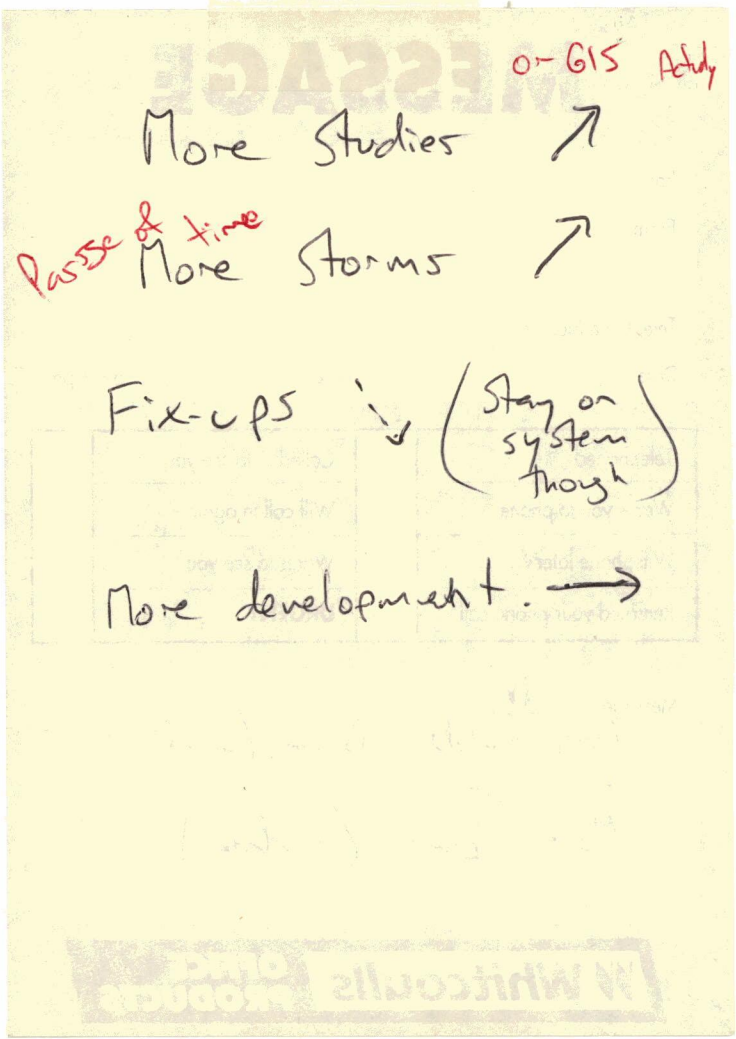
Tauranga City

STATE OF THE ENVIRONMENT TAURANGA 2000

city - our environment

Tauranga District Council


More Studies
Pass of time
More Storms
Fix-ups
(Stay on system though)
More development.

Tauranga is the Maori word for "landing place". The name dates back to the 12th century when the earliest settlers arrived from the Takitimu and Mataatua waka. For the past 800 years, the climate, bountiful seafood and pleasant surroundings have lured people to settle here.

Today the district is one of the fastest-growing areas in the country, with a current population (June 2000) estimated to be 90,600. This growth places continuing development pressures on the natural and physical environment.

Tauranga Central Business District

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Cover Photograph: Roger Cherry

EXECUTIVE SUMMARY

The Tauranga District State of the Environment Report attempts to answer the fundamental questions - what is the quality of Tauranga's environment and is it improving or getting worse?

A way of answering this is to look at whether we are meeting environmental targets.

In summary, the key findings concerning Tauranga's environment are:

- The size of urban sections is getting smaller, as higher-density housing is established in areas such as central Mount Maunganui and the Avenues, and as infill development occurs.
- Tauranga Central is the most intensively developed area of urban Tauranga with Bethlehem the least developed.
- Increased infill housing near the port and airport is likely to affect people's amenity through noise impacts.
- Accessibility to facilities and services, such as schools, supermarkets, and reserves, is a major reason why people choose to live in established areas of the District.
- Provision of community services and facilities is not keeping pace with new housing and subdivisions in Urban Growth Areas such as Bethlehem and Papamoa.
- Properties which have a sea or harbour view are valued at nearly 75% more than properties which do not.
- The Matua Saltmarsh, Waikareao Estuary and Papamoa dunelands are the most intact significant ecological sites in the District, with Mauao, surprisingly, one of the most modified and fragmented ecologically significant areas.
- The overall landscape quality of the District is good with a baseline measure of 50 landscape points.
- Less than half of the significant ecological areas in the District - which include Mauao, the coastal dunes and harbour saltmarsh areas - are legally protected from modification or destruction. Only 5% of potential significant ecological areas are protected (protection being by way of reserve or convenants).
- The amount of productive rural-type land is continuing to decrease, due to urban growth pressures.
- Properties in the identified coastal hazard risk areas are valued at nearly twice that of properties landward of these hazard areas.
- Our open coast beaches from Mount Maunganui to Papamoa have been relatively stable over the past 11 years.
- Of properties in Tauranga, 6% are within identified flood-prone areas.
- Housing lifestyle is changing in Tauranga; 9% of people live in high-density housing and 34% in medium-density housing.
- Car ownership in Tauranga is continuing to increase, with just over one car to every two people.
- While traffic congestion is increasing, this is at a lesser rate than our population growth.

SECTION 1: INTRODUCTION

The State of the Environment Report for Tauranga District provides a way of measuring the environment in which we live, work and reside. It provides a snapshot overview of the current state of our environment and the key environmental issues facing us through a list of indicator measures.

While there are many environmental, cultural, economic and social issues that concern the District, this report restricts itself to matters which are primarily functions of the Tauranga District Council.

