400 metres	NO	-
14	(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.	Yes	YES	
	<i>Development prohibited in these areas</i>		-	28.4 ¹⁴
	<i>Development Dependent on consent of Council (Council able to decline applications)</i>		Yes	28.4(i) 28.4(j) 22.6.2
	<i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i>		-	-
	(b) Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes	YES	Coastal Environment Zone
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	YES	22.6.1
16	Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.	Yes	YES	
	<i>Rural Zones with rules which restrict the amount of residential development</i>		Yes	10.5.1
	<i>Rules or Policies which guide new development on to land with less productive potential</i>		Yes	10.6.9 10.6.11 10.7.1
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	NO	-
18	Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents.	Yes	YES	
	<i>Special Zones for heavy industry and offensive trades which exclude residential use</i>		Yes	19.8
	<i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i>		-	-

¹⁴ Development has to avoid those annotated areas shown on Planning Maps.

19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i> <i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	Yes	YES	-
			- Yes	- As Non-Complying
		Yes.	YES	17.5.1-9 18.4.1- 9
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	9.8.3 11.6.9 28.4(f)
21	Minimum lot size in high density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	NONE	
22	Minimum lot size for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	No minimum lot size	28.4(b) ¹⁵ 28.4(c)
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	1	13.4.6(h)
24	<p>Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.</p> <p><i>Based on efficient utilisation of infrastructure</i></p>	Yes	YES Yes	 14.1
25	<p>Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.</p> <p><i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed In commercially zoned areas</i></p>	Yes	Yes - Yes Yes	- 17.5 18.4 16.5.5
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-

¹⁵ Development density governed by bulk and location requirements (formula for yards and daylighting)

28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac. (b) Maximum number restriction(threshold).	Yes 20	NO -	- -
29	Maximum height of residential buildings	9-12m	10m	13.4.6(d)

KAWERAU DISTRICT COUNCIL PROPOSED DISTRICT PLAN 1996

Kawerau District is geographically New Zealand's smallest District. The boundaries are just large enough to encompass the Tasman Pulp and Paper Mill and the nearby mill township. Over recent years the population numbers in the town have been declining and new residential development rare.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a)Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?	Yes	YES	As Reserves
	<i>Register of Sites</i>		<i>Yes</i>	
	<i>Identification on maps</i>		<i>Yes</i>	
	(b)Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?	Yes	YES	
2	<i>Conservation Zone</i>		-	-
	<i>Reserves</i>		<i>Yes</i>	-
	<i>Recognised as "Special Policy Areas"</i>		-	-
	<i>Protection through General Rules</i>		<i>Yes</i>	-
3	Policies and rules which restrict the amount of vegetation that can be cleared.	Yes.	NO	-
	<i>Hazard areas</i>		-	
	<i>In reserves</i>		-	
	<i>Adjacent to reserves / riparian margins</i>		-	
4	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	NO	-
5	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	
6	Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.	20m + formula for slope and vegetation		Shown on Maps
	<i>Use esplanade reserves, strips, margins</i>		<i>Yes</i>	
	<i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i>		<i>Yes</i>	
	<i>Criteria for lots greater than 4ha</i>		-	
7	<i>Required on all water margins</i>		-	
	<i>Special criteria where lots adjoin sensitive areas</i>		-	
	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	Yes	
	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	NO	

8	<p>(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?</p> <p style="text-align: right;"><i>Maximum height limits</i> <i>Overshadowing / daylighting Rules (such as angles)</i> <i>Yards</i></p> <p>(b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.</p>	Yes	YES	
			Yes	3.3.1
			Yes	3.3.1
			Yes	3.3.2
		Yes	NO	-
9	<p>Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.</p> <p style="text-align: right;"><i>Permitted Activities in zones only</i> <i>Rules requiring establishment of cycleways and pedestrian paths</i> <i>Methods outside Plan</i></p>	Yes	NO	-
			-	-
			-	-
			-	-
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	<p>Policies and rules directed and promoting urban consolidation.</p> <p style="text-align: right;"><i>Related to the utilisation of infrastructure</i> <i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i> <i>Related to energy efficiency / pollution abatement</i></p>	Yes	NO	-
			-	-
			-	-
			-	-
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	NO	-
13	<p>(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or</p> <p>(b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.</p>	Yes, 0 - 400 metres	NO	-
		Yes, 0 - 400 metres	NO	-
14	<p>(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.</p> <p style="text-align: right;"><i>Development prohibited in these areas</i> <i>Development Dependent on consent of Council (Council able to decline applications)</i> <i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i></p> <p>(b) Provision made for future sea level rise in controlling subdivision in coastal areas?</p>	Yes	YES	
			-	-
			Yes	6.2
			-	-
		Yes	NO	No ¹⁶

¹⁶ District landlocked.

15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	NO	-
16	<p>Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.</p> <p><i>Rural Zones with rules which restrict the amount of residential development</i></p> <p><i>Rules or Policies which guide new development on to land with less productive potential</i></p>	Yes	<p>NO</p> <p>Yes</p> <p>-</p>	-
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	YES ¹⁷	-
18	<p>Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents.</p> <p><i>Special Zones for heavy industry and offensive trades which exclude residential use</i></p> <p><i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i></p>	Yes	<p>YES</p> <p>Yes</p> <p>-</p>	<p>Yes - Industrial Zone</p> <p>-</p>
19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigated excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i></p> <p><i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	<p>Yes</p> <p>Yes.</p>	<p>YES</p> <p>-</p> <p>Yes</p> <p>YES</p>	<p>-</p> <p>-</p>
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	2.1.2 2.2.3
21	Minimum lot size in high density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	N.A.	-
22	Minimum lot size for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	None Stated	-
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	2	Appendix C

¹⁷ Relates to building coverage only - maximum of 30%.

24	<p>Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.</p> <p><i>Based on efficient utilisation of infrastructure</i></p>	Yes	NO	-
25	<p>Policies and Rules in the Plan which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.</p> <p><i>Defined mixed-use zones</i></p> <p><i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i></p> <p><i>Some residential development allowed In commercially zoned areas</i></p>	Yes	NO	-
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	<p>(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac.</p> <p>(b) Maximum number restriction(threshold).</p>	Yes 20	NO -	- -
29	Maximum height of residential buildings	9-12m	8m	3.3.1

NORTH SHORE CITY COUNCIL PROPOSED DISTRICT PLAN 1996

North Shore City is one of a number cities which make up the greater Auckland urban area. The city has a population of over 172,000 and a growth rate of 2.5% a year. Its urban population and commercial areas are largely concentrated in the southern half of the city, but new commercial and residential development is taking place, and is planned, in the north.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?	Yes	YES	Appendix 8A
	<i>Register of Sites</i>		Yes	-
	<i>Identification on maps</i>		Yes	-
	(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?	Yes	YES	8.3.1(2)
	<i>Conservation Zone</i>		Yes	-
	<i>Reserves</i>		-	-
	<i>Recognised as "Special Policy Areas"</i>		Yes	19.5
	<i>Protection through General Rules</i>		Yes	19.4.1
2	Policies and rules which restrict the amount of vegetation that can be cleared.	Yes.	YES	
	<i>Hazard areas</i>		Yes	8.3.1(4)
	<i>In reserves</i>		-	-
	<i>Adjacent to reserves / riparian margins</i>		Yes	8.3.2(4)&(6) 8.3.1(6)
3	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	YES	8.3.5(4)
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	8.3.1(8)
				8.3.2(3)
				8.3.2(4)
				8.3.2(7)
5	Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.	20m + formula for slope and vegetation		
	<i>Use esplanade reserves, strips, margins</i>		Yes	8.3.1(3)
	<i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i>		Yes	
	<i>Criteria for lots greater than 4ha</i>		-	-
	<i>Required on all water margins</i>		-	-
	<i>Special criteria where lots adjoin sensitive areas</i>		Yes	
6	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	YES	8.3.1(14) ¹⁸ 8.3.5(6) 8.4.1.2(e)

¹⁸ Related to areas with hazards.

7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	NO	-
8	<p>(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?</p> <p style="text-align: right;"><i>Maximum height limits</i></p> <p style="text-align: right;"><i>Overshadowing / daylighting Rules (such as angles)</i></p> <p style="text-align: right;"><i>Yards</i></p> <p>(b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.</p>	<p>Yes</p> <p>Yes</p>	<p>YES</p> <p>Yes</p> <p>Yes</p> <p>NO</p>	<p>16.6.1.2</p> <p>16.6.1.3</p> <p>Table 16.3</p> <p>-</p>
9	<p>Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.</p> <p style="text-align: right;"><i>Permitted Activities in zones only</i></p> <p style="text-align: right;"><i>Rules requiring establishment of cycleways and pedestrian paths</i></p> <p style="text-align: right;"><i>Methods outside Plan</i></p>	<p>Yes</p> <p>-</p> <p>Yes</p> <p>Yes</p>	<p>YES</p> <p>-</p> <p>Yes</p> <p>Yes</p>	<p>-</p> <p>-</p> <p>9.4.6.1]</p> <p>12.4.2.10</p> <p>-</p>
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	
11	<p>Policies and rules directed and promoting urban consolidation.</p> <p style="text-align: right;"><i>Related to the utilisation of infrastructure</i></p> <p style="text-align: right;"><i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i></p> <p style="text-align: right;"><i>Related to energy efficiency / pollution abatement</i></p>	<p>Yes</p> <p>-</p> <p>-</p> <p>-</p>	<p>YES</p> <p>-</p> <p>-</p> <p>-</p>	<p>Section 6</p> <p>-</p> <p>-</p> <p>-</p>
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	YES	Residential 6 Zone
13	<p>(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or</p> <p>(b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.</p>	<p>Yes, 0 - 400 metres</p> <p>Yes, 0 - 400 metres</p>	<p>YES¹⁹, not specified</p> <p>NO</p>	<p>16.4.6</p> <p>-</p>

¹⁹ Based around walking distance to assist public transport - exact dimensions not stated.

14	<p>(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.</p> <p><i>Development prohibited in these areas</i></p> <p><i>Development Dependent on consent of Council (Council able to decline applications)</i></p> <p><i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i></p> <p>(b) Provision made for future sea level rise in controlling subdivision in coastal areas?</p>	Yes	YES	<p>8.3.1</p> <p>See Chapter 8</p> <p>-</p> <p>8.3.1(16)</p>
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	YES ²¹	-
16	<p>Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.</p> <p><i>Rural Zones with rules which restrict the amount of residential development</i></p> <p><i>Rules or Policies which guide new development on to land with less productive potential</i></p>	Yes	YES	<p>18.3.1(1)</p> <p>18.4.1</p> <p>-</p>
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	YES ²²	16.6.1.12
18	<p>Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents.</p> <p><i>Special Zones for heavy industry and offensive trades which exclude residential use</i></p> <p><i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i></p>	Yes	YES	<p>15.5 (certain Industrial Zones)</p> <p>-</p>
19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i></p> <p><i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	Yes	YES	<p>-</p> <p>-</p> <p>10.5</p> <p>10.4.2</p> <p>10.4.3</p> <p>10.5</p> <p>15.3.5</p>

²⁰ In areas based on a 1-in-100 year flood event (extreme).

²¹ Specified for 1:5 slopes.

²² Specified as “30% of the site must be of permeable surfaces”.

20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	9.5.5.3(d) 17.3
21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	150m ² - 250m ² ²³	16.6 (For Res. 6 A-C zones)
22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	Res 1. 1200 - 4000 Res 2. 350 - 5000 Res 3. 400 - 600 Res. 4 325 - 400 Res 5. None Res. 7 200m ²	16.6
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	1-2 ²⁴	Table 12.1
24	Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development. <i>Based on efficient utilisation of infrastructure</i>	Yes	yes	17.4.1
25	Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated. <i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed In commercially zoned areas</i>	Yes	YES Yes Yes -	- Res 7 Zone + spot zoning 15.5 15.6.1.9 -
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac. (b) Maximum number restriction(threshold).	Yes 20	NO -	- -
29	Maximum height of residential buildings	9-12m	8m (9m Residential 6)	16.6.1.2

²³ The figure of 150 metres is only for intensive housing development in the Residential C zone.

²⁴ Dependent on floor area (demarcation at 50 square metres of gross floor area).

FAR NORTH DISTRICT COUNCIL PROPOSED DISTRICT PLAN 1996

The Far North District is a very large, encompassing the northern tip of the North Island. Around 60% of its 55,244 residents live in rural areas, the main urban centres being Kaitaia, Kaikohe, Kerikeri, Kawakawa, Pahia and Taipa-Mangonui (each with of population of 5,000 or less). The District has a very extensive coastline and a number of high-value native forest areas and wetlands.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?	Yes	YES	Schedule 6
	<i>Register of Sites</i>		Yes	-
	<i>Identification on maps</i>		Yes	
	(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?	Yes	YES	
	<i>Conservation Zone</i>		Yes	7.8
	<i>Reserves</i>			
	<i>Recognised as "Special Policy Areas"</i>		Yes	Significant Natural areas defined in Schedule 6
	<i>Protection through General Rules</i>		Yes	4.8.7.3.3 4.2.5.2 4.2.5.6 4.2.5.7 4.2.7.5.3 9.15.2
2	Policies and rules which restrict the amount of vegetation that can be cleared.	Yes.	YES	
	<i>Hazard areas</i>		Yes	4.5.5.2
	<i>Special Policy Areas</i>		Yes	4.2.7.4.1 4.5.5.2 4.3.7.5.1
	<i>In reserves</i>		Yes ²⁵	7.8.4.5.8
	<i>Adjacent to reserves / riparian margins</i>		Yes	4.8.7.5.3 4.8.7.3.2
3	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	NO ²⁶ protection for patches only	4.3.5.3 4.3.5.5
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES ²⁷	4.8.7.3.2

²⁵ Actually in Conservation Zones

²⁶ While policy exists to protect significant natural areas (SNAs), no policy or rule is present that encourages connectivity and therefore areas consist of patches rather than a network.

²⁷ These include "de facto" reserves established through a range of setbacks and vegetation clearance controls.

13	(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or	Yes, 0 - 400 metres	NO	-
	(b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.	Yes, 0 - 400 metres	NO	-
14	(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.	Yes	YES	<i>In defined Hazard areas see 9.7.2</i>
	<i>Development prohibited in these areas</i>		Yes ³²	9.7.2
	<i>Development Dependent on consent of Council (Council able to decline applications)</i>		Yes	4.5.5.1
	<i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i>			9.3.3 9.7.3
	(b) Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes	YES	4.5.5.3
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	YES ³³	4.5.5.2
16	Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.	Yes	YES	4.4.5.2 4.4.5.4 5.7.1.2.2
	<i>Rural Zones with rules which restrict the amount of residential development</i>		Yes	6.7.4.3.1
	<i>Rules or Policies which guide new development on to land with less productive potential</i>		Yes	6.5.5 6.5.2
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	YES ³⁴	5.9.4.3.5 5.8.4.3.5 5.8.4.5.5
18	Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental the health and wellbeing of residents.	Yes	NO	<i>No defined areas solely for heavy industries</i>
	<i>Special Zones for heavy industry and offensive trades which exclude residential use</i>		-	-
	<i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i>		-	-

³² For areas in Hazards Area 2.

³³ But only in defined Hazard areas.