The indicators included in this report will be surveyed annually to assess changes and trends and what the District Council may need to do to maintain our environment.

A glossary is contained at the end of the report to explain specific terms used.

SECTION 2: WHY MONITOR?

Monitoring helps understand why changes are occurring to our environment. It assists Council to decide how to manage change and highlights future problems.

This report is born out of the need to know what the state of our environment is and which direction it is heading. Under the Resource Management Act 1991 (RMA) there is a legislative requirement to monitor our environment. Through monitoring, both Council and the community can obtain information to determine if we are being successful in the sustainable management of the natural and physical environment.

The purpose of the RMA is to promote "sustainable management" and to do this the Act requires (among many other things) councils to monitor the state of their area's environment.

New Zealand's first national monitoring report was released in October 1997. It highlighted the need for better environmental information and forecast a gloomy environmental outlook if significant changes did not occur in the way the environment was managed.

Tauranga's State of the Environment Report is the first step in what will be an ongoing and systematic process of learning how the community's actions affect the District's environment. Many of the indicators require long-term data to be useful, but in a number of instances that information is not available. This report steers away from saying whether indicators show good or bad trends. The focus here is on achieving the sustainability objectives set down in the District Plan. Whether a trend is good or bad should be self-evident over time.

2.1 WHAT ARE INDICATORS?

Indicators are aspects of the environment (known parameters) which are monitored regularly to show trends or changes.

This report presents 44 indicators under five headings which correspond to the key policy themes in the District Plan.

It uses the *pressure-state-response* model format established by the Ministry for the Environment for its national indicators programme.

Human activities exert pressures on the district's environment, changing both the quality and quantity of natural resources. These changes alter the state, or condition, of the environment. The human responses to these changes include measures to reduce, prevent or mitigate undesirable change or environmental results. The indicators used in this report include both state and pressure indicators.

2.2 MONITORING INFORMATION SOURCES

Information in this report is derived from several sources. Some has been derived from external indicator reports.

Primary sources of information are:

- Council's Geographic Information System (GIS)
- Data collected by Council from building permits and resource consent applications.
- Landscape indicators derived from the Boffa Miskell report, Outstanding Natural Features and Landscapes, State of the Environment Indicators (March 2000).
- Ecological and biodiversity indicators derived from the Wildland Consultants Ltd report, Natural Heritage Indicators of the Tauranga District (May 2000).
- Resident survey and opinion information, particularly in the Amenity Section of the report, from Key Research, including their Tauranga Residential Intensification Study, Telephone Survey and Workshop Results (September 1999).

SECTION 3: MONITORING THEMES

Tauranga's District Plan divides the environment into five key areas:

- Amenity values
- Natural resources
- Heritage
- Hazards
- Physical resources.

Heritage, although important, will not be reported on until further research is completed. Heritage comprises natural, built and cultural features including historic buildings, archaeological sites, trees, landforms and ancestral lands.

Amenity values, natural resources, hazards and physical resources have been evaluated in a two-step process. Firstly, indicators were selected for each theme based on objectives of the District Plan. The second step involved developing methodologies and applying these to each indicator. The following sub-section describes each of the topic areas.

3.1 AMENITY VALUES

Amenity values are those parts of the environment which contribute to the pleasure we derive from our surroundings. They include privacy, access to facilities and reserves, and perception of the District's attributes and characteristics. In a fast-growing district like Tauranga, amenity values can change rapidly. A key aspect of this report is information on access to sufficient privacy, degree of impact by building overshadowing and perception of streetscape.

3.2 NATURAL RESOURCES

Natural resources keep our water clean, make the environment interesting and provide other important services (cooling, protecting against hazards, and maintaining soil fertility, for example). Natural resources comprise the plants, animals and landforms that give Tauranga a distinctive character. Weed growth, species diversity and development pressures in and adjacent to the most Special Ecological Sites underpin the natural resource indicators which also include indicators for landscape quality.

3.3 HAZARDS

The geology of Tauranga and the proximity of many dwellings to the coast present a risk to property (and to a lesser degree, people). For the purpose of this report, hazard risk has been evaluated indirectly by looking at the number of properties potentially affected and their comparative land values.

The hazards theme includes consideration of hazardous substances, although recent legislation and administrative changes associated with these have changed district council responsibilities. Many hazardous substances fall below the risk threshold of public interest (e.g., domestic stores of fuels and chemicals, etc.). The Hazardous Substances and New Organisms Act 1996 covers the management of all hazardous substances. The information on hazardous substances within Tauranga District is limited to substances controlled by the Dangerous Goods Act 1974.

3.4 PHYSICAL RESOURCES

The form and rate at which the District grows determines many long-term environmental effects. For example, an absence of local services or the creation of new subdivisions lacking necessary facilities force people to use cars for all but their most basic requirements. Investment in roading has an effect on energy consumption by encouraging people to use private motor vehicles, but can also provide opportunities for public transport.

Private vehicle ownership and land-use changes are key indicators to monitor physical resource consumption and are related to a wider issue of resource inefficiency and waste.

SECTION 4: AMENITY VALUE INDICATORS

4.1 BACKGROUND

Studies on urban development in Tauranga, such as the Western Bay of Plenty Urban Development Study (1986), predicted a market for lower-density development on the city fringe. This lead to the creation of the five Urban Growth Areas in 1991. However, low-density development can result in increasing infrastructure costs, greater dependency on cars and a loss of productive land. In respect of amenity, many people traditionally preferred "conventional" development - the quarter-acre section and single free-standing home. Intensification of existing developed areas as a response to population growth, which has boomed in the past decade, has effects on people's amenity values.

In May 1993 Council commissioned research[1] on people's perceptions of their residential environment. That study found people were:

- Feeling "jammed" in by residential infill
- Concerned for lost privacy
- Aware of lost "open space"
- Concerned to see views protected.

The respondents also sought flexibility in the way they used their land and felt Council should provide a greater diversity of residential development opportunities. A number opposed regulation as a means of achieving this. Other themes emerging from the study were the importance of access to facilities (i.e., shopping centres, public open space and employment) and the need for a variety of trees and green spaces.

(1)Tauranga District Council Residential Environment Study, Dialogue Consultants (May 1993).

4.2 OUR RESPONSE TO THESE ISSUES

Council has a limited ability to address some amenity problems. Privacy, for example, can be extremely difficult to manage as even properties a great distance apart can affect one another. Tauranga's relatively uneven topography compounds privacy issues with houses tending to overlook each other. However, amenity values are one of the most important areas of community interest, and it is an area in which the Council has a significant planning involvement.

Council's main planning response to amenity issues has been through the District Plan and in providing reserves and facilities. Daylighting rules, noise controls, building height limits, minimum lot size, and open-space structure planning all contribute to positive amenity outcomes.

The District Plan:

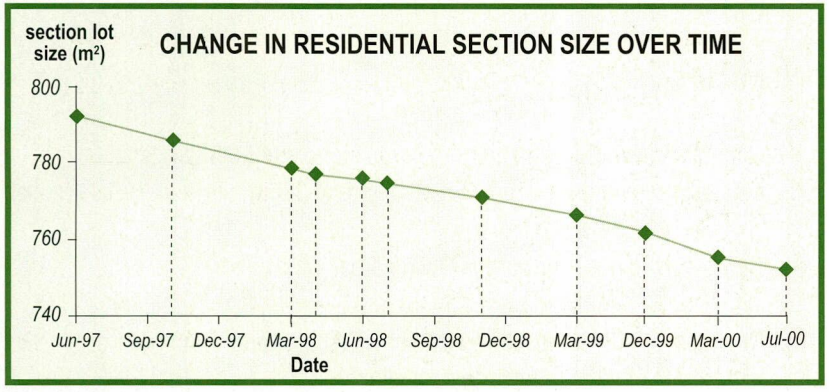
- Reduces the width of mandatory yards along site boundaries and standardises minimum residential lot size at 325m^2 in Residential A zones
- Removes the need for outdoor living areas on a site
- Provides significant flexibility to those wishing to develop their properties within a defined building height envelope
- Reduces the minimum rural section size for some forms of "lifestyle" development.

INDICATOR 1 - AVERAGE RESIDENTIAL SECTION SIZE

Residential section size is considered a good indicator of amenity values. Higher-density environments often lack high amenity value features such as open space, greenery, and a human scale. However, poor amenity may also be the result of an absence of good design and service provision.

STATE

Over the past three years (since data has been collected by the Council), sections in Tauranga have decreased by 13m^2 each year. At this rate it will take 33 years for sections to average the current minimum size of 325m^2. Diminishing section size has a number of ramifications. Firstly, it means people will increasingly live at higher densities which will increase pressure on infrastructure (roads, sewers, parking, stormwater) and neighbourhood amenity (noise, privacy, outlook).



- Section sizes in Tauranga are getting smaller on average by 13m^2 every year.

INDICATOR 2 - PROPORTION OF SECTION OCCUPIED BY THE HOUSE

The percentage of a section occupied by the main dwelling (site coverage) is another good indicator of amenity. Private open space provides children with play areas, entertainment areas, and some visual variety.

For these reasons private open space is evaluated as an amenity proxy, although it must be recognised that intensively developed sites can also be considered attractive in contributing to an area's feel.

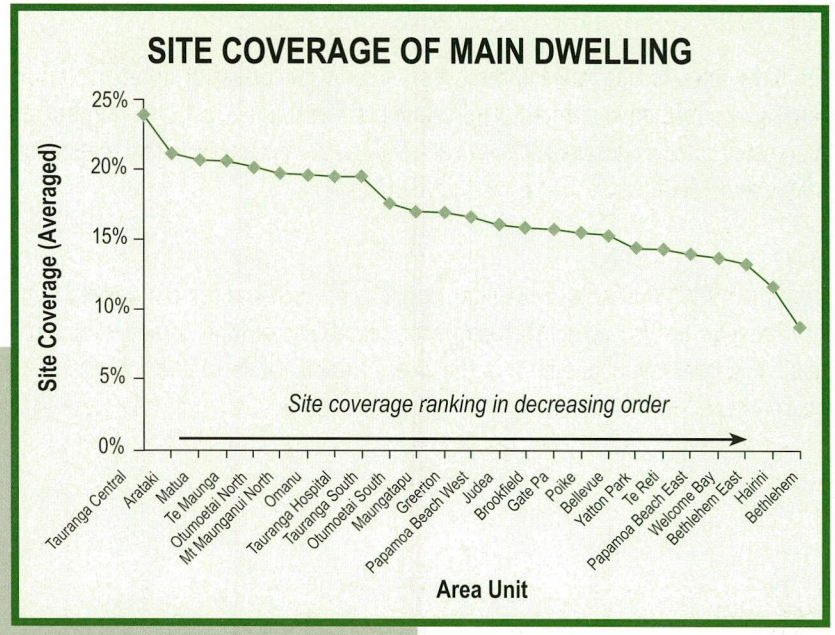
The picture below shows two dwellings on sections close to the proposed District Plan minimum lot size of 325m^2(2). In both cases the main dwelling occupies most of the section illustrating a common type of residential infill development. Over time this indicator will monitor change in site coverage and so a cumulative effect on neighbourhood amenity.