³⁴ Maximum area to be covered ranges from 50 - 60% of the site area dependent on site location (Residential or Settlement zone).

19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i> <i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	Yes	YES	- 5.9.4.1
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	4.8.7.4.1 9.10
21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	No such areas	-
22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	300 - 400m ² (Dependent on zone)	5.8.4.3.1 5.8.4.5.1 5.9.4.5.1
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	2	Table 11.1
24	<p>Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.</p> <p><i>Based on efficient utilisation of infrastructure</i></p>	Yes	NO ³⁵	6.9
25	<p>Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.</p> <p><i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed In commercially zoned areas</i></p>	Yes	YES - Yes Yes	- Settlement Zone 5.10.1
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	<p>(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac.</p> <p>(b) Maximum number restriction(threshold).</p>	Yes 20	NO none	- -

³⁵ A "Future Urban Zone" does exist but this is for the purposes of avoiding rural land fragmentation that would otherwise make the conversion to full Residential zoning difficult.

29	Maximum height of residential buildings	9-12m	8-9 metres (Dependent on zone)	5.9.3.3 5.8.4.3.3 5.8.4.5.4
----	---	-------	--------------------------------------	-----------------------------------

MANUKAU CITY COUNCIL PROPOSED DISTRICT PLAN 1995

Manukau City is the third largest city in New Zealand, and forms part of the greater Auckland urban area. The growth rate of Manukau is 2.5% per year. While fast growing, the city still has large areas of open land, particularly near the international airport. The city is also has a large, shallow, harbour which has many small inlets and bays.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a)Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?	Yes	YES	<i>Schedules 6B and 6C</i>
	<i>Register of Sites</i>		<i>Yes</i>	
	<i>Identification on maps</i>	Yes	<i>Yes</i>	<i>Public Open Space Zones 1 & 5</i>
	(b)Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?		YES	
	<i>Conservation Zone</i>		<i>Yes</i>	
2	<i>Reserves</i>	Yes.	Yes	-
	<i>Recognised as "Special Policy Areas"</i>		-	-
	<i>Protection through General Rules</i>		<i>Yes</i>	<i>6.9.2</i>
3	Policies and rules which restrict the amount of vegetation that can be cleared.	Yes.	YES	<i>12.4.3</i>
	<i>Hazard areas</i>		-	-
	<i>In reserves</i>		-	-
	<i>Adjacent to reserves / riparian margins</i>		<i>Yes</i>	<i>9.8.2.3(f)</i>
4	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	YES	<i>15.4.1</i> <i>Structure Plans for "Future Development Areas also show what appear to be green corridors"</i>
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	<i>9.4.1(d)</i> <i>15.4.4</i>

5	<p>Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.</p> <p><i>Use esplanade reserves, strips, margins</i> <i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i> <i>Criteria for lots greater than 4ha</i> <i>Required on all water margins</i> <i>Special criteria where lots adjoin sensitive areas</i></p>	20m + formula for slope and vegetation	<p>Variable according to Resource Management Act</p> <p>Yes³⁶ Yes - - Yes</p>	<p>15.4.1 15.4.1 - - Coastal Setbacks Chapter 11</p>
6	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	NO	-
7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	YES ³⁷	9.9.3.1 13.4.2
8	<p>(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?</p> <p><i>Maximum height limits</i> <i>Overshadowing / daylighting Rules (such as angles)</i> <i>Yards</i></p> <p>(b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.</p>	<p>Yes</p> <p>Yes</p>	<p>YES</p> <p>Yes Yes Yes</p> <p>NO³⁸</p>	<p>-</p> <p>13.11.1.3 5.18.1 13.11.1.5.1</p> <p>-</p>
9	<p>Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.</p> <p><i>Permitted Activities in zones only</i> <i>Rules requiring establishment of cycleways and pedestrian paths</i></p> <p><i>Methods outside Plan</i></p>	Yes	<p>YES</p> <p>Yes</p>	<p>9.9.2.11(a)(v) 9.9.2.11(e)³⁹ 9.9.2.11(f)</p>
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	<p>Policies and rules directed and promoting urban consolidation.</p> <p><i>Related to the utilisation of infrastructure</i> <i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i> <i>Related to energy efficiency / pollution abatement</i></p>	Yes	<p>- - Yes</p>	<p>- - 8.4.1</p>

³⁶ Many waterways already have esplanade reserves established or proposed. Absence of detailed rules therefore does not mean such protection is not afforded.

³⁷ Rule 9.9.3.1 requires lots to be sited as to take “best advantage of.....solar orientation”

³⁸ Except in Integrated Residential Zone.

³⁹ On specified routes identified on Planning Maps.

12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	YES	8.4.1
13	(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or (b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.	Yes, 0 - 400 metres Yes, 0 - 400 metres	NO NO	- -
14	(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris. <i>Development prohibited in these areas</i> <i>Development Dependent on consent of Council (Council able to decline applications)</i> <i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i> (b) Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes Yes	YES NO	9.4.2 9.9.2.7 9.8.2.1(b) 9.9.3.1(b) 9.8.2.1 9.4.2 -
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	NO	-
16	Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use. <i>Rural Zones with rules which restrict the amount of residential development</i> <i>Rules or Policies which guide new development on to land with less productive potential</i>	Yes	YES Yes Yes	 12.3 12.10.2 12.4.1
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	Yes ⁴⁰	13.1.1.3
18	Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents. <i>Special Zones for heavy industry and offensive trades which exclude residential use</i> <i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i>	Yes	YES Yes Yes	- Business 6 Zone 9.9.3.3 ⁴¹ 13.12.4 17.6.4.10

⁴⁰ Relates to maximum site that can be covered by buildings (typically 30 - 35%).

⁴¹ No buildings to be sited within corridors of electrical transmission lines of 110kV or more.

19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i> <i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	Yes	YES - Yes	14.4.2 - 13.10.1 ⁴²
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	9.9.2.12(b) 9.9.2.12(c)
21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	0-400m ²	13.11.1.3 Integrated Housing Zone
22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	400m ² (Main Res). 700m ² (Res Settlement) 1200m ² (Special Policy Area) ⁴³	13.11.1.3
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	2	Schedule 8A
24	<p>Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.</p> <p><i>Based on efficient utilisation of infrastructure</i></p>	Yes	YES Yes	 16.4.2
25	<p>Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.</p> <p><i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed in commercially zoned areas</i></p>	Yes	NO - - Yes ⁴⁴	 - - 14.10.1
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO ⁴⁵	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-

⁴² Most non residential activities treated as non-complying or restricted discretionary.

⁴³ Note that there are in fact a number of small policy areas with densities of one unit per 500m² - 1200m²

⁴⁴ As Controlled Activities within Business 1, 2 and 3 Zones.

⁴⁵ Except in Integrated Intensity Housing Zone where special design guidelines apply.

28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac. (b) Maximum number restriction(threshold).	Yes 20	NO -	- -
29	Maximum height of residential buildings	9-12m	5.5 - 8.0 metres most zones 9 metres for two policy areas 9.5 metres for Integrated housing Special conditions allow buildings up to 17 metres	<i>13.11.1.3 and Appendix A (Design guide for integrated housing)</i>

WAITAKERE CITY COUNCIL PROPOSED DISTRICT PLAN 1995

Waitakere City Council (population 156,000) adopted the strategic theme of "Eco-City" and has attempted to carry this forward into its Proposed District Plan. The plan uses similar numbering for policies and rules, and also for each chapter. Policies are displayed in the table below as just a number, Rules are prefixed by "Rule" and where some rule number are duplicates a suffix is added. These suffixes are "RM" for riparian margin, "LE" for living environment, "PNA" for protected natural areas, "CS" for coastal settlement, "Sub" for the subdivision chapter.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a)Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?	Yes	YES	
	<i>Register of Sites</i>		<i>Yes</i>	<i>Table 3.6(a)</i>
	<i>Identification on maps</i>		<i>Yes</i>	<i>Including a number of maps in the Policy Section.</i>
	(b)Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?	Yes	YES	
	<i>Conservation Zone</i>		-	-
	<i>Reserves</i>		<i>Yes</i>	<i>Some form part of the "Green Network"</i>
	<i>Recognised as "Special Policy Areas"</i>		<i>Yes</i>	<i>Labelled As Protected Natural Areas</i>
	<i>Protection through General Rules</i>		<i>Yes</i>	<i>2.1</i> <i>2.15</i> <i>Rule 10.1</i> <i>Rule 11.1(Sub)</i>
2	Policies and rules which restrict the amount of vegetation that can be cleared.	Yes.	YES	4.7
				<i>Rule 2.2</i>
	<i>Hazard areas</i>			<i>Rule 2.3 PNA</i>
	<i>In reserves</i>		<i>Yes</i>	5.3
	<i>Adjacent to reserves / riparian margins</i>		<i>Yes</i>	2.4
				<i>Rule 2.2(RM)</i>
				<i>Rule 2.3 (RM)</i>
3	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	YES	1.6
				1.16
				5.1
				5.3
				<i>Rules 1-6 in Managed Natural Zone and Protected Natural Areas</i>

4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	1.5 1.17
5	Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules. <i>Use esplanade reserves, strips, margins 4 ha Rule (<4 ha = 20 m) as per the Resource Management Act Criteria for lots greater than 4ha Required on all water margins Special criteria where lots adjoin sensitive areas</i>	20m + formula for slope and vegetation	20 metres + Yes Yes Yes Yes Yes	1.1 Rule 2.2(Sub) Rule 2.2(sub) Rule 2.2(sub) Rule 2.2(sub)
6	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	YES	3.4 Rule 1.0 Rule 3.1(RM)
7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	NO	-
8	(a)Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings? <i>Maximum height limits Overshadowing / daylighting Rules (such as angles) Yards</i> (b)Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.	Yes Yes	YES Yes Yes Yes	Rule 4.1(LE) Rule 5.1(LE) Rule 5.1(LE)
9	Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas. <i>Permitted Activities in zones only Rules requiring establishment of cycleways and pedestrian paths Methods outside Plan</i>	Yes	YES - Yes Yes	4.3 4.4 10.8 - May be imposed as a condition of subdivision consent. Part of Greenway (reserves) Management
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	Policies and rules directed and promoting urban consolidation. <i>Related to the utilisation of infrastructure Related to the protection of soils with a high life-supporting capability, fertility or versatility Related to energy efficiency / pollution abatement</i>	Yes	YES - - Yes	- - 1.1 ⁴⁶ 1.2

⁴⁶ Protection of waterways from pollution.

12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	YES	1.2
13	(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or (b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.	Yes, 0 - 400 metres Yes, 0 - 400 metres	YES 500 - 1,000 metres ⁴⁷ -	11.29 Rule 2.2 (LE) -
14	(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris. <i>Development prohibited in these areas</i> <i>Development Dependent on consent of Council (Council able to decline applications)</i> <i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i> (b) Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes - - Yes	YES - Yes - -	Rule 1.1 3.6 10.14 - Rule 1.1(Hz) Rule 3.2(LE) - 7.2 Rule 1.1(b)(Hz)
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	NO	-
16	Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use. <i>Rural Zones with rules which restrict the amount of residential development</i> <i>Rules or Policies which guide new development on to land with less productive potential</i>	Yes	YES Yes No	3.1 Rule 2.1 (CS) Rule 7.1(Sub) -
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	YES	4.1 Rule 7.1 (LE)
18	Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental the health and wellbeing of residents. <i>Special Zones for heavy industry and offensive trades which exclude residential use</i> <i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i>	Yes	YES Yes	10.16 10.20 Rule 2.2(Sub)

⁴⁷ 500 metres is used for medium density housing around train stations, 700 and 1,000 metres are used in relation to the centre of the Glen Eden, Westgate, Henderson or New Lynn Community Centres.

19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p style="text-align: center;"><i>Certain activities prohibited</i> <i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	Yes	-	-
		-	Yes	-
		Yes.	YES	10.1 10.2 10.3 Rule 1.5.2 Rule 13.1(LE) Rule 14.1(LE)
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	10.9 Rule 2.1(Sub) Rule 3.1(Sub) Rule 4.1(Sub)
21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	None Specified	
22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	450m ² (Living Environment) ⁴⁸	Rule 2.1 (LE) Rule 2.2(LE)
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	1-2 ⁴⁹	Rule 12.1(LE)
24	Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development. <i>Based on efficient utilisation of infrastructure</i>	Yes		
25	Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated. <i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed in commercially zoned areas</i>	Yes	YES Yes Yes	11.9 11.20 Community Zone See Working Zone
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	YES ⁵⁰	10.7

⁴⁸ But variable with a resource consent to 350m or 400 metres (L1 Zone)

⁴⁹ Typically 2 but 1 is the minimum for medium-density housing areas according to the assessment criteria.

⁵⁰ In fact this is a policy which requires new public and semi-public spaces to be designed to enable surveillance.

27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac.	Yes	NO	-
	(b) Maximum number restriction(threshold).	20	-	-
29	Maximum height of residential buildings	9-12m	8m	Rule 4.1(LE)

CHRISTCHURCH CITY COUNCIL PROPOSED DISTRICT PLAN 1995

Christchurch City is the largest urban area in the South Island and has a population of 310,000. The city is unusual for New Zealand in that it is more symmetrical than most. The city has limited frontage to the coast, but has two moderately sized rivers running through it (the Avon and the Heathcote).

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?	Yes	YES	2.7.3
	<i>Register of Sites</i>		Yes	10.2.1
	<i>Identification on maps</i>		Yes	Part 4, Appendix 2
	(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?	Yes	YES	-
	<i>Conservation Zone</i>		Yes	Zoned as Conservation 1, 1A, or 3
	<i>Reserves</i>		Yes	Some set aside as Esplanade Reserves.
2	<i>Recognised as "Special Policy Areas"</i>		-	-
	<i>Protection through General Rules</i>		Yes	17.1
				17.2
				17.3
3	Policies and rules which restrict the amount of vegetation that can be cleared.	Yes.	YES	(Part 14)
	<i>Hazard areas</i>			
	<i>In reserves</i>		Yes	2.3.2
4	<i>Adjacent to reserves / riparian margins</i>			3.2.4
	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	YES	2.2.10
				2.4.5
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	2.7.8
				14.1.11
				2.2.7
				2.2.8
				2.2.9
4				2.2.10
				2.6.6

5	<p>Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.</p> <p><i>Use esplanade reserves, strips, margins</i></p> <p><i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i></p> <p><i>Criteria for lots greater than 4ha</i></p> <p><i>Required on all water margins</i></p> <p><i>Special criteria where lots adjoin sensitive areas</i></p>	<p>20m + formula for slope and vegetation</p>	<p>Typically 12 - 20 metres</p> <p>Yes</p> <p>Yes</p> <p>-</p> <p>-</p> <p>Yes</p>	<p>-</p> <p>Section 6 (part 14)</p> <p>-</p> <p>-</p> <p>-</p> <p>6.4 (Where identified on Planning Maps and Appendix 1 part 14))</p>
6	<p>Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.</p>	<p>Yes.</p>	<p>YES</p>	<p>10.2.3</p> <p>Part 9 5.3</p>
7	<p>Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).</p>	<p>Yes</p>	<p>YES</p>	<p>11.4.2⁵¹</p>
8	<p>(a)Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?</p> <p><i>Maximum height limits</i></p> <p><i>Overshadowing / daylighting Rules (such as angles)</i></p> <p><i>Yards</i></p> <p>(b)Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.</p>	<p>Yes</p> <p>Yes</p>	<p>YES</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>YES</p>	<p>4.2.1</p> <p>4.2.2</p> <p>4.2.3</p> <p>4.2.4.</p> <p>4.2.5</p> <p>4.2.2(a)(ii)</p>
9	<p>Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.</p> <p><i>Permitted Activities in zones only</i></p> <p><i>Rules requiring establishment of cycleways and pedestrian paths</i></p> <p><i>Methods outside Plan</i></p>	<p>Yes</p>	<p>YES</p> <p>-</p> <p>Yes</p> <p>Yes</p>	<p>7.4.2</p> <p>7.4.5</p> <p>7.5.1</p> <p>7.5.2</p> <p>-</p> <p>In specified locations as part of subdivision location Active cycling programmes, provision of covered cycle parks etc.</p>
10	<p>Policies and rules which encourage or require the use of traffic calming measures in residential streets.</p>	<p>Yes</p>	<p>NO</p>	<p>-</p>

⁵¹ Policy 11.4.2 encourages outdoor living spaces to be orientated to the sun and not to shade neighbours.