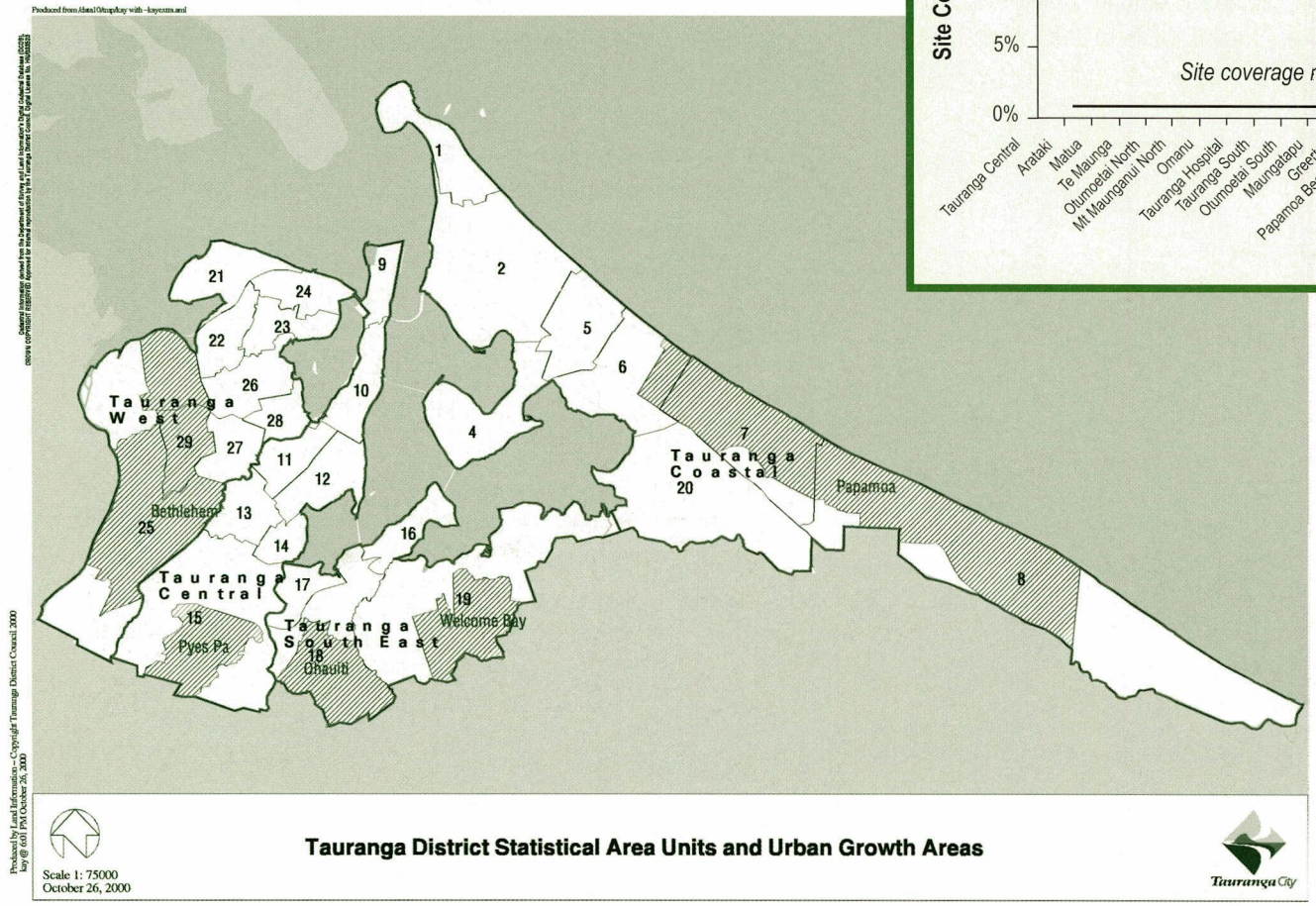
(2) Minimum size means size at which a resource consent is not required to build a house.

STATE

Of the 27 area units making up the District, Tauranga Central[3] at 23.7% is currently the most intensively covered, followed by Arataki (20.8%) and Matua (20.6%).

Least coverage is found in the new Urban Growth Areas of Tauranga due to their lower density-housing levels and a lack of infill. Hence, Bethlehem, which excludes the Bethlehem central urban area, has only 9% site coverage because of the mix of Rural, Residential A and Rural-Residential zoning.





LEGEND

- Urban Growth Area
- 1 MT MAUNGANUI NORTH
- 2 OMANU
- 4 MATAPIHI
- 5 ARATAKI
- 6 TE MAUNGA
- 7 PAPAMOA BEACH WEST
- 8 PAPAMOA BEACH EAST
- 9 SULPHUR POINT
- 10 TAURANGA CENTRAL
- 11 TAURANGA HOSPITAL
- 12 TAURANGA SOUTH
- 13 GATE PA
- 14 YATTON PARK
- 15 GREERTON
- 16 MAUNGATAPU
- 17 POIKE
- 18 HAIRINI
- 19 WELCOME BAY
- 20 KAIRUA
- 21 MATUA
- 22 BELLEVUE
- 23 OTUMOETAI SOUTH
- 24 OTUMOETAI NORTH
- 25 BETHLEHEM
- 26 BROOKFIELD
- 27 TE RETI
- 28 JUDEA
- 29 BETHLEHEM EAST

(3) Specific areas in this report are Statistics NZ census area units.

INDICATOR 3 - SATISFACTION WITH STREETSCAPE

The term "streetscape" means the overall look of the street or its character. In general, people have difficulty perceiving streetscape - a large number of intangibles, such as visual appeal, like of trees and shrubs, and housing preference influence perceptions.

STATE

From the 1999/2000 survey results[4] only 2% of residents are dissatisfied with the character of their area. This suggests, regardless of other amenity changes occurring, that most people like the overall appearance of their local street environment.

(4) Tauranga Residential Intensif cation Study, Telephone Survey and Workshop Results, Key Research (September 1999).

INDICATOR 4 - SATISFACTION WITH NOISE LEVELS

Noise is a considerable environmental issue for many people. Most common noise problems are associated with normal domestic activities.

Unlike many other environmental effects, noise can be difficult to screen, can affect human health and is invasive. Noise is a critical aspect of an urban environment and an important part of amenity values.

Noise remains an issue for a significant portion of the population. Land-use intensification may lead to further noise-related concerns.

As more survey information becomes available, better-targeted policy responses should become possible. For example, identification and protection of special acoustic environments, such as residential neighbourhoods, may be possible once the current noise environment is better understood.

STATE

From the 1999/2000 survey results:

- 8% of respondents expressed dissatisfaction with the quietness of their neighbourhood
- When considering higher-density living, 9% of respondents raised noise as a likely problem. Noise was the third most commonly raised concern.

INDICATOR 5 - RESIDENTIAL DEVELOPMENT WITHIN PORT AND AIRPORT NOISE AREAS

The Port of Tauranga and Tauranga Airport are both noisy activities which affect the heart of urban Tauranga. Noise is managed in the District Plan by defining areas of allowable noise which serve the dual purpose of defining where noise is likely to be an issue to residents, and thresholds for enforcement if too much noise is created. The Port of Tauranga administers a noise management plan.

The potential for future residential development within the port and airport noise areas has been evaluated as a measure of reverse sensitivity (i.e., resident pressure on the port and airport to further reduce noise activities).

STATE

Of the 72 land parcels within a 250m line of airport noise contours in the District Plan, nine parcels are considered likely candidates for residential "infill" development. Of the 74 potentially subdividable land parcels within the 55dBA Port Noise Control Boundary in the District Plan, 37 are considered "likely" candidates for residential development or site redevelopment.

- 12.5% of properties within 250m of Tauranga Airport noise contours are considered potential residential infill candidates
- 50% of properties within the 55dBA Port of Tauranga noise contour are considered potential residential infill candidates.

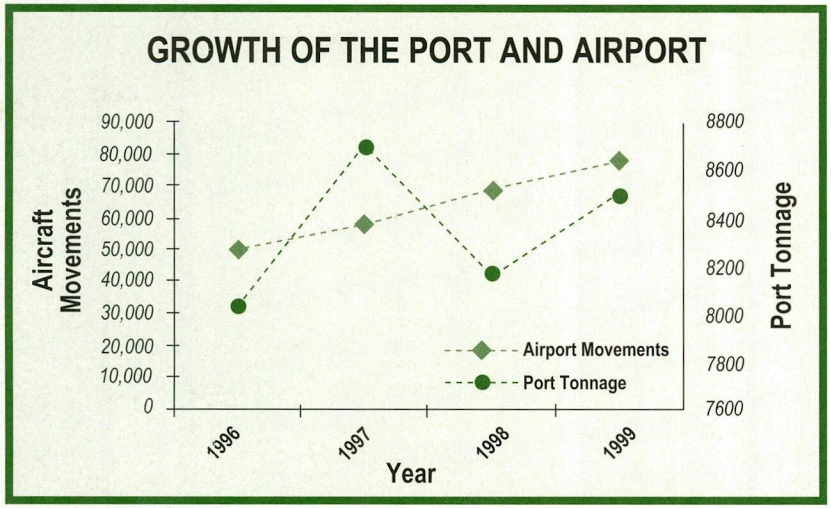
Housing Development Bethlehem

INDICATOR 6 - PROJECTED GROWTH OF THE PORT AND AIRPORT

The port and airport are both likely to generate further noise as they expand. Current noise contours set an upper limit for noise emission, but do not control levels within the set upper limits. Projected growth is therefore considered a good indicator for noise effects on the community from these two significant activities.

STATE

Tauranga Airport Authority plans to achieve 4% annual growth [5], while the Port of Tauranga plans to achieve between 10% and 20% annual growth [6].



(5) Tauranga Airport Strategic Plan, Tauranga District Council (November 1999).
(6) Port Of Tauranga Annual Report (1998/99).
(7) Tauranga Residential Intensification Study, Telephone Survey and Workshop Results, Key Research (September 1999). This study excluded Urban Growth Areas and focussed on the District's Residential Zones.

INDICATOR 7 - SATISFACTION WITH SECTION PRIVACY

Over the past 14 years Council has undertaken several surveys of residential amenity. These surveys appear to demonstrate increasing concern for lost privacy and open space. The most recent survey (1999) has a quantitative element which will enable better comparison in future years.

In summary research indicated:

DATE	REFERENCE	PRIVACY CONCLUSION
April 1986	Western Bay of Plenty Urban Development Strategy Study, McDermott Associates	People need a sense of control over their environment. Privacy is a core need. A view is considered important. Separation from neighbours is less critical for older people, i.e., section size may be sacrificed for quality of living space (the house).
May 1993	Tauranga District Residential Environment Study, Dialogue Consultants	Many people feel they have poor privacy, particularly where a neighbour overlooks the property. Council should require adequate section size - but problems with this are acknowledged. Privacy is difficult to control in a city.
Sept. 1999	Key Research[7]	Behind traffic concerns and noise, privacy was the next most significant issue to survey respondents when asked of expectations of increasing density. 6% felt too crammed in their residence.