11	<p>Policies and rules directed and promoting urban consolidation.</p> <p><i>Related to the utilisation of infrastructure</i></p> <p><i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i></p> <p><i>Related to energy efficiency / pollution abatement</i></p>	Yes	YES	<p>6.1.1</p> <p>6.1.2</p> <p>11.5.2</p> <p>6.1.1</p> <p>2.1.1</p> <p>6.3.4</p> <p>2.3.1</p> <p>3.1.3</p> <p>6.1.1</p> <p>6.3.2</p>
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	YES ⁵²	6.1.1
13	<p>(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or</p> <p>(b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.</p>	<p>Yes, 0 - 400 metres</p> <p>Yes, 0 - 400 metres</p>	YES	6.1.1
14	<p>(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.</p> <p><i>Development prohibited in these areas</i></p> <p><i>Development Dependent on consent of Council (Council able to decline applications)</i></p> <p><i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i></p> <p>(b) Provision made for future sea level rise in controlling subdivision in coastal areas?</p>	<p>Yes</p> <p>-</p> <p>-</p> <p>Yes</p>	<p>YES</p> <p>Yes</p> <p>-</p> <p>YES</p>	<p>2.5.2</p> <p>10.1.1</p> <p>10.1.2</p> <p>10.1.3</p> <p>6.3.6</p> <p>Where specified on Maps Section 7 (part 14)</p> <p>-</p> <p>2.5.4</p> <p>10.1.1</p>
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	YES	2.5.9 ⁵³

⁵² Policy 6.1.1 in fact encourages higher population densities around “focal points”. These are located along transport routes. The explanation with the policy hints at walking being encouraged.

⁵³ This Policy in fact promotes the planting of unstable land to mitigate erosion hazards.

16	<p>Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.</p> <p><i>Rural Zones with rules which restrict the amount of residential development</i></p> <p><i>Rules or Policies which guide new development on to land with less productive potential</i></p>	Yes	YES	<p>6.3.4 13.1.6</p> <p>2.5.2 (Rural Zone Chapter) 4.3.1 (Part 14)</p>
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	NO	In some rural zones only
18	<p>Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental the health and wellbeing of residents.</p> <p><i>Special Zones for heavy industry and offensive trades which exclude residential use</i></p> <p><i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i></p>	Yes	YES	<p>Some working environment zones only allow "caretaker or security flats at 1 per business.</p> <p>Some Rural zones (e.g 2 & 5) are maintained because they are located in the airport noise footprint)</p>
19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i></p> <p><i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	<p>Yes</p> <p>-</p> <p>-</p> <p>Yes.</p>	<p>NO⁵⁴</p> <p>-</p> <p>-</p> <p>YES</p>	<p>-</p> <p>-</p> <p>-</p> <p>11.4.8 also Part 11 (Health and Safety)</p>
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	<p>10.4.12 10.4.13 10.4.14 10 (Part 14)</p>
21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	No Limit	-

⁵⁴ Unless resource consent is declined - no prohibited activities

22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	360m ² (1A Zone) 2000 (1B Zone) 455 (H Zone) 1000 (RS Zone) 270 (2 Zone) 600 (RV Zone)	2.4.1
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	1-2 ⁵⁵	Part 13 (Table 1B)
24	Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development. <i>Based on efficient utilisation of infrastructure</i>	Yes	NO -	- -
25	Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated. <i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed in commercially zoned areas</i>	Yes	YES Yes Yes ⁵⁶	3.2 (Business 1 Zone) 4.3.2 (Business 3, 4 5, & 6 Zones)
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac. (b) Maximum number restriction(threshold).	Yes 20	NO -	- -
29	Maximum height of residential buildings	9-12m	7-8 m 11m (New Brighton) Medium Density Areas None Specified	3.2.3 4.2.1

⁵⁵ 1 for the Residential 4, 4A, 4B and 4C Zones.

⁵⁶ The Business 3 - 6 Zones are largely industrial where residential dwellings are limited to 1 per business.

WELLINGTON CITY COUNCIL PROPOSED DISTRICT PLAN 1994

Wellington is the largest city of (158,000) of the greater Wellington urban area. The city has a relatively well developed public transport system for a New Zealand urban area, a lengthy coastline for its size, and a hilly topography that makes the developing straight roads and good building platforms difficult.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	<p>(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?</p> <p style="text-align: right;"><i>Register of Sites</i></p> <p style="text-align: right;"><i>Identification on maps</i></p> <p>(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?</p> <p style="text-align: right;"><i>Conservation Zone</i></p> <p style="text-align: right;"><i>Reserves</i></p> <p style="text-align: right;"><i>Recognised as "Special Policy Areas"</i></p> <p style="text-align: right;"><i>Protection through General Rules</i></p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>	<p>YES</p> <p><i>Yes</i></p> <p><i>Yes</i></p> <p>Yes</p> <p>-</p> <p>-</p> <p>Yes</p>	<p><i>Schedule Attached to "Conservation Site" Chapter.</i></p> <p>19</p> <p>-</p> <p>-</p> <p>5.1.13.8</p>
2	<p>Policies and rules which restrict the amount of vegetation that can be cleared.</p> <p style="text-align: right;"><i>Hazard areas</i></p> <p style="text-align: right;"><i>In reserves</i></p> <p style="text-align: right;"><i>Adjacent to reserves / riparian margins</i></p>	<p>Yes.</p> <p>-</p> <p>-</p> <p>-</p>	<p>YES</p> <p>-</p> <p>-</p> <p>-</p>	<p>4.2.5.4</p> <p>4.2.5.5</p> <p>-</p> <p>-</p> <p>-</p>
3	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	NO	-
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	NO	-
5	<p>Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.</p> <p style="text-align: right;"><i>Use esplanade reserves, strips, margins</i></p> <p style="text-align: right;"><i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i></p> <p style="text-align: right;"><i>Criteria for lots greater than 4ha</i></p> <p style="text-align: right;"><i>Required on all water margins</i></p> <p style="text-align: right;"><i>Special criteria where lots adjoin sensitive areas</i></p>	<p>20m + formula for slope and vegetation</p> <p>Yes</p> <p>Yes</p>	<p>20 metres on all "rivers" over 3m in width</p> <p>Yes</p> <p>Yes</p>	<p>5.1.16.3</p> <p>5.1.16.3</p>
6	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	YES	5.1.10
7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	YES ⁵⁷	4.2.1.3

⁵⁷ Policy 4.2.1.3 Encourages energy-efficient development such as solar orientation (no angles specified).

8	<p>(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings?</p> <p style="text-align: right;"><i>Maximum height limits</i> <i>Overshadowing / daylighting Rules (such as angles)</i> <i>Yards</i></p> <p>(b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.</p>	Yes	YES	<p><i>Yes</i> <i>5.1.3.4</i> <i>Yes</i> <i>5.1.3.5</i> <i>Yes</i> <i>5.1.3.2</i></p> <p><i>But as a Discretionary Activity subject to 5.4.2 and the Accompanying Design Guide.</i></p>
9	<p>Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas.</p> <p style="text-align: right;"><i>Permitted Activities in zones only</i> <i>Rules requiring establishment of cycleways and pedestrian paths</i></p> <p style="text-align: right;"><i>Methods outside Plan</i></p>	Yes	YES	<p><i>Yes</i> <i>Where Subdivision is discretionary and made subject to the Design Guide.</i> <i>No</i></p>
10	<p>Policies and rules which encourage or require the use of traffic calming measures in residential streets.</p>	Yes	YES	<p><i>Where Subdivision is discretionary and made subject to the Design Guide.</i></p>
11	<p>Policies and rules directed and promoting urban consolidation.</p> <p style="text-align: right;"><i>Related to the utilisation of infrastructure</i> <i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i> <i>Related to energy efficiency / pollution abatement</i></p>	Yes	YES	<p><i>4.2.1.1</i> <i>Yes</i> <i>14.2.1.1</i></p>
12	<p>Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.</p>	Yes	NO	-
13	<p>(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or</p> <p>(b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.</p>	Yes, 0 - 400 metres	NO	-
		Yes, 0 - 400 metres	NO	-

14	(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.	Yes	YES	4.2.7.1
	<i>Development prohibited in these areas</i>	-		
	<i>Development Dependent on consent of Council (Council able to decline applications)</i>		Yes	5.3.6
	<i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i>	-	-	-
	(b) Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes	NO	No provision recorded
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	NO	-
16	Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.	Yes	NO ⁵⁸	-
	<i>Rural Zones with rules which restrict the amount of residential development</i> <i>Rules or Policies which guide new development on to land with less productive potential</i>		Yes	15.1.3.1 15.4.5
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	YES ⁵⁹	5.1.3.3 5.1.3.8
18	Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents.	Yes	YES	4.2.10.3
	<i>Special Zones for heavy industry and offensive trades which exclude residential use</i>		-	-
	<i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i>		Yes	5.3.7

⁵⁸ A Rural Zone exists but this does not appear to be related to the conservation of soils with high agricultural / horticultural potential, or life-supporting capacity.

⁵⁹ Rules relate to building coverage rather than impermeable surfaces, special runoff controls are used in the Porirua Stream catchment area.

19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigate excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i></p> <p><i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	<p>Yes</p> <p>-</p> <p>-</p> <p>Yes.</p>	<p>NO</p> <p>-</p> <p>YES</p> <p>YES</p>	<p>-</p> <p>-</p> <p>4.2.2.2</p> <p>6.2.2.1</p> <p>6.2.2.3</p> <p>7.1.1.2</p> <p>7.1.1.3</p> <p>7.1.1.4</p> <p>4.2.2.2</p> <p>6.2.2.1</p> <p>6.2.2.3</p> <p>7.1.1.2</p> <p>7.1.1.3</p> <p>7.1.1.4</p>
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	NO	-
21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	NO	-
22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	NO	-
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	1	5.1.1.2.1
24	<p>Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development.</p> <p><i>Based on efficient utilisation of infrastructure</i></p>	Yes	NO	-
25	<p>Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated.</p> <p><i>Defined mixed-use zones</i></p> <p><i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i></p> <p><i>Some residential development allowed In commercially zoned areas</i></p>	Yes	<p>YES</p> <p>-</p> <p>Yes</p> <p>Yes</p>	<p>-</p> <p>7.1.1</p> <p>9.1.1</p> <p>13.1.1</p> <p>NB: Cottage type industries and existing uses in full residential only</p> <p>7.1.1</p> <p>13.1.1</p>

26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	YES ⁶⁰	
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	YES	<i>Where Subdivision is discretionary and made subject to the Design Guide.</i>
28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac.	Yes	NO	-
	(b) Maximum number restriction(threshold).	20	-	-
29	Maximum height of residential buildings	9-12m	10m (Inner Residential) 8m (Outer Residential) Up to 19m in Parts of Oriental Bay	5.1.3.4.1 5.1.3.4.2

⁶⁰ Note: Council has crime prevention guidelines which lie outside the District Plan.

HURUNUI DISTRICT COUNCIL PROPOSED DISTRICT PLAN 1996

Hurunui District lies north of Christchurch City from which it is separated by Waimakariri District. The district is predominantly rural in character and has a population of around 9,000 which is growing at the rate of 1.1% per year. Main settlements in the District are Amberly (the administrative centre), Hawarden, Culverden and Hanmer Springs, none of which exceed more than 3,000 people. The District is bordered on one side by the Pacific Ocean, and on another, the Southern Alps mountain range.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	<p>(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?</p> <p style="text-align: right;"><i>Register of Sites</i></p> <p style="text-align: right;"><i>Identification on maps</i></p> <p>(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?</p> <p style="text-align: right;"><i>Conservation Zone</i></p> <p style="text-align: right;"><i>Reserves</i></p> <p style="text-align: right;"><i>Recognised as "Special Policy Areas"</i></p> <p style="text-align: right;"><i>Protection through General Rules</i></p>	<p>Yes</p> <p>Yes</p>	<p>YES</p> <p><i>Yes</i></p> <p><i>Yes</i></p> <p>YES</p>	<p><i>Appendix A2</i></p> <p><i>2.1</i></p> <p><i>2.2</i></p> <p><i>7.2</i></p> <p><i>7.3</i></p> <p><i>Appendix A7.1</i></p> <p><i>7.2.2</i></p> <p><i>See Chapter A2</i></p>
2	<p>Policies and rules which restrict the amount of vegetation that can be cleared.</p> <p style="text-align: right;"><i>Hazard areas</i></p> <p style="text-align: right;"><i>In reserves</i></p> <p style="text-align: right;"><i>Adjacent to reserves / riparian margins</i></p>	<p>Yes.</p> <p>-</p> <p>-</p> <p>-</p>	<p>YES</p> <p>-</p> <p>-</p> <p>-</p>	<p>1.9</p> <p>A 7.2.1</p> <p>-</p> <p>-</p> <p>-</p>
3	Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.	Yes	NO	-
4	Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).	Yes	YES	A 7.2.1
5	<p>Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.</p> <p style="text-align: right;"><i>Use esplanade reserves, strips, margins</i></p> <p style="text-align: right;"><i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i></p> <p style="text-align: right;"><i>Criteria for lots greater than 4ha</i></p> <p style="text-align: right;"><i>Required on all water margins</i></p> <p style="text-align: right;"><i>Special criteria where lots adjoin sensitive areas</i></p>	<p>20m + formula for slope and vegetation</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>	<p>20 metres but may vary</p> <p><i>Yes</i></p> <p><i>Yes</i></p> <p>-</p> <p><i>Yes</i></p> <p>-</p>	<p><i>A 4.1</i></p> <p><i>A 4.1</i></p> <p>-</p> <p><i>Those listed in</i></p> <p><i>Appendix E1</i></p> <p>-</p>
6	Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.	Yes.	YES	<p>1.4</p> <p>1.6</p> <p>1.8</p>

				A 1.2.14
7	Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).	Yes	NO	12.7 ⁶¹
8	(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings? <i>Maximum height limits</i> <i>Overshadowing / daylighting Rules (such as angles)</i> <i>Yards</i> (b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.	Yes Yes	YES <i>Yes</i> <i>Yes</i> <i>Yes</i> No	 <i>B 1.2.3</i> <i>B 1.2.4</i> <i>B 1.2.1</i> -
9	Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas. <i>Permitted Activities in zones only</i> <i>Rules requiring establishment of cycleways and pedestrian paths</i> <i>Methods outside Plan</i>	Yes	NO - - -	- - - -
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	Policies and rules directed and promoting urban consolidation. <i>Related to the utilisation of infrastructure</i> <i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i> <i>Related to energy efficiency / pollution abatement</i>	Yes	YES <i>Yes</i> <i>Yes</i> -	 <i>12.2</i> <i>12.3</i> <i>16.1</i> -
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	NO	-
13	(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or (b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.	Yes, 0 - 400 metres Yes, 0 - 400 metres	NO NO	- -

⁶¹ One policy does however read “to promote implementation of energy conservation measures in siting and construction of buildings.”