STATE

- A lack of privacy is an issue for 6% of survey respondents
- When looking to the future, 14% of respondents consider diminished privacy a significant issue.

INDICATOR 8 - ACCESSIBILITY OF SCHOOLS, RESERVES AND SUPERMARKETS

Accessibility is the proximity of people and their houses to shops, schools, playing fields, supermarkets and other services and facilities. While accessibility could be better measured by looking at the length of journey someone must travel in a car or on foot to get to a destination by road, this indicator has been calculated as a straight line ("as the crow flies") distance. This is considered a reasonable measure for accessibility, although in future years it is hoped to measure actual journey distance.

In summary, research indicated:

DATE	REFERENCE	ACCESSIBILITY CONCLUSION
April 1986	Western Bay of Plenty Urban Development Strategy Study, McDermott Associates	Satisfaction with the suburbs is low due to poor facilities. 48% of expenditure on housing is on things relating to accessibility (garaging, location, etc). Access to schools, shops, sports facilities are modestly important (ranked 7th-15th). Access to work ranked 18th of 19 factors. The elderly have a priority for access to facilities - much more so than younger people.
May 1993	Tauranga District Residential Environment Study, Dialogue Consultants	Access to shopping, commercial facilities is important. A few kilometres driving is acceptable. Carparking is a priority for access. Access is an important determinant on where people live.
Sept. 1999	Key Research [8]	46% of respondents cite high satisfaction with their proximity to services.

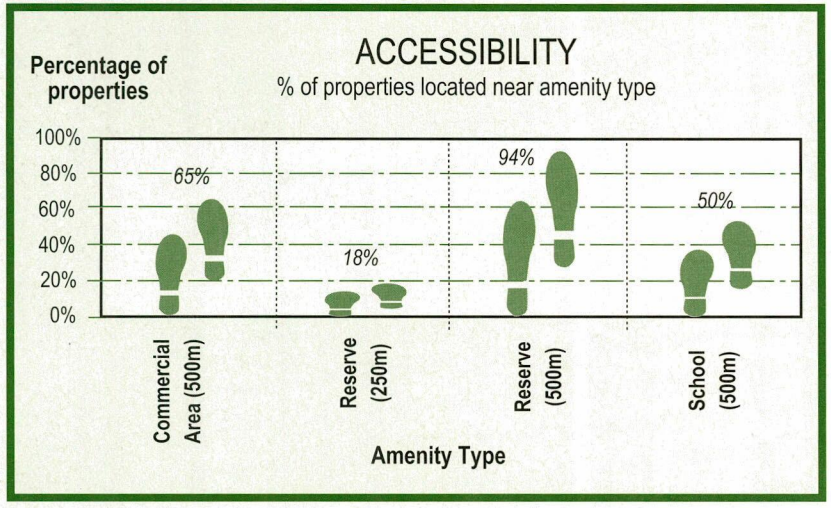
(8) This survey covered residents in existing infill areas.

Brookfield

STATE

As can be seen, 1999/2000 survey results show that 46% of infill area residents consider accessibility to services a major drawcard of their area [9].

- Half of all residential properties lie within 500m of a pre-school, primary, or secondary school
- 65% of all residential properties are within 500m of a commercial area
- 94% of all residential properties are within 500m of a public reserve, 18% are within 250m of a reserve.



(9) Tauranga Residential Intensification Study, Telephone Survey and Workshop Results, Key Research (September 1999).

INDICATOR 9 - COMPARISON OF URBAN GROWTH TO FACILITIES ACCESS

One way of predicting the future is to extend current patterns. This indicator looks at the rate of household growth projected for each of the 27 area units within the District[10] and compares this to the measure of accessibility used for Indicator 8 (access to facilities such as libraries, schools, reserves, etc., within each area). The result indicates whether the District is becoming more or less accessible. The 10 highest growth areas are listed below.

STATE

AREA UNIT	PROJECTED HOUSEHOLD GROWTH RATE	ACCESSIBILITY RANKING (OF 27)[11]
Bethlehem East	21%	21
Papamoa Beach East	15%	20
Papamoa Beach West	12%	24
Matapihi	10%	27
Te Maunga	6%	23
Greerton	6%	15
Hairini	5%	25
Bellevue	3%	13
Poike	3%	6
Mt Maunganui North	3%	3

In summary, this indicator suggests that amenities, reserves and facilities are not keeping pace with urban growth and development.

- The 10 fastest-growing areas in the District include six with poor access to amenities.

(10) Refer Tauranga District Statistical Area Units map, on page 9.
(11) Accessibility ranking: 1 = best, 27 = worst .

INDICATOR 10 - VALUE OF NEIGHBOURHOOD RESERVES

The provision of neighbourhood reserves is a key element in maintaining and enhancing amenity values in the District. The value people place on neighbourhood reserves is considered to be a good indicator of amenity.

People's perception of amenity may change over time, which may be reflected in changing use or demand for neighbourhood reserves. A Neighbourhood Reserves Management Plan is being prepared which will consider these issues in more detail.

STATE

The 1993 Residential Environment Study[12] concluded it was important for Council to provide small reserves within 200-300m of residents' dwellings for such things as walking and playing.

The results for 1999/2000[13] found 3% of survey respondents said they were drawn to an area because of the quality of reserves. Seven percent of respondents thought proximity to open space was a quality they liked about their neighbourhood.

- 3% of survey respondents said they were drawn to an area by its reserves, 7% said proximity to open space was a favourable quality of their current location.

Vale Street Otumoetai

(12) Tauranga District Residential Environment Study, Dialogue Consultants (May 1993).
(13) Tauranga Residential Intensification Study, Telephone Survey and Workshop Results, Key Research (September 1999).