14	(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris.	Yes	YES	
	<i>Development prohibited in these areas</i>	-	-	-
	<i>Development Dependent on consent of Council (Council able to decline applications)</i>	-	Yes	A 9.2 A 9.3
	<i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i>	-	-	-
	(b) Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes	Yes	A 9.2 Appendix A9
15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	NO	-
16	Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.	Yes	YES	1.2 1.3
	<i>Rural Zones with rules which restrict the amount of residential development</i>		Yes	-
	<i>Rules or Policies which guide new development on to land with less productive potential</i>		-	-
17	Rules which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	YES	B 1.2.2 ⁶²
18	Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents.	Yes	YES	A 1.2.4 A 1.2.5
	<i>Special Zones for heavy industry and offensive trades which exclude residential use</i>		Yes	B 1.4.3
	<i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i>		-	-
19	(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigated excluded from residential and mixed use areas?	Yes	NO	
	<i>Certain activities prohibited</i>	-	-	-
	<i>Activities subject to consent of Council (subject to assessment of environmental effects)</i>	-	-	-
	(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?	Yes.	YES	10.8 A 1.2.8
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	A 3.2.3

⁶² Building coverage only (35%)

21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	None	-
22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	Min 250 Ave. 350 600-800 metres if unserved	
23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	1	A 5.2.3(b)
24	Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development. <i>Based on efficient utilisation of infrastructure</i>	Yes	YES Yes	A3.2.5 12.5 16.2
25	Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated. <i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed in commercially zoned areas</i>	Yes	YES No Yes ⁶³ No	- B1.4.1 -
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac. (b) Maximum number restriction(threshold).	Yes 20	NO -	- -
29	Maximum height of residential buildings	9-12m	10m	A1.2.6

⁶³ Primary Industries are excluded however.

PORIRUA CITY COUNCIL PROPOSED DISTRICT PLAN 1994

Porirua is a largely dormitory city for Wellington. While it has a population of 46,000+ within a relatively confined area, over 80% of the land in the City is rural. The City has within its boundaries an elaborate network of waterways and some wetlands of high ecological significance.

NB: Italics for recording and note taking purposes only.

No.	Indicator	Reference	Actual	Provision
1	<p>(a) Have areas of ecological significance (wetlands and areas of native vegetation) been identified in the District Plan?</p> <p style="text-align: right;"><i>Register of Sites</i></p> <p style="text-align: right;"><i>Identification on maps</i></p> <p>(b) Are these areas zoned or identified as policy areas for the purpose of conservation or low-intensity recreation?</p> <p style="text-align: right;"><i>Conservation Zone</i></p> <p style="text-align: right;"><i>Reserves</i></p> <p style="text-align: right;"><i>Recognised as "Special Policy Areas"</i></p> <p style="text-align: right;"><i>Protection through General Rules</i></p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>-</p> <p>-</p>	<p>YES</p> <p>No</p> <p>Yes</p> <p>YES</p> <p>-</p> <p>Yes</p> <p>Yes</p> <p>-</p>	<p><i>But references found throughout text</i></p> <p>-</p> <p>Policy C9.1.1</p> <p>-</p> <p>-</p> <p><i>Various named throughout text</i></p> <p>-</p>
2	<p>Policies and rules which restrict the amount of vegetation that can be cleared.</p> <p style="text-align: right;"><i>Hazard areas</i></p> <p style="text-align: right;"><i>In reserves</i></p> <p style="text-align: right;"><i>Adjacent to reserves / riparian margins</i></p>	<p>Yes.</p> <p>-</p> <p>-</p> <p>-</p>	<p>YES</p> <p>-</p> <p>-</p> <p>-</p>	<p>C 9.1.6</p> <p>C10.1.5</p> <p>-</p> <p><i>D 3.1.4</i></p> <p>-</p>
3	<p>Policies, rules or other methods for the establishment of a 'green network' or ecological corridors and spaces.</p>	<p>Yes</p>	<p>YES</p>	<p>C 9.1.8</p> <p>C 9.1.9</p>
4	<p>Policies and rules encouraging or requiring the use of planted riparian strips or margins (as filters for contaminants and ecological corridors).</p>	<p>Yes</p>	<p>YES</p>	<p>10.1.5</p>
5	<p>Width of riparian strip, esplanade reserve, esplanade strip encouraged or required by policies and rules.</p> <p style="text-align: right;"><i>Use esplanade reserves, strips, margins</i></p> <p style="text-align: right;"><i>4 ha Rule (<4 ha = 20 m) as per the Resource Management Act</i></p> <p style="text-align: right;"><i>Criteria for lots greater than 4ha</i></p> <p style="text-align: right;"><i>Required on all water margins</i></p> <p style="text-align: right;"><i>Special criteria where lots adjoin sensitive areas</i></p>	<p>20m + formula for slope and vegetation</p> <p>Yes</p> <p>Yes</p> <p>-</p> <p>Yes (over 3 m width)</p> <p>-</p>	<p>0-20 metres but may vary</p> <p>Yes</p> <p>Yes</p> <p>-</p> <p>Yes (over 3 m width)</p> <p>-</p>	<p>10.1.2</p> <p>10.1.2</p> <p>-</p> <p>E10</p> <p>-</p>
6	<p>Policies, rules or methods which control topsoil loss during earthworks preparation for subdivision and development.</p>	<p>Yes.</p>	<p>YES</p>	<p>C 4.2.2</p> <p>D 3.1.4</p>
7	<p>Policies and rules which encourage solar orientation of lots and buildings (due north + or - 20 degrees).</p>	<p>Yes</p>	<p>NO</p>	<p>-</p>

8	(a) Are there policies and/or rules which restrict the overshadowing of neighbouring properties and buildings? <i>Maximum height limits</i> <i>Overshadowing / daylighting Rules (such as angles)</i> <i>Yards</i> (b) Do these rules make provision for terraced, or attached housing by limiting the control to a north-south axis where such development is proposed.	Yes	YES <i>Yes</i> <i>Yes</i> <i>Yes</i>	 <i>D 3.2.1</i> <i>D 3.2.1</i> <i>D 3.2.1</i> -
9	Presence or policies, rules or methods which encourage the provision of dedicated cycleways and pedestrian paths in residential areas. <i>Permitted Activities in zones only</i> <i>Rules requiring establishment of cycleways and pedestrian paths</i> <i>Methods outside Plan</i>	Yes	YES ⁶⁴ - - -	 C 7.1.7 C 1.2.4 -
10	Policies and rules which encourage or require the use of traffic calming measures in residential streets.	Yes	NO	-
11	Policies and rules directed and promoting urban consolidation. <i>Related to the utilisation of infrastructure</i> <i>Related to the protection of soils with a high life-supporting capability, fertility or versatility</i> <i>Related to energy efficiency / pollution abatement</i>	Yes	YES <i>Yes</i> <i>Yes</i> -	 C 3.1.2 D 4.1.4 -
12	Objectives, policies and rules and methods in the District Plan which provide for higher-density development around key transportation corridors.	Yes	NO	-
13	(a) Policies and/or rules in the District Plan which encourage the establishment high and medium-density residential dwellings within 400 metres of public transport stops. Or (b) Policies and/or rules in the District Plan which encourage the establishment of public transport stops within 400 metres of dwellings in high and medium-density residential areas.	Yes, 0 - 400 metres Yes, 0 - 400 metres	NO NO	- -
14	(a) Policies and rules which restrict and control residential subdivision and development on flood plains and coastal areas which may be prone to flooding and/or on land that is prone to damage from slippage, slumpage, inundation or falling debris. <i>Development prohibited in these areas</i> <i>Development Dependent on consent of Council (Council able to decline applications)</i> <i>Subject to Controlled Consent (Council unable to decline applications but can set conditions)</i> (b) Provision made for future sea level rise in controlling subdivision in coastal areas?	Yes - - - Yes	YES ⁶⁵ - Yes - NO	 - <i>D 3.1.3</i> - -

⁶⁴ Cycleways are provided through Annual Plan process, or made a condition of a resource consent.

⁶⁵ Council uses Building Act provisions. Flood control has been passed onto the Regional Council.

15	Rules in the District Plan which restrict the removal of vegetation from slopes which have a gradient of more than 33 degrees, or which because of their soil type and geology are prone to slippage	Yes	NO	-
16	<p>Policies and rules in the District Plan which restrict residential subdivision and development of land which has soils of high fertility, life-supporting capacity, or versatility for agricultural / horticultural use.</p> <p><i>Rural Zones with rules which restrict the amount of residential development</i></p> <p><i>Rules or Policies which guide new development on to land with less productive potential</i></p>	Yes	<p>YES</p> <p>-</p> <p>-</p>	<p>C 4.1.8</p> <p>C 6.1.5</p> <p>-</p> <p>-</p>
17	Rules in the District Plan which restrict the maximum amount of site area that can be covered by impermeable surfaces.	Yes	YES	D 3.2.1 ⁶⁶
18	<p>Policies and rules in the District Plan which separate residential areas from areas which contain activities whose effects would be detrimental to the health and wellbeing of residents.</p> <p><i>Special Zones for heavy industry and offensive trades which exclude residential use</i></p> <p><i>Rules which prohibit or restrict residential development in noise footprints of airports and other similar activities</i></p>	Yes	<p>NO</p> <p>-</p> <p>-</p>	<p><i>There is an Industrial Zone but it does not exclude residential uses.</i></p> <p>-</p> <p>-</p>
19	<p>(a) Are non-residential activities which have adverse effects on residents which can not be avoided or mitigated excluded from residential and mixed use areas?</p> <p><i>Certain activities prohibited</i></p> <p><i>Activities subject to consent of Council (subject to assessment of environmental effects)</i></p> <p>(b) Are non-residential activities which locate in residential and mixed use areas subject to rules and standards which ensure their adverse effects are avoided or mitigated to a level acceptable to the local community?</p>	<p>Yes</p> <p>-</p> <p>-</p> <p>Yes.</p>	<p>YES</p> <p>-</p> <p>-</p> <p>YES</p>	<p>Yes Through Non compliance with D 3.2.1</p> <p>-</p> <p>-</p> <p>D 3.2.1</p>
20	Rules in the District Plan which require all new dwelling units in a residential subdivision to be connected to a high-quality sewerage treatment system.	Yes	YES	C 4.2.3
21	Minimum lot size or housing density in high-density residential areas and residential areas adjacent (within 400m) to public transportation routes;	130 - 631m ²	None	-
22	Minimum lot size or housing density for areas not designated for high-density development or which are not adjacent to public transport routes.	500+ m ²	None Specified ⁶⁷	

⁶⁶ Maximum building coverage of 35%.

⁶⁷ Provided lots are of a size which can accommodate a complying dwelling.

23	Number of carparks required per residential unit in medium and high-density residential areas.	0 - 1	1-2 ⁶⁸	D 3.2.1
24	Policies and rules relating to the geographic sequencing of land on urban fringes released for residential subdivision and development. <i>Based on efficient utilisation of infrastructure</i>	Yes	YES -	C 14.2.1 -
25	Policies and rules which provide for mixed land uses, either by way of specialised zones, or by way of rules which allow mixed land uses where adverse effects can be avoided or mitigated. <i>Defined mixed-use zones</i> <i>Rules allowing de facto mixed-use zones (allowing both residential and full commercial together))</i> <i>Some residential development allowed In commercially zoned areas</i>	Yes	YES <i>No</i> <i>Yes</i> <i>No</i>	- <i>C 3.2.2</i> <i>D 1.1.1</i> <i>D 3.1.1</i> -
26	Use of rules requiring windows of dwellings adjacent to public spaces to overlook those public spaces.	Yes	NO	-
27	Policies, rules or other methods in the District Plan which encourage residential subdivision street / accessway layouts to be based upon a tight grid network of straight streets / paths and short cul-de-sacs, where ever topography allows.	Yes	NO	-
28	(a) Policies and rules which restrict the number of dwellings in a single apartment block or cul-de-sac. (b) Maximum number restriction(threshold).	Yes 20	NO -	- -
29	Maximum height of residential buildings	9-12m	10m	D 3.2.1

⁶⁸ One for dwellings less than 75 square metres in area, two for dwellings over that limit.

APPENDIX O

Good Practice - Examples of Provisions in New Zealand Proposed District Plans

Indicator 1

POLICY: Settlement should be of a type and density that avoids or minimises adverse impacts on native vegetation and fauna habitat. In particular settlement should be:

- located away from areas of significant and outstanding native vegetation and fauna habitat, provided that where any restrictions on settlement on large (30ha) sites within Protected and Coastal Natural Areas are such that reasonable use can not be made of the land, and net environmental benefit may be gained from alternative settlement patterns, particular provision may be made for these sites to be listed as scheduled activities within the District Plan.
- consolidated within the urban area to protect the city's native vegetation and fauna habitat from adverse effects, including the effects of environmentally damaging plants, and the reduction of the extent, range and linkages between native fauna habitat, vegetation and natural features that are associated with intensive settlement. (Waitakere Proposed District Plan 1995 - Policy 2.1).

POLICY: To encourage subdivision, use and development activities to be undertaken in such a way that the natural features and landscapes which contribute to the amenities of the district are protected and enhanced. (Hurunui Proposed District Plan - Policy 7.2).

Indicator 3

POLICY: Activities on any public land should be carried out in a way that promotes and enhances regeneration and the re-establishment of linkages between areas of native vegetation and fauna habitat within the Green Network, and the effectiveness of any adjacent Ecological Linkage / Restoration Natural Areas in protecting the stability of native ecosystems. (Waitakere Proposed District Plan 1995 - Policy 5.3).

POLICY: To further extend and protect natural ecosystems and habitats.
Explanation: The fragility of some existing habitats in the City is exacerbated by the lack of adequate buffer protection and a number of sites are isolated. Their protection would be enhanced by the provision of open space linkages and extension of green areas where this is practicable...increasing the area of land to enable regeneration will enhance the viability of these areas. In promoting this policy, the Council is conscious of the need to balance the protection of these areas with legitimate land-use options that may reasonably be available to landowners. Consequently, where intervention is proposed it is intended to supplement this with alternative options such as incentives, environmental compensation and in some cases land purchases. (City of Christchurch City Plan 1995: Policy 2.4.5).

Indicator 4

POLICY: Activities (including structures should be managed in such a way that avoids further clearance and damage to native vegetation with the riparian margins of the City's lakes, rivers, wetlands and the coast, provided that exotic vegetation may be removed where there is a programme to restore native vegetation to the riparian margins. (Waitakere Proposed Plan 1995 - Policy 1.5).