INDICATOR 11 - THE PERCENTAGE OF PEOPLE UNHAPPY WITH HOUSING DENSITY

Housing density is an issue raised by many people in terms of impacts on amenity values, such as privacy, overshadowing and parking.

Current growth strategies include enabling higher densities throughout the District. Urban Growth Areas have developed at a relatively low density, and although rules do not discount their intensification, this may be prevented by private site covenants.

STATE

In 1999/2000 6% of residents[14] living in infill areas consider their existing environment too crammed.

(14) Tauranga Residential Intensification Study, Telephone Survey and Workshop Results, Key Research (September 1999).
(15) Ibid.

INDICATOR 12 - PEOPLE'S APPRECIATION OF TREES

People value trees, shrubs, vegetation and greenery. Trees, above all, are considered a key measure of amenity value. The street-tree indicator of amenity is likely to require further survey evaluation.

STATE

From the 1999/2000[15] survey which asked residents what they liked and disliked about where they live:

- 3% of respondents said they like the number of trees in their street
- 1% dislike trees
- While people value trees in their street it is not a major reason for liking where they live.


Fraser Street

INDICATOR 13 - RATIO OF TREE DENSITIES BETWEEN NEW SUBDIVISIONS AND ESTABLISHED SITES

Planting road berms with street trees and other vegetation is a means of maintaining an attractive streetscape, an objective of the District Plan.

A measure of streetscape amenity has been developed by evaluating and comparing the number of trees growing in streets within the District.

STATE

The following benchmarks have been established:

TYPE OF STREETSCAPE AMENITY	NO. TREES PER KILOMETRE IN STREET
Poor amenity streets:	0-59 trees
Average amenity streets:	60-99 trees
Good amenity streets:	100 - 199 trees
Excellent amenity streets:	200+ trees

Grace Road

Kopurererua Valley urban fringe

Nine streets in the District of sufficient length have been selected to date to evaluate the level of streetscape amenity their trees and shrubs provide, assessing tree heights and densities, both public and private, in a street.

STREET NAME	NO. OF TREES / KM	OVERALL STREETSCAPE AMENITY RATING
Fraser Street	213	Excellent
Waratah Street	124	Good
Sixth Avenue	102	Good
The Drive	136	Good
Ranch Road	96	Average
Poike Road	54	Poor
Beaumaris Boulevard	24	Poor
Maunganui Road	55	Poor
Hartford Avenue	53	Poor

Future measurement will compare new subdivisions with existing areas using the benchmark scale (assuming newly planted trees all mature). This will provide a measure of the state of the street amenity, as well as a measure of likely future pressures. As expected, the results above indicate that established areas (e.g., Fraser Street, Waratah Street) have higher streetscape amenity than new subdivisions (e.g., Beaumaris Boulevard).

INDICATOR 14 - LONG-TERM AVERAGE NOISE LEVELS

People have expressed concern about changing noise levels. A long-term programme of noise sampling has been set up to establish the performance of current residential noise standards in maintaining residential amenity.

The noise surveys aim to monitor selected sites over time, including the lower (L_{10}) and upper (L_{95}) noise thresholds. These sites will be measured annually and in future will also include residential sites adjacent to business and industrial areas.

STATE

Noise levels were measured at several residential sites between March and May 2000 in accordance with New Zealand Standard measurement specifications.

RESIDENTIAL SITE LOCATION	NOISE LEVELS (dBA)[16] Average maximum L_{10}	Average minimum L_{95}
QUIET RESIDENTIAL AREAS[17]		
Forrester Drive (Welcome Bay)	49	30
Idesia Grove (Matua)	48	31
Monterey Key (Papamoa West)	47	30

(16) Measured in decibels (dBA).
(17) Noise levels influenced by normal residential site activity only.

RESIDENTIAL SITE LOCATION	NOISE LEVELS (dBA)[18] Average maximum L_{10}	Average minimum L_{95}
ADJACENT TO MAIN ARTERIAL ROADS[19]		
Cameron Road (Tauranga Central)	68	56
Waihi Road (Judea)	70	58
Maunganui Road (Mt Maunganui North)	73	63

Results for 2000 suggest even quiet residential areas exceed current residential noise standards during daytime hours. The District Plan permitted noise level (L_{10}) is 45 dBA for residential areas between 7am and 11pm, and 35 dBA between 11pm and 7am. The current standards, although aimed at a minimum environmental quality, may not necessarily protect neighbourhoods with special noise characteristics (for example, those that are extremely quiet or those adjacent to major roads).

- Current noise standards for some residential areas are being exceeded during daytime hours.

(18) Measured in decibels (dBA).
(19) Noise levels influenced by traffic.

Central Mount Maunganui

INDICATOR 15 - SATISFACTION WITH ACCESS TO SCHOOLS, RESERVES AND COMMERCIAL AREAS

Satisfaction levels are a measure of people's perception of the environment.

This indicator should be read in conjunction with Indicator 8 which also reports on accessibility. Indicator 8 looks at distance to schools, reserves and businesses (objective), while this indicator is a measure of residents' opinion on their accessibility to these amenities (subjective).

STATE

People living in infill residential areas appear well served with amenity and facilities, with 46% of 1999/2000 survey[20] respondents citing proximity to services as a reason for satisfaction with their area. However, 22% are dissatisfied with traffic congestion, possibly suggesting their idea of accessibility has more to do with vehicle access than pedestrian access.

- 46% of residents consider proximity to services as the major reason for enjoying where they live.