POLICY: Where activities result in any of the following adverse effects, the offsetting of that effect may be required:

- alteration of the structure of stream beds and their banks;
- exacerbation of flooding, erosion, subsidence or slipping such that water quality is affected;
- degradation of the quality of waters in streams, lakes, estuaries and other waterways;
- impeding of the natural movement of native aquatic flora and fauna;
- loss of native vegetation along riparian margins;

provided that any offsetting of effects shall give priority to restoration of water courses and margins, planting appropriate native vegetation and the removal of any barriers to water flow and movement of biota. (Waitakere Proposed District Plan 1995 - Policy 1.17).

Indicator 6

POLICY: Activities involving the disturbance of soil or rock and exposure of soils should be carried out in a way that minimises the loss or degradation of topsoil and the disturbance of surrounding soil structure. (Waitakere Proposed District Plan 1995 - Policy 3.4).

POLICY: To require the rehabilitation of sites where the extraction of land resources has occurred. (Hurunui Proposed District Plan - Policy 1.8).

POLICY: Any person carrying out site works or subdivision shall avoid, remedy or mitigate soil erosion or silt discharge from the land by a combination of one or more of the following techniques, or of any other additional or alternative technique or combination of techniques that will achieve the same result:

- (i) Runoff control measures, these may be runoff diversion channels, contour drains, earth bunds, or similar, which control and direct runoff and limit the accumulation of erosive volumes of water.
- (ii) Sedimentation retention ponds, where used, these shall be located and constructed with the Council's engineering standards and shall have the sediment removed when the pond is half full of sediment;
- (iii) Silt fences and hay bales: These shall be constructed to avoid outflanking or underscoring of the fence by runoff. The maximum spacing between rows of silt fences / haybales is dependent on the slope of the site and shall be in accordance with Council standards;
- (iv) Vegetative Buffer Strips: These shall be appropriately located and sized to filter sediment from overland runoff. The minimum width of such strips and the maximum length of bare ground between strips is dependent on the slope of the site;
- (v) Stormwater inlet protection: Measures to filter sedimentation from runoff draining bare worked areas to stormwater systems shall be implemented. Such measures may include filter cloth and gravel or securely staked haybales;

All vegetation clearance shall be undertaken in such a manner as to prevent debris entering any watercourse. (North Shored Proposed District Plan 1994 - Policy 9.4.2.3.).

Indicator 7

RULE: Each lot shall be sited to best advantage in terms of topography including aspect, avoidance of natural hazards, access and the maximisation of solar orientation (Manukau Proposed District Plan: Rule 9.9.3.1(b)).

Indicator 9

POLICY: To require the inclusion of safe cycle links, where appropriate in new subdivisions (Christchurch City Plan 1995 : Policy 7.4.2).

POLICY: Pedestrian and cycle access should be designed and constructed in a way that maximises links with local neighbourhoods, shops, schools, community facilities, local recreation areas and town centres, and access routes to and through, where appropriate, the Green Network in order to promote alternatives to motor vehicle use (Waitakere Proposed District Plan 1995 - Policy 4.3)

METHODS: Promotion and provision of facilities to encourage cycling and walking forms of transport through financial contributions (Far North District Plan, 4.10.6.4).

RULE: Where proposed cycleways are shown on arterial roads or elsewhere in the City on Planning Maps, the provision of cycleways may be required as a condition of approval for a Resource Consent including subdivision. (I) Cycleway standards shall meet the following criteria: (a) Be designed to provide separation between cyclists and other modes of transport; (b) have a permanent all weather surface with a smooth transition between different surface materials; (c) Be built to comply with the following widths.....(Manukau Proposed District Plan, Rules 9.9.2.11(e).

Indicator 11

POLICY: That the geographic patterns of land use activities be provided for which have the potential to minimise dependence on motorvehicles. (Far North District Plan, 4.7.5.2)

POLICY: That greater energy efficiency be achieved through urban consolidation and energy efficient transportation (Far North District Plan 4.10.5.2).

POLICY: The Transportation Network should be managed in such a way that: (a) transport generated carbon dioxide and noxious gas emissions and the consumption of non-renewable fuels is reduced; (b) ensures a pattern of development and supporting infrastructure which permits the city to be efficiently and effectively served by passenger transport services; (c) demand for vehicle transport is reduced... (Manukau District Plan 8.4.1).

Indicator 12

POLICY: Activities should be located within the urban area in a way that supports mixed business and residential nodes around existing town centres, as a way of reducing vehicle trip length and numbers, supporting passenger transport and therefore minimising discharges of contaminants from vehicles on to roads and into waterways. Particular regard should be had for the location of medium-density housing within and adjacent to these central locations. (Waitakere Proposed Plan 1995).

Indicator 13

POLICY: To achieve a gradual increase in overall population density within the existing urban area through: (a) high building densities near the central city and suburban focal points; and (b) by managing the rate at which land is zoned at the edge of the urban area for urban purposes. (Christchurch City Plan 1995: Policy 6.1.1).

METHODS: Increased development densities on selected land near defined passenger transport routes or centres; indicate future through-routes within structure plans and the planning maps that provide continuous connection through areas which they serve and ensure that they are designed to allow convenient use by passenger transport vehicles; require a high standard of pedestrian access to collector and primary roads; require activities within commercial centres to provide for passenger transport facilities at the time of development (Manukau Proposed District Plan Methods for Policy 8.4.1).

Indicator 14

POLICY: To avoid development, or limit its scale and density, in areas subject to moderate to high risk of natural hazards unless the risk of damage can be mitigated (Christchurch City Plan 1995 : Policy 2.5.2).

POLICY: To ensure that subdivision is either restricted, or subject to appropriate mitigation measures in areas which may be subject to risk from inundation, flooding from rivers, potential sea level rise or high water tables in wetland areas. (Christchurch City Plan 1995 : Policy 10.1.1)

POLICY: To avoid the subdivision of land that may be subject to erosion, subsidence, slippage or rock fall (Christchurch City Plan 1995: Policy 10.1.2).

POLICY: To avoid higher intensity forms of built development in areas that could be subject to sea level rise. *Explanation: Areas within the City, particularly in the Brooklands and Spencerville area, and adjacent to the estuary and the lower reaches of the Avon and Heathcote Rivers could be subject to inundation on current projections of sea level rise to the year 2100...where development has not already taken place it would be unwise to contemplate new development of urban intensity*

where the cost of providing protection to such areas would far exceed the investment in the development concerned (Christchurch City Plan 1995 : Policy 2.5.4).

Indicator 16

POLICY: That urban expansion onto soils of high quality be avoided (Far North District Plan 5.7.3.2.2).

POLICY: To avoid urban growth on highly versatile soils (DSIR Classes V1 and V2) unless the need for this protection is clearly outweighed by the efficient use, development or protection of other natural or physical resources. (Christchurch City Plan : Policy 6.3.4)

Indicator 26

POLICY: New public and semi-public spaces should be designed in a way that ensures the safety of all users, and in particular, should provide for:

- Overlooking (surveillance) of public and semi-public spaces from surrounding buildings during the day and where possible night;
- direct and efficient movement routes through such spaces;
- adequate signage including connections with other routes;
- Adequate lighting;
- integration of pedestrian systems with vehicle routes.

(Waitakere Proposed District Plan 1995 - Policy 10.7.)

Other Ideas

PREVENTING LAND WASTAGE:

POLICY: To ensure that all new allotments in the Suburban Zone are capable of accommodating a complying residential dwelling. *Explanation: This policy seeks to ensure subdivision creates a practical arrangement of allotments for residential subdivision, and that no allotments are created which are not suitable for placement of a dwelling.* (Porirua City Proposed District Plan 1994 - Policy C 6.1.3)

MANUKAU INTEGRATED INTENSIVE HOUSING ZONE

Manukau City Proposed District Plan contains an unusual zone (by New Zealand standards) referred to as the “Integrated Intensive Housing” zone. This is a prototype zoning intended as a demonstration of alternative (to the New Zealand norm) residential development. Residential development is made subject to a design guide which forms Appendix A of Chapter 13 (the Residential section) of the Proposed District Plan. The zone specially makes provisions for:

- Pedestrian and cycleway linkages along roads and through residential blocks.
- A principally grid-network of streets well inter-connected (to minimise energy use)
- Use of traffic calming measures
- Reduction in parking spaces
- Street layouts running east-west and north-south to maximise the number of north facing lots
- Building placement determined according to solar orientation principles
- Passive surveillance (dwellings overlooking streets, paths and public spaces)

WAITAKERE CITY MEDIUM-DENSITY HOUSING ASSESSMENT CRITERIA

This part of the Waitakere Proposed District Plan sets out the assessment criteria for medium-density housing and are “designed to give designers and builders flexibility and to provide for site responsive designs”. The Proposed Plan makes medium-density housing the subject of a resource consent as a limited discretionary activity. Assessment criteria in the plan for medium-density housing which help meet the indicators in this thesis include:

- *Residential surveillance:* Fences should permit outlook from units to the road to ensure safety, visual contact and surveillance. Solid fences should be minimised and used only where the main outdoor space is located in front of the unit and some visual contact from windows can be maintained
- Minimise main outdoor space at the front to avoid high solid fences onto the road, or consider permeable treatments such as planting, or lattices to give privacy without creating a solid barrier
- *Transport linkages:* Ensure the development is well connected into the neighbourhood with adequate vehicle and pedestrian links
- Minimise exposure of living spaces and principal outdoor space to predominant (winter) winds
- Maximise exposure to winter sunshine
- Houses should be orientated to obtain winter sun in main living spaces
- Sunlight is to be provided to outdoor space
- Where possible, retain existing trees and vegetation which can be major assets and help achieve an instant maturing effect, provide shade and shelter and help stabilise the soil
- Houses are encouraged to be linked to allow efficient use of sites

- Building form and site layout is designed to minimise impermeable surfaces and allow efficient stormwater management. Impermeable surfaces should not exceed 65% of site area
- Noise sensitive areas such as sleeping areas should be located away from major roads, railway lines, etc, and protected by noise shielding if necessary
- House entries in multi-level developments should be designed to minimise large numbers of entries off long corridors
- House entries should be well lit.

APPENDIX P

Summary Of Recent Subdivision Case Law Examples⁶⁹

Minister of Conservation V Whangarei District Council and F Visser 1994. A019/94

Subject of Appeal: Appellant sought to overturn a subdivision consent which had been granted for a 20.83 hectare block of land abutting the coast.

Points Relevant to Thesis: The applicant made efforts to convince the Court that significant stands of native vegetation in the area to be subdivided would be protected. The Court decided that the areas discussed were not significant in terms of the District Plan, but found that the coastal fringe contributed positively to the visual character of the area and had ecological significance. These would at least be partially lost if the subdivision were to proceed. The Court was not satisfied that the effect upon the Council's ability to uphold the provisions of the District Plan in other cases would not be adverse, and that the appropriate use and development and protection of natural and physical resources would not assured by upholding the proposal. The appeal was allowed and the application declined.

Relevant to Indicators: 1(a) and 1(b).

J Clear Family Trust V Queenstown Lakes District Council 1994. C120/94

Subject of the Appeal: The applicant sought to overturn a decision against the declining of a resource consent for a form of rural-residential development on a 3.5221 hectare site near Arrowtown. The land is on the edge of the Rural zone and the underlying soils recognised as being of high productive value.

⁶⁹ Cases Kindly Supplied by Data Services Limited, Burton Consultants, and Butterworths of New Zealand Ltd..

Points Relevant to Thesis: The District Plan categorised the appeal site as land that had moderate to high value for food production and had policies to protect it for that purpose. The fact that the site had not been used for food production for some time was found by the Court not to be a factor that justified it being subdivided. The appellants failed to provide a compelling argument that the land should be subdivided because of special circumstances. The appeal was disallowed.

Relevant to Indicators: 17

J S Hunt V Palmerston North City Council 1993. W013/93

Subject of Appeal: Applicant sought to overturn the declining of a subdivision consent to subdivide a 1.818 hectare block located on rural land on the corner James Line and Kelvin Grove Road.

Points Relevant to Thesis: The Court found that there was ample land for true residential development in the immediate vicinity of the appeal site and there was no need to extend the urban boundary. The Court also recognised that the Council was looking at the efficient use and development of natural and physical resources in deciding to keep the land rural. Although services had been extended very close to the periphery of urban development leaving areas of land closer to the city undeveloped the Court felt that there was no need to exacerbate the situation. The appeal was dismissed.

Relevant to Indicators: 11, 25.

A W Bos V Hamilton City Council 1992. A121/92

Subject of the Appeal: The appeal challenged the refusal for subdivision of a 4.2339 hectare lot into five rural-residential lots and an esplanade reserve.

Points Relevant to Thesis: The Court found that although the appeal site was small (similar to other lots in the vicinity) it contained a sufficient area of good quality soil to enable it to be usefully employed for rural use. The land was not so awkwardly shaped

as to militate against efficient management as part of a farming operation and could be amalgamated with lots on either side. The appeal was dismissed.

Relevant to Indicators: 17

MA & G G Armstrong V Waimakariri District Council 1995. C033/05

Subject of Appeal: The appellants sought to change the Waimakariri Transitional District Plan through the extension of the Rural - Residential zone and the creation of a 'Part Time Farming Zone' near Ohoka.

Points Relevant To Thesis: The Court found that the proposed development was largely residential in character and did not see the zoning as being the stand-alone type typical of true Rural-Residential development but rather a step towards the full urbanisation of Ohoka. The Court decided that little weight could be attached to the proposition that the land was too valuable for a dairy farm. The only reason for this was the unjustified expectation in the market place that it had subdivision potential. As a working dairy farm the land was producing a satisfactory income. It was decided that rezoning to enable subdivision would not promote the sustainable management of resources. Also it would lead to the permanent loss of productive farmland; it would necessitate the extensions to services that would become the responsibility of a public agency; and it was likely to have cumulative effects. The appeal was disallowed.

Relevant to Indicators: 17, 25

R. & I C Robinson V Ashburton District Council 1994. W092/94

Subject of Appeal: The appellant sought to subdivide rural land adjacent to Ashburton into 19 lots.

Points Relevant to Thesis: the Court decided that, taking into account general planning considerations, rural land on the edge of urban areas must not, by a process of attrition, become increasingly fragmented resulting in the inevitable extension of the urban fence.

Land was seen as a finite resource and once subdivided and allowed to become used for intensive residential development was unlikely to be recovered for use in food production or other economic crops. It was also the objective of the Council to strictly police its urban fence. The activity was deemed to result in fragmentation of land resulting in significant adverse effects. The appeal was dismissed.

Relevant to Indicators: 17, 25

G F McIntyre V Tasman District Council 1994. W083/94

Subject of the Appeal: The appellant wished to overturn a refusal by the Tasman District Council to zone 5 hectares of her land Residential and a further 3 hectares to 'Low Density Residential'.

Points Relevant to Thesis: The Court found that in this case the extension of services [which would be required by the subdivision] should be carried out in a co-ordinated progression. If development proceeded on an ad hoc basis they could not be sustainably managed by the Council. Rezoning to residential would result in approximately 30 extra dwellings, over and above that for low-density zoning, which would take the single largest block out of the zone and put pressure on other land owners to seek rezoning also. The Tribunal refused the appellant's proposal for full Residential, deciding instead that the whole property should be zoned Low Density Residential. In common with the other Low Density Residential areas it would have to await or negotiate the availability of a reticulated sewerage system before subdivision.

Relevant to Indicators: 25.

A H Burnett V Tasman District Council 1995. W025/95

Subject of Appeal: The appellant sought the reversal of the Council's refusal of a subdivision consent for some rural land.

Points Relevant to Thesis: The key issue was deemed to be whether or not in terms of the relevant planning instruments and the provisions of the Resource Management Act 1991 the effect of the application to create a rural -residential allotment was contrary to the Council's Planning Strategy for the Rural B zone which sought to preserve the existing rural uses of the zone. The Court held that the primary functions of rural land were 'its existence to provide life sustaining produce of which it is capable of yielding; to provide a habitat for all those non -human life forms which choose to inhabit it, and the contribution it makes in its virgin state to the quality of life'. The Court expressed that the continued existence of some land in a natural state free of any development meets a need which future generations will have, and which current resource management practices must recognise. It was decided that the subdivision would be contrary the Council's plan and sustainable management, and was capable of creating an undesirable precedent. The appeal was dismissed.

Relevant to Indicators: 17.

Canterbury Regional Council V Selwyn District Council 1996. W142/96

Subject of the Appeal: The appellant sought to overturn Plan Change (16) to the Ellesmere Section of the Selwyn Transitional District Council Plan which rezoned 7.067 hectares of land on the edge of Linclon, Residential.

Points relevant to Thesis: Due to the irregular shape of the land parcel in question and its proximity to residential uses the land was not found to be of high versatility. The Court decided that because the wording of the Resource Management Act (as opposed to the former Town and Country Planning Act 1977) high quality land could not now be separated out as an element which the Act protected. Regional Councils could therefore

only protect resources for the use of future generations if the decision can be based on fact and prediction. It can no longer rely on statute alone. The Court concluded that there was demand for residential sections which was not being met and that urban land resource would be exhausted within seven years. The District Council had followed the lead of the Regional Council generally in making it clear that future development in and around Lincoln must be restricted. Allowing the subdivision was therefore held to have no likely cumulative effect. The Court decided that given all relevant factors the inclusion of the land within the residential area as opposed to retaining it for the foreseeable needs of future generations for food production was “totally inconsequential”. The appeal was dismissed.

Relevant to Indicators: 11, 17.

Becmead Investments Limited and Ors. V Christchurch City Council 1996. A088/96

Subject of Appeal: The appellant sought to overturn the decision of a Commissioner who had decided against the rezoning of two blocks (20.9 and 15.4 hectares in area) via a Plan Change, at the north west edge of Christchurch from Rural H to Residential.

Points Relevant to Thesis: The land in question contained land of high versatility (Class 1 and 2 soils) but was sandwiched between residential development and active urban related recreation areas. Highly versatile soils were regarded as abundant in the area (compared to other parts of the country) and their loss had to be balanced by perceived urban growth requirements including the establishment of an adequate ‘land bank’ to accommodate future expansion. The Court felt that they were not persuaded in this instance that the removal of the blocks from any potential future rural activity was ‘of sufficient moment’ to warrant rejection of the Plan Change. The blocks, while near the airport were beyond the 50 Ldn line identified [such that there was no perceived noise hazard]. The appeal was allowed and the Proposed Plan Change confirmed.

Relevant to Indicators: 11, 17, 19.

Wilbow Corporation NZ Ltd. V North Shore City Council 1995. W107/95

Subject of Appeal: The appeal was against the refusal of a subdivision consent for a 9.6 hectare block of land situated in Brown's Bay.

Points Relevant to Thesis: The proposal to develop the site had been vigorously opposed by numerous submitters so the applicant subsequently amended the proposal to reduce the number of lots created from 107 to 75 and areas of existing vegetation retained as reserves. The appellant also sought to reduce the gradient of the slopes, using some of the fill in the valley floor to achieve more manageable sections. This would result in the destruction of some low quality tree cover and the piping of a stream. The Court decided that the loss of the stream was minor given that it was already degraded beyond hope of restoration; the creation of reserve was deemed to protect areas of significant indigenous vegetation.; and the extent of cutting and filling when coupled with the nature and extent of the areas of land intended for public reserve was such that it could not be said that the land was unsuitable for subdivision. Adequate provision had been made for services. The appeal was allowed subject to conditions.

Relevant to Indicators: 1(a), 1(b), 21.

Canterbury Area Heath Board V Selwyn District Council 1993. C087/93

Subject of Appeal: Appellant sought the cancellation of the grant of a subdivision consent and land use consent to allow subdivision of a 1.73 hectare lot and Lincoln for residential purposes.

Points Relevant to Thesis: The appeal was settled by Consent requiring that no dwellings be erected until the Lincoln Sewerage Treatment Plant was upgraded to sufficient degree of completion to raise the treatment capacity of the Plant to a population equivalent of 5,250 and all sewerage from buildings erected on the lots was to be connected to that system.

Relevant to Indicators: 21

B C Hodson V Wanganui District Council 1994. A036/94

Subject of Appeal: The appellant sought to reverse the refusal of land use consent for a proposed poultry processing plant on Great North Road (Zoned Residential) , Wanganui.

Points Relevant to Thesis: The Court as not convinced that the appellant had taken suitably comprehensive advice in regard to noise containment, nor was it convinced that the plant would be constructed in such a manner that would be functionally satisfactorily and suitable to ensure that the pleasantness of the environment enjoyed by the people of the area would not be adversely affected. There was also conflict as to the potential odour from the plant. It was concluded that the effects of the development would hinder the eventual residential growth pattern in the area which the District Plan envisaged. The appeal was dismissed.

Relevant to Indicators: 20(a), 20 (b).

A B Mitchell V Auckland City Council 1993. A023/93

Subject of Appeal: The conversion of a Motel Block in Herne Bay into residential units to produce a residential density not permitted in the Auckland District Plan.

Points Relevant to Thesis: The Court decided that granting of a consent was in keeping with the purposes of the Resource Management Act [sustainable management], with suitable balancing if conditions; for sound practicable reasons it was appropriate for the building to remain largely in its existing form, rather than be converted into a lower number of units within the same bulk or envelope; and, no generated effects were anticipated to significantly affect the residential amenities of the area. On the basis of the conditions of consent, any effect on the environment was considered minor; and granting the consent would not be contrary to the residential objectives and policies of the District Plan. The appeal was allowed subject to subdivision consent.

Relevant to Indicators: 11, 12

A. A. McFarlane V Christchurch City Council 1994, W072/94

Subject of Appeal: The appeal concerns the refusal of the Council to allow the appellant to subdivide three new allotments of just over 2,000 square metres from a 10 hectare block and build dwellings on them.

Points Relevant to Thesis: The land is zoned Rural 2. The proposal was an expansion of an existing urban area, but not an expansion of an urban area into a rural area [the land having previously been use for machinery standing and storage purposes]. The appeal land was not land of high actual value for the production of food. It was not deemed a wise use and management of this small piece of land that it be used for agricultural production. Costs of returning the land to production were high. The appeal was allowed.

Relevant to Indicators: 11, 17

M B Smith & J A Lester V Waikato District Council 1993. A099/93

Subject of Appeal: The appellants sought to overturn a decision by the Council not to grant subdivision consent for a five lots subdivision on rural land.

Points Relevant to Thesis: The Waikato Council Plan recognised the continual rural-residential demand, but as far as the Rural B zone was concerned, made it clear that to qualify for consent the land had to be of little or no productive value. Although the site had certain soil limitations, it was nonetheless of more than a little productive value. The Court was satisfied that it could be usefully amalgamated with either neighbouring property for productive purposes. The appeal was declined.

Relevant to Indicators: 17

S Smyth, C Johnstone, M & A Reid V North Shore City Council 1996. A058/96

Subject of the Appeal: The appeal was against the granting of a subdivision consent to subdivide three existing lots, each with a house on Queen Street, Northcote.

Points Relevant to Thesis: The area of the rear of three lots was only able to be made up through a reduction in the esplanade reserve width. Yards to the rear of the sites fronting the western side of the street are linked along the coastal edges with mature pohutakawa trees. The Court was not satisfied that, even allowing for engineering/building measures put forward to reduce the impact on the pohutakawa trees along the cliff edge, development of the two units would be appropriate in the face of the Proposed District Plan's concern to protect native vegetation within the conservation area. The appeal was allowed and the subdivision consent cancelled.

Relevant to Indicators: 1(b), 2.

Stillwater Ratepayers Assoc. & A. R. C. V Rodney District Council 1997. C048/97

Subject of Appeal: The appeal was against the rezoning of land at the mouth of the Weiti River, Stillwater, from Residential 3F to Medium Intensity Residential rather than Conservation 3.

Points Relevant to Thesis: The land owners wanted the Medium Intensity zoning to be extended to the seaward side of a coastal ridge. This would allow for only a small conservation area abutting the Nature Conservation Zone on the estuary edge. The Court found that subdivision as allowed by rezoning to Medium Intensity Residential would cause greater risk from domestic predators and was an important matter to be taken into account. It was considered that subdivision should be kept as far away as possible from the sand spits in order to protect a significant habitat for indigenous fauna; and, urban development visible from the north east and east would not protect the natural character of the coastal environment. The Court decided that it was appropriate to have the Medium Density development as far as the main stream running through the site because

that would have minimal landscape effects; would be in character with the existing development; and any siltation and stormwater effects could be remedied or mitigated to a point where they would be unmeasurable. Further extension of zoning was not considered likely to safeguard the life-supporting capacity of the ecosystem represented by the land in the vicinity of the sand spits. The Council was directed to modify the plan change so that land to the east of the stream was zoned Conservation 3.

Relevant to Indicators: 1(a), 1(b), (4).

J O & H J Gill and Ors. V Rotorua District Council 1993. W029/93

Subject of Appeal: An appeal against the granting of a consent by Rotorua District Council for the development of 11 dwellings and recreational facilities on 2.1043 hectares of rural zoned land at Kariri Point, Lake Tarawera.

Points Relevant to Thesis: The Court found that the Rural zoning was not inconsistent with the desirability of protecting the area that in the zoning the Council was setting out to limit residential development in the Rural environment in the public interest. Granting consent was held to be inconsistent with a designation on the land which related to the site's preservation as a scenic reserve. The Court concluded that the finite characteristics of the natural resources of the site would, in time, be modified by the proposal to a point which would bring them into line with the settlements on either side of the peninsula and destroy the nationally important characteristics. It decided that the cumulative effects of the development would be by major adverse effects. The appeal was allowed.

Relevant to Indicators: 1(b).

North Shore City Council and Others V Auckland Regional Council 1996. A086/96

Subject of Appeal: This was an appeal on the location of a line determining the urban limits at Okura Bay/ Long Bay, North Shore.

Points Relevant to Thesis: The Okura Bay / Long Bay area is the only remaining greenfields area remaining in the fast growing North Shore City. Okura estuary is however also the last area of the east of North Shore City which largely retains its natural qualities.

In making its decisions that Court considered the following aspects:

- That there was adequate infrastructure available should the development proceed (it was concluded there was);
- That the only other way of meeting demand for housing was for more intensive use of the existing urban area; the court noted that while some had already taken place there would be some community resistance if future demand (12,000 households per decade) was to be met by intensification;
- The Okura estuary was considered to be an outstanding landscape by the Department of Conservation and the Auckland Regional Council; the effects of this estuary would be considerable;

The court concluded that it did not need to make findings on the issues of the extent of urbanisation, regional transport, or archaeological sites. In considering whether extension of the urban area the Court said that the case rested on whether or not urbanisation would sustain the potential of resources to meet the reasonably foreseeable needs of future generations; safeguard the life-supporting capacity of air, soil, water and ecosystems; and avoid remedy or mitigate any adverse effects on the environment. The issue was not whether urbanisation would enable people to provide for their well-being. It was decided that it was not necessary that the urban limits be defined at Glenvar Road, but it was necessary that they exclude land in the Okura catchment. The appeal was

allowed in part, the Court determining that the urban limits be moved from Glenvar Road to the catchment boundary between Long Bay and Okura.

Relevant to Indicators: 1(a), 1(b), 11, 25.

Bibliography

- ABARE and Australian Department of Foreign Affairs and Trade (1995) *Global Climate Change: Economic Dimensions of a Cooperative International Policy Response beyond 2000*, ABARE, Canberra.
- Ahern J (1995) "Greenways as a Planning Strategy", in *Landscape and Urban Planning, An International Journal of Landscape Ecology, Landscape Planning and Landscape Design*: Elsevier Science, Amsterdam, Pages 131 - 155
- Ali Memon P. & Perkins H. C. (1993) *Environmental Planning In New Zealand*, Dunmore Press, Palmerston North.
- Allan S. (1987) *Water & Soil Issues: A Guide for Town and Country Planning*, National Water and Soil Conservation Authority, Wellington.
- Alonso W (1964) *Location and Land Use: Toward a General Theory of Land Rent*, Harvard University Press, Massachusetts.
- American Society of Planning Officials (ASPO) (1976) *Subdividing Rural America: Impacts of Recreational Lot and Second Home Development*, U.S. Government Printing Office, Washington D.C.
- Australian Road Research Board (ARRB) (1976) *Streets Not Roads*, Proceedings of the 8th ARRB Conference, Vermont South.
- Auckland Regional Water Board (1983) *Guideline: Riparian Zone Management*, Auckland Regional Authority.
- Bach M (1997) "Towards More Sustainable Patterns of Development and Transport : Reducing the Need To Travel: New Policy Developments in England. A paper presented at the "Pathways To Sustainability : Local Initiatives for Cities and Towns" Conference, Newcastle, Australia.

- Bachels M. (1996) *Developing Positive Feedback for Sustainable Transport: Learning From Car Dependence* in *Sustainable Energy Forum* Conference Proceedings of a Conference held in Tauranga March 1996
- Baily M. (1997) "Plan Methodologies Fail New Urban Development" in *Planning Quarterly : Journal of the New Zealand Planning Institute*, Number 125 June 1997, AGM Publishing, Auckland Pages 14 - 16.
- Bannister D (1992) "Energy Use, Transport and Settlement Patterns" in *Sustainable Development and Urban Form*, Prion Publishers, London. Pages 160 - 182
- Barbier E, (1987) "The Concept of Sustainable Economic Development, in *Environmental Conservation*, Volume 14, No. 2.
- Barclay B (1993) "Transport and the Urban Community" in *Planning Quarterly, Journal Of The New Zealand Planning Institute*, June 1993 Edition.
- Barton H (1992) "City Transport: Strategies for Sustainability", in *Sustainable development and Urban Form*, Prion Publishers, London. Pages 197 - 217.
- Barton H., Davis G, & Guise R. (1995) *Sustainable Settlements: A Guide for Planners, Designers and Developers*, University of the West of England, Bristol.
- Barton N., Edwards M., & Fookes T. (1993) "Towards an Understanding of Urban Sustainability - A Progress Report on Research for the Ministry for the Environment" in *Proceedings of the 1993 New Zealand Planning Institute Annual Conference*.
- Baschak L. A. & Brown R. D. (1995) "An Ecological Framework For the Planning, Design and Management of Urban River Greenways" in *Landscape and Urban Planning, An International Journal of Landscape Ecology, Landscape Planning and Landscape Design: No. 33*, Elsevier Science, Amsterdam, Pages 211 - 225

- Bell W (1987) "A Social and Community Impact Evaluation of Future Development Options for Metropolitan Adelaide" In *Australian Planner: Journal of the Royal Australian Planning Institute* Vol. 24 No. 4 Federation Press, Sydney.
- Berkhout V & Hill M (1992) "Urban Consolidation and Housing Affordability", in *Australian Planner: Journal of the Royal Australian Planning Institute*. Vol. 30 Number 1, Federation Press, Sydney.
- Bertuglia C.S. Clarke G. P. & Wilson A.G. (1994) *Modelling the City, Performance. Policy and Planning*, Routledge, London.
- Bickers A. (1996) "Sustainable Urban Transport Implications : A Provocative Layman's Transport Dream" in *Sustainable Energy Forum* Conference Proceedings of a Conference held in Tauranga March 1996.
- Bicknell K B, Ball R.J. Cullen R. & Bigsby H (1996) *Estimating New Zealand's Ecological Footprint* a paper presented at the 1996 Conference of the New Zealand Agricultural Economics Society, Blenheim, July 1996.
- Blowers A (1992) "Sustainable Urban Development: The Political Prospects" in *Sustainable development and Urban Form*, Prion Publishers, London. Pages 24 - 39.
- Breheny M. J. (1992) "Sustainable Development and Urban Form: an Introduction", in *Sustainable development and Urban Form*, Prion Publishers, London. Pages 1 - 24
- Breheny M. J. (1992) "The Contradictions of the Compact City: A Review ", in *Sustainable development and Urban Form*, Prion Publishers, London. Pages 138 - 160.
- Brindle R. (1989) "Never Mind The Width - Feel The Quality" in *Australian Planner, Journal of the Royal Australian Planning Institute*, Volume 27, No.4 , Federation Press, Sydney.

- Britton S, Le Heron R. & Pawson E (1992) *Changing Places In New Zealand: A Geography Of Restructuring*, New Zealand Geographical Society, Christchurch.
- Brotchie J (1992) "The Changing Structure Of Cities", in *Urban Futures*, special issue 5, pages 13-26.
- Building Industry Authority (1992) *Surface Water*, Building Industry Authority.
- Cadman D & Payne G (1990) "*The Living City, Towards a Sustainable Future*", Routledge, London.
- Caswell Tricia (1995) "Design Within Natural Landscapes" In *Australian Planner: Journal of the Royal Australian Planning Institute Vol. 32 No. 2* Federation Press, Sydney. Pages 116 - 120.
- Cevero R. (1996) "Paradigm Shift: From Automobility to Accessibility Planning" in *Proceedings of the 15th EAROPH World Planning Congress Conference*, Auckland, Pages 47 - 70.
- Christchurch City Council (1995) *Proposed Christchurch City Plan*, Christchurch City Council.
- Collie J S. (1990) "The Case for Urban Consolidation" in *Australian Planner: Journal of the Royal Australian Planning Institute Vol. 28. No. 2* Federation Press, Sydney. Pages 26 - 33
- Collier A (1995) *Sustainable Fisheries Management*, Thesis, Waikato University.
- Collier K J, Cooper A.B., Davies-Colley R.J. Rutherford J.C., Smith C.M. and Williamson R.B. (1995) *Managing Riparian Zones: A Contribution to Protecting New Zealand's Rivers and Streams*, Department of Conservation, Wellington.
- Coleman A (1990 Second Edition) *Utopia on Trial*, Hilary Shipman Ltd, London.

Commission On College Geography (1969) *The Spatial Expression of Urban Growth*, Association of American Geographers, Washington DC

Commissioner for the Environment (1976), *Moutoa Farm Settlement Land Development Proposal: Environmental Impact Audit*. Commission for the Environment.

Cronin K. (1988), *Ecological Principles for Resource Management*, Ministry For The Environment

Department of Housing and Regional Development (Infrastructure and Urban Strategies Branch) (1995) *Smart Planning Not Sprawl: The Costs and Benefits of Alternative Fringe Planning*, Department of Housing and Regional Development, Canberra.

Department of the Environment (1992) *Evaluating the Effectiveness of Land Use Planning*, HMSO, London.

Dialogue Consultants (1992) *Indicators of Sustainable Development*, Ministry for the Environment, Wellington.

Dialogue Consultants (1993) *Tauranga District Residential Environment Study : Residential Environmental Assessment*, Dialogue Consultants Auckland.

Dixon J. (Ed.) (1993) *Creating Safer Communities: A Discussion Paper*, Victorian Community Council Against Violence, Melbourne.

Dunn M. J. (1982) *Rural Subdivision: Policies and Controls*, A paper presented to the Rural Planning Seminar, May 1982, Bulls.

Edwards K A. (1997) "UNEP Perspectives On How We Are Travelling Along The Road To Sustainability", in Proceedings of the "Pathways To Sustainability : Local Initiatives for Cities and Towns" Conference, Newcastle, Australia.

Edwards M. (1993) *Resource Management Ideas: No. 5 Urban Sustainability* Ministry for the Environment, Wellington.

- Elkin T. McLaren D. and Hillman M. (1991) , *Reviving the City - Towards Sustainable Urban Development*, Friends of the Earth, London.
- Fabos J. G. (1995) "Introduction and Overview: The Greenway Movement, Uses and Potentials of Greenways", in *Landscape and Urban Planning, An International Journal of Landscape Ecology, Landscape Planning and Landscape Design*: Elsevier Science, Amsterdam, Pages 1 - 13.
- Fink A (1995) *The Survey Handbook*, Sage Publications, Thousand Oaks, California.
- Fleury A. M. & Brown R. R. (1996) "A Framework for the Design of Wildlife Conservation Corridors with Specific Application to Southwestern Ontario" in *Landscape and Urban Planning, An International Journal of Landscape Ecology, Landscape Planning and Landscape Design*: Elsevier Science, Amsterdam, Pages 163- 185.
- Fookes T (1992) "A Guide to the Resource Management Act with Particular Reference to Sustainable Management" in *Sustainable Management and the Resource Management Act - Proceedings of a Conference At the School of Engineering University of Canterbury*.
- Fookes T (1992²) *Resource Management Ideas No.3 : Social and Economic Matters*, Ministry for the Environment, Wellington.
- Forman R.T.T. & Godron M. (1986) *Landscape Ecology*, John Wiley and Sons, New York.
- Froude V. (1997) *Implementing the Biodiversity Provisions in the Resource Management Act : A Review of Council Progress to Date*, Pacific Ecologic Management Associates, Wellington.
- Gardner W & McDonald D H (1978) *Residential Density Preferences*, Town and Country Planning Division, Ministry of Works, Wellington.

- Gendall P J, Hosie J E and Russell D F (1994) *International Social Survey Programme: The Environment*. Department of Marketing, Massey University, Palmerston North.
- Ghosh A K (1990) "Economic Growth Or Environmental Protection: The San Francisco Experience", In *Australian Planner, Journal of The Royal Australian Planning Institute* , Federation Press, Sydney.
- Gibbs N (1994) *Enabling Sustainable Communities : A Strategic Policy Paper*, Ministry for the Environment, Wellington.
- Giddens A. (1989) *Sociology*, Pergamon Press, London.
- Gillespie A (1992) "Communications Technologies and the Future of the City" in *Sustainable development and Urban Form*, Prion Publishers, London.
- Gilpin A. (1990) *An Australian Dictionary of Environment and Planning*. Oxford University Press, Melbourne.
- Gold Coast City Council (1990) *People, Places & Planning*, Planning and Development Department, Gold Coast City.
- Gollner A. (1996) "To Sprawl or not to Sprawl: A Journey To Work Perspective" in *Australian Planner, Vol.33, No. 3* Federation Press, Sydney.
- Gordon R. (1969) *Interviewing, Strategy, Techniques, and Tactics*, Homewood, Dorsey.
- Gow L. J. A. (1991) *Sustainable Management: the Key to the Resource Management Bill* an Address given to the 1991 New Zealand planning Institute Conference, Dunedin.
- Gough J D & Ward J C (1991) *Information for Environmental Decision Making: A Case Study Approach*. Centre For Resource Management, Lincoln University.

- Grant M. (1995) "Sustainable Management: A Sustainable Ethic?" in *Resource Management News*, Resource Management Law Association of New Zealand, November/December 1995.
- Green B. (1981) *Countryside Conservation: The Protection and Management of Amenity Ecosystems*, George Allen and Unwin, London.
- Greenpeace International (1994) *The Climate Change Time Bomb : Signs of Climate Change form the Greenpeace Database*, Stichting Greenpeace Council, Amsterdam.
- Gresswell R. E. , Barton B. A, & Kershner J. L. (1989) *Practical Approaches To Riparian Resource Management : An Educational Workshop*, US Bureau of Land Management, Billings (Montana)
- Grundy K. J. (1994) "Public Planning in a Market Economy" in *Planning Quarterly, Journal of the New Zealand Planning Institute*, June 1994, Pg. 20 - 23.
- Hammond A, et al. (1995) *Environmental Indicators : A Systematic Approach to Measuring and Reporting on Environmental Policy Performance In the Context of Sustainable Development*, World Resources Institute.
- Hamnett S. (1996) "Sustainable Urban Form : The Example of MFP Australia" in *Proceedings of the 15th EAROPH World Planning Congress Conference*, Auckland page 88
- Haughton G. & Hunter C. (1994) *Sustainable Cities*, Jessica Kingsley Publishers, London.
- Hedgecock D & Mouritz M (1993) "Water Sensitive Residential Design" in *Australian Planner: Journal of the Royal Australian Planning Institute Vol. 31 No. 2* Federation Press, Sydney. Pages 114 - 118
- Hewison G J (1994) *A Guideline of New Zealand's International Obligations Affecting the Coastal Environment*, A Report Prepared for the Department of Conservation, Wellington.

- Hewetson D. (1994) *Infill Survey Report: Results of the 1994 Residential Infill Survey of Hokowhitu and Kelvin Grove Residents*, Department of Strategic Planning, Palmerston North City Council, Palmerston North.
- Hewetson D. (1994ⁱⁱ) *The Greenfields Report - An Investigation Into Greenfields Residential Development in Palmerston North City*. Department of Strategic Planning, Palmerston North City Council, Palmerston North.
- Heywood P. (1994) "Sustainable Rural Land Use" in *Proceedings of the 1994 New Zealand Planning Institute Annual Conference, Nelson*.
- Hill D. (1993) "Development and Reserve Standards Under the RMA: Icons and Iconoclasts, Some Provocative Thoughts for a Panel Discussion" in *Proceedings of the 1993 New Zealand Planning Institute Annual Conference, Auckland*.
- Horne C. (1991) "The Curse Of The Car" in *Terra Nova: The Resource Management Magazine of New Zealand*, October 1991 issue, Brooker & Friend, Wellington. Pages 16 - 18.
- Hughes T. (1993) *Planning For Road Safety Under the Resource Management Act*, a paper presented to the 1993 New Zealand Planning Institute Conference, Auckland.
- Hurunui District Council (1996) *Hurunui Proposed District Plan*, Hurunui District Council, Amberly.
- Jacobs J. (1965) *The Death and Life of Great American Cities*, Pelican, London
- Johnston R. J. (1986) *The Dictionary Of Human Geography (2nd Edition)*, Basil Blackwell Ltd., Oxford.

- Joint Venture for Affordable Housing (1989) *Australian Model Code For Residential Development*, Australian Government Publishing Service, Canberra.
- Kawerau District Council (1996) *Kawerau District Council Proposed District Plan*, Kawerau District Council, Kawerau.
- Kennedy P & Trevelyan A (1994) "Designer Offers Alternative to Urban Sprawl" in *Planning Quarterly, Journal of the New Zealand Planning Institute*, March 1994, AGM Publishing, Auckland .
- Khan M F F H (1996) *Sustainable Land Use and Transport Planning in Urban Areas: A Case Study of Auckland*, A thesis prepared in partial fulfillment of the requirements for the Degree of Master of Resource and Environmental Planning at Massey University, Palmerston North
- Kinnear S. (1993) *Resource Management Act 1991: Provision for Subdivision in a Proposed District Plan*.
- Kirwan R. (1992) "Urban Consolidation: The Economic Potential" in *Australian Planner, Journal of the Royal Australian Planning Institute*, Vol. 30 Number 1, Federation Press, Sydney.
- K.R.T.A. Limited. (1985) *Energy and Urban Form: Report No.119*, New Zealand Energy Research and Development Committee, Auckland.
- Kuik O. and Verbruggen H (Ed.) (1991) *In Search of Indicators of Sustainable Development*, Kluwer Academic Publishers, Dordrecht
- Lang J (1995) "The Human Dimension of Urban Design" in *Urban Futures: Issues for Australian Cities* No. 17 February 1995, Urban Management Group of the Commonwealth Department of Housing and Regional Development, Woden. Pages 25 - 36
- Law R. G. (1993) "Urban Sustainability: the Water Cycle" in *Proceedings of the 1993 New Zealand Planning Institute Annual Conference*, Auckland.

- Linehan J., Gross M. & Finn J (1995) "Greenway Planning: Developing a Landscape Ecological Network Approach" in *Landscape and Urban Planning, An International Journal of Landscape Ecology, Landscape Planning and Landscape Design*: Elsevier Science, Amsterdam, Pages 179-193.
- Local Government Management Board (1994) *Local Agenda 21 Roundtable Guidance: Planning, Transport and Sustainability*, Paper 5 in a series of papers produced by the Local Government Development Board, Luton. Page 2 - 7.
- Lower Hutt City Council Staff (1994?) *Working Draft Lower Hutt City District Plan* Lower Hutt City Council
- McAlley D. and McQuoid R. G. (1982) *Taupo Peri- Urban Growth Land Use Study*, Department of Lands and Survey, Hamilton.
- McDermott Associates and Sheppard & Rout (1986) *Towards a Policy for Urban Consolidation*, Ministry of Works and Development.
- McDermott Fairgray Ltd. and Barry Rae Consultants (1994) *Planning for Urban Centres Under the Resource Management Act: A Discussion Paper*, Ministry for the Environment, Wellington.
- McIntyre J. M. (1992) *Rural - Residential Subdivision: A Strategy For the Future*. A Project undertaken in partial fulfillment of the requirements for the Bachelor of Resource and Environmental Planning (Hons.) Degree at Massey University.
- MacRae J. (1996) "Environmental Legislation to Achieve Sustainable Communities" in *Proceedings of the 15th EAOPH World Planning Congress*, Auckland. Supplementary Paper.
- Magee A. (1996) "Waitakere Eco-city: Potential for Local Sustainability initiatives" in *Sustainable Energy Forum* Proceedings of a conference held in Tauranga 1996.

- Manakau City Council (1995) *Manukau City Proposed District Plan : Nga Tohu mo Te Rohe o Manukau*, Manukau City Council, Auckland.
- Maplesden J. (1993) "The Flat Bush Urban Development Study: High Density Villages as a Sustainable Alternative to Conventional Subdivision" in *Proceedings of the 1993 New Zealand Planning Institute Annual Conference, Auckland*.
- Masterton District Council (1994) *Masterton District Council Proposed District Plan*, Masterton District Council, Masterton.
- Mees P (1994) "To Good To Be True? : Are Journeys To Work Really Becoming Shorter?" in *Australian Planner, Journal of the Royal Australian Planning Institute*, Federation Press, Sydney.
- Mein B. (1993) *Efficient Management Of The Transport Resource: A Local Authority Perspective*, a paper presented to the 1993 New Zealand Planning Institute Conference, Auckland.
- Melville A (1991) "Stormwater - The Pervasive Polluter" In *Terra Nova: The Resource Management Magazine of New Zealand. August 1991* Brooker & Friend, Wellington
- Menzies B. J. & Bell M. J. (1981) *Peri-Urban Development - A Case Study of the Adelaide Hills*, Department of Agriculture, (South Australia) Adelaide.
- Middleton P. (1966) *An Architectural Approach to Residential Subdivision*. in *Town Planning Quarterly* , (March 1966), Auckland.
- Milne C. D. A. (ed.) (1993) *Handbook of Environmental Law*, Royal Forest and Bird Protection Society of New Zealand, Wellington.
- Ministry For the Environment (1989) *Resource Management Law Reform: Sustainability, Intrinsic Values and the Needs of Future Generations*, Resource Management Working Paper No. 24, Ministry for the Environment, Wellington.

Ministry for the Environment (1990) *State of the Environment Reporting In New Zealand*, Ministry for the Environment, Wellington.

Ministry for the Environment & Department of Statistics (1991) *Reporting State of the Environment Information*, Ministry for the Environment, Wellington

Ministry For the Environment (1992) *The Context: Sustainable Development as a Backdrop for the Resource Management Act - Information Sheet Number One*, Ministry for the Environment.

Ministry For The Environment (1992²) "Effects, what effects? : Ideas for Implementing Assessment of effects for Subdivision", in *Proceedings of the 1992 New Zealand Institute of Surveyors Conference On Subdivision*.

Ministry for the Environment (1993) *Making Connections: An Overview of Agenda 21*, Ministry for the Environment, Wellington.

Ministry for the Environment (1995) *A Sustainable Land Management Strategy for New Zealand: A Discussion Paper*, Ministry for the Environment, Wellington.

Ministry for the Environment (1996) *National Environmental Indicators : Building a Framework for a Core Set*, Ministry for the Environment, Wellington.

Ministry for the Environment (1997) *Environment Performance Indicators, Proposals for Air, Fresh Water & Land : Signposts for Sustainability*, Ministry for the Environment, Wellington.

Ministry of Commerce (1994) *Energy Supply and Demand Scenarios to 2020"* Ministry of Commerce, Wellington

Mitlin D & Satterthwaite D (1990) *Human Settlements And Sustainable Development: The Role of Human Settlements And of Human Settlement Policies In Meeting Development Goals And In Addressing The Issues of Sustainability At Global and Local Levels*, United Nations Centre for Human Settlements (Habitat)

- Morris W & Ecologically Sustainable Design Ltd. (undated) *Mixed Use Compatibility For Inner Newcastle*, City of Newcastle (Australia).
- Muhammad Z B (1996) "Planning Methods Towards Achieving Sustainable Community" in *Proceedings of the 15th EAROPH World Planning Congress Conference*, Auckland. Pages 1 - 39.
- Mulcock C. (1994) " Panel Discussion; Sustainable Rural Land Use" in *Proceedings of the 1994 New Zealand Planning Institute Annual Conference*, Nelson.
- Murphy G. (1992) *Riparian Zone Management: A Review of the Literature*, Bay of Plenty Regional Council, Whakatane.
- Newman O. (1972) *Defensible Space*, MacMillan Publishing, New York
- Newman P. (1997) "From Symbolic Gesture To The Mainstream : Next Steps In Local Sustainability" in *Proceedings of the "Pathways To Sustainability : Local Initiatives for Cities and Towns"* Conference, Newcastle, Australia.
- Newman P. & Kenworthy J. (1992) *Winning Back the Cities*, Pluto Press, Leichhardt.
- Newman P. Kenworthy J. and Vintila P. (1992) *Transport and Urban Form*, Murdoch University, Australia.
- New Zealand Institute of Agricultural Science (1974) *Competition For Productive Land : Rural - Urban Pressures in New Zealand*, New Zealand Institute of Agricultural Science, Wellington
- New Zealand Law Society (1992) *Subdivisions and the Resource Management Act* , New Zealand Law Society, Wellington.
- Nijkamp P, Lasschuit P. & Soeteman F. (1992) "Sustainable Development in a Regional System" in *Sustainable Development and Urban Form*, Pion Publishers, London. Pages 39 - 67.

- North Shore City Council (1993) *Draft Urban Development Strategy*, North Shore City Council, Takapuna, Auckland.
- North Shore City Council (1994) *North Shore City Council Proposed District Plan*, North Shore City Council, Takapuna, Auckland.
- Oluwoye J (1997) *Ways Towards Sustainable Traffic and Transport for Cities and Towns*, A paper presented at the "Pathways To Sustainability : Local Initiatives for Cities and Towns" Conference, Newcastle, Australia.
- Owens S. (1992) "Energy, Environmental Sustainability and Land Use Planning" in *Sustainable Development and Urban Form* , Prion Publishers, London, Pages 79 - 106.
- Organisation for Economic Cooperation and Development (OECD) (1991) *Environmental Indicators: A Preliminary Set*, OECD, Paris
- Organisation for Economic Cooperation and Development (OECD) (1995) *Urban Energy Handbook - Good Local Practice*, OECD, Paris
- Orrskog L. & Snickars F (1992) " On The Sustainability of Urban and Regional Structures in in *Sustainable development and Urban Form*, Prion Publishers, London. Pages 106 - 122.
- Pacione M. (1990) *Urban Problems : An Applied Urban Analysis*, Routledge, London.
- Palmerston North City Council (1995) *Palmerston North City Proposed District Plan*, Palmerston North City Council.
- Parker A A (1995) "Cycling and Urban Travel: How Much Society Could Save By Substituting Bicycle Trips For Shorter Car Trips" in *Urban Futures: Issues for Australian Cities* No. 18 June 1995, Urban Management Group of the Commonwealth Department of Housing and Regional Development, Woden. Pages 53 - 60

- Pavletich H J & McShane O (1997) *Taking the Heat Off the RMA*, An unpublished paper dated May 1997 distributed at a presentation to the New Zealand Resource Management Law Association Lunch at the Aotea Centre in Auckland, July 1997.
- Peet J (1993) "A Theoretical Framework for Sustainable Management", in *Sustainable Management and the Resource Management Act* Proceedings of a Seminar Held 20 February at the School of Engineering, University of Canterbury.
- Peet J (1993²) *Ecological Economics: A Challenge to the Engineering Profession?* A paper presented to the IPENZ Conference, Hamilton, February 1993.
- Porirua City Council (1994) *Porirua Proposed District Plan*, Porirua City Council, Porirua
- Pritchard M (1991) "Towards The Sustainable City" in *Terra Nova: The Resource Management Magazine of New Zealand*, October 1991 issue, Brooker & Friend, Wellington. Pages 12 - 15
- Randall A (1987) *Resource Economics: An Economic Approach To Natural Resource And Environmental Policy (2nd Edition)*, John Wiley & Son New York.
- Rees W (1996) "Revisiting Carrying Capacity: Area-Based Indicators of Sustainability" in *Population and Environment: A Journal of Interdisciplinary Studies*, Volume 17, No. 3, January 1996, Human Sciences Press. (A copy is also on the Internet: <http://dieoff.org/page110.htm>).
- Reynolds F. (1993) "The Urban - Rural Interface: A Landowners Perspective" in *Proceedings of the 1993 New Zealand Planning Institute Annual Conference*.
- Roper B & Rudd C (1993) *State & Economy In New Zealand*, Oxford University Press, Auckland

- Rotorua District Council (RDC) (1993) *Proposed Rotorua District Plan*, Rotorua District Council.
- Safe City Committee of the Toronto City Council & City of Toronto Planning and Development Department (1992) *A Working Guide for Planning and Designing Safer Urban Environments*, Toronto
- Sarkissan W, Forsyth A and Heine W (1990) "Residential Social Mix" in *Australian Planner, Journal of the Royal Australian Planning Institute*, Vol. 28, No. 1, Federation Press, Sydney. Pages 5 - 14.
- Spargo G. & Adrienne Young Cooper (1996) *Closing the Loop : Developing Effective Resource Management Monitoring Strategies*. Proceedings from a series of Workshops supported by the Ministry For the Environment and The New Zealand Local Government Association.
- Stanley D. (1996) *Urban Growth - Is it Out of Control?* A Speech Given to the Resource Management Law Association, Auckland.
- Statistics New Zealand (1996) *New Zealand Official Year Book*, Statistics New Zealand, Wellington.
- Stonyer E J. (1972) *The Conservation of Land For Primary Production*, Ministry of Agriculture and Fisheries, Wellington.
- Strauss A and Corbin J (1990) *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Sage Publications London.
- Tai B. (1996) "Compliance With Green Legislation" in *Australian Planner*. Journal of the Royal Australian Planning Institute, Vol. 33 No. 3 1996.
- Tauranga District Council (Department of City Services) (1997) *Roading Data: Traffic Counts*, Tauranga District Council, Tauranga.
- Taylor R & Smith I (1997) *The State of New Zealand's Environment*, Ministry for the Environment, Wellington.

- The Royal Society of New Zealand (1988) *Climate Change in New Zealand, An abridged version of a report prepared by the New Zealand Climate Committee of the Royal Society of New Zealand as a contribution towards the Climate Change Programme of the New Zealand Government*, Royal Society of New Zealand, Wellington
- Troy P N (1990) "The Greenhouse Effect and The City" in *Australian Planner, Journal of the Royal Australian Planning Institute*, Vol. 28, No. 1, Federation Press, Sydney. Page 17- 22.
- United Nations Centre for Human Settlements (Habitat) (1996), *An Urbanizing World, Report On Human Settlements*, Oxford University Press,
- Upton S. (1995) *The Problems of Rural Subdivision*, A speech by the New Zealand Minister for the Environment, given to the 1995 New Zealand Planning Institute Conference, Taupo.
- Ulrich S. C. & Ward J C (1997) *Indicators of Natural Character of Freshwater: Generic Approaches to Management*. , Centre for Resource Management, Lincoln University
- Vasbenter L (1991) "Communities Plan Their Own Housing" In *Terra Nova: The Resource Management Magazine of New Zealand*. August 1991 Brooker & Friend, Wellington
- Waitakere City Council (1995) *Our Place, Our Future, Waitakere City Proposed District Plan*, Waitakere City Council, Auckland.
- Wanganui District Council (1996) *Wanganui District Council Proposed District Plan*, Wanganui District Council, Wanganui.
- Ward J C (1993) *Indicators of the State of the Coastal Environment and Management Practices*. Centre for Resource Management, Lincoln University.

- Ward B., & Dubos R. (1972) *Only One Earth: The Care and Maintenance of a Small Planet*, Deutch, London
- Webb T H, Jessen M R. & Wilde R. H (1995) "Identification of High Class Land" in *Broadsheet*, New Zealand Association of Resource Management.
- Western Bay of Plenty District Council (1992) *Rural Subdivision Review Planning Report*, Western Bay of Plenty District Council , Tauranga
- Western Bay of Plenty District Council (1995) *Proposed Western Bay of Plenty District Plan (as amended through decisions on submissions)*, Western Bay of Plenty District Council, Tauranga.
- Works Environmental (1996) *Rural Subdivision Under the Resource Management Act 1991: A Report on the Issues Aims and Attitudes On Rural Subdivision in New Zealand*, Works Consultancy Services Ltd, Wellington.
- Wolff E. A. (Ed.) (1975) *Urban Alternatives : Proceedings of the USERC Environment, Resources and Urban Development Workshop*, Pergamon Press, New York.
- World Conservation Union (IUCN), United Nations Environment Programme (UNEP) & World Wide Fund for Nature (WWF) (1990), *Caring for the World: A Strategy for Sustainability - 2nd Draft*.
- World Health Organization Expert Committee (1991) *Environmental Health in Urban Development*, World Health Organization, Geneva.
- World Resources Institute (1996) *World Resources 1996 - 1997: A Guide to the Global Environment*, Oxford University Press, New York.

Personal Communications

Murray Cameron	Policy Analyst, Ministry For The Environment, Northern Regions Office, Auckland.
Richard Coles	Planner, Tauranga District Council (fomerly with Alandale Planning Consultants working on the Kawerau District Plan)
Aaron Collier	Planner, Western Bay of Plenty District Council
Sue Dalhberg,	Planner, Masterton District Council (by telephone).
Gerry Hodgson,	Denniston, Hodgson, Turner Architects, Tauranga.
Julie Turner	Planner, Waitakere City Council (by telephone).
Chris Van Tonder	Woodward Clyde Consultants, Auckland

Environment Court Decisions Cited

A A McFarlane V's Christchurch City Council (1994); Environment Court decision number W072/94

A B Mitchell V's Auckland City Council (1993); Environment Court decision number A023/93

A W Bos V's Hamilton City Council (1992); Environment Court decision number W013/93

A H Burnett V's Tasman District Council (1995); Environment Court decision number W025/95

B C Hodson V's Wanganui District Council (1994); Environment Court decision number A036/94

Becmead Investments Limited and Others V's Christchurch City Council (1996); Environment Court decision number A088/96

Canterbury Area Health Board V's Selwyn District Council (1993); Environment Court decision number C087/93

Canterbury Regional Council V's Selwyn District Council (1996); Environment Court decision number W142/96

G F McIntyre V's Tasman District Council (1994); Environment Court decision number W083/94

J Clear Family Trust V's Queenstown Lakes District Council (1994); Environment Court Decision number C120/94

J O & H J Gill, and Others V's Rotorua District Council (1993); Environment Court decision number W029/93

J S Hunt V's Palmerston North City Council (1993); Environment Court decision number W013/93

M A & G G Armstrong V's Waimakariri District Council (1995); Environment Court decision number C033/95

McLeod European Ltd. V's Hamilton City Council (1995): Environment Court decision number A015/95

M B Smith & J A Lester V's Waikato District Council (1993); Environment Court decision number A099/93

Minister of Conservation V's Whangarei District Council (1994); Environment Court decision number A019/94

North Shore City Council, Green, McCahill Properties Ltd; Durafort Investments Ltd; and Okura River Farm Partnership V's Auckland Regional Council (1996); Environment Court decision number W029/93.

R & I C Robinson V's Ashburton District Council (1994); Environment Court decision number W092/94

S Smyth, C Johnstone, M & A Reid V's North Shore City Council (1996); Environment Court decision number A058/96

Stillwater Ratepayers Association and Auckland Regional Council V's Rodney District Council (1997); Environment Court decision number C048/97.

Warbrick M J R and Others; Dickson G J; and McDonald's System of New Zealand Ltd. V's Whakatane District Council (1995); Environment Court decision number A019/95

Wilbow Corporation of New Zealand Limited V's North Shore City Council (1995); Environment Court decision number W107/95