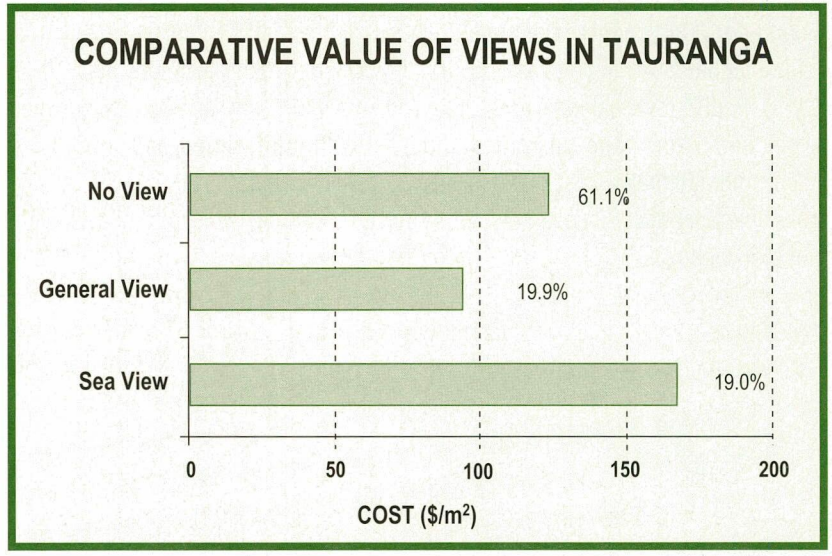
(20) Tauranga Residential Intensification Study, Telephone Survey and Workshop Results, Key Research (September 1999).
(21) The methodology used to prepare this indicator does not evaluate all the attributes of sites, so results may be skewed by other factors (like view areas also having excellent access to reserves and beaches).
(22) Properties with view information for the District were assessed from the NZ Valuation database. From this, five areas were selected as representative to monitor future trends, Matua, Cherrywood, Mount Maunganui, Omanu and Greerton.

INDICATOR 16 - COMPARATIVE VALUE OF PROPERTY VIEWS[21]

People are prepared to pay a large premium for sea views from their homes. It is planned to track change in this premium through gross changes in property valuations. Because valuations derive much of their detail from historic property sales, they should reflect the abundance and quality of views (as abundance declines, valuations of those properties with views will rise, and those that have lost views may decline).

STATE

61% of the properties analysed[22] are considered to have no view, with the remaining 39% having either a general view or a seaview.



Because of the data used in this indicator, results infer that properties with no view are worth more than a general view. This may occur where a property at Mount Maunganui for example, is one property back from the beach and in an expensive area, but has no view. This property would still be worth more than a property in Greerton with a general view of the Kaimai Ranges. Some properties and their development potential are also restricted by hazards, such as slope instability, or may be flood prone. Again, this would affect the property value.

SCORECARD: PRESSURE

There is some discrepancy between expected and actual amenity pressure indicators. In general, the environment is subject to greater pressures than desirable.

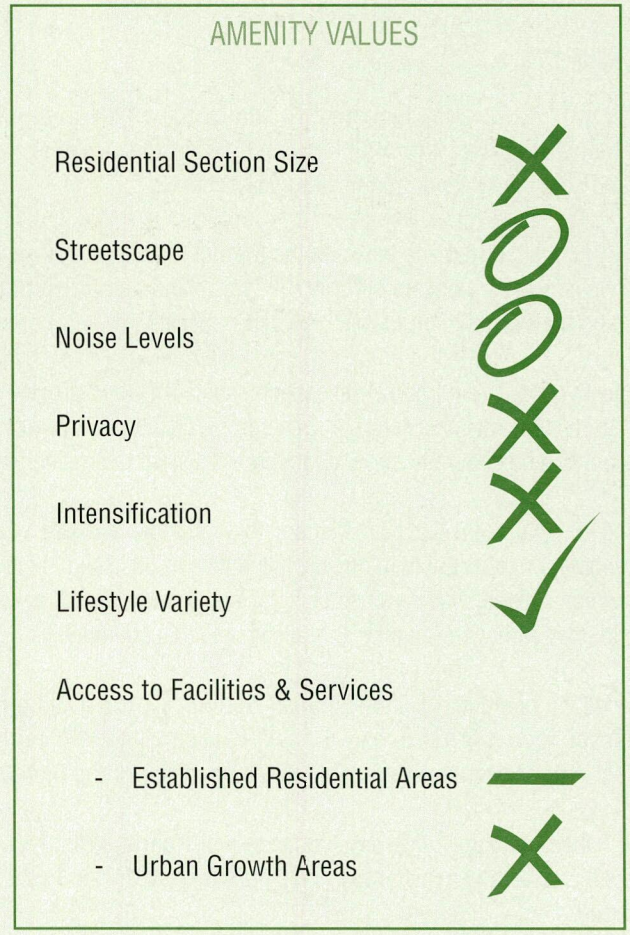
New development is responsible for much of the pressure on amenity in Tauranga as new buildings replace older ones or previously undeveloped sites are built on. Some development contrasts with the existing character of an area. This is especially the case where infill development results in increased residential densities and reduced outdoor living space around homes.

SCORECARD: STATE

The current state of the District's amenity shows some room for improvement. However, state indicators are, in part, reliant on people's response to a questionnaire and their unprompted identification of issues. The target values for these issues and for pressure indicators are relatively unclear until a reasonable data history is built up.

The main areas of amenity concern to residents remain unchanged from earlier studies, and clear patterns are emerging. In order of importance these are:

- Proximity to services
- Noise
- Privacy
- Increasing housing densities.



SECTION 5: NATURAL RESOURCE INDICATORS

5.1 BACKGROUND

People have lived in Tauranga for centuries and by the time Europeans arrived much of today's land was shrub or fern land. Since then, further vegetation clearance and substantial land modification has occurred.

Ecologically, the main difference between the District today and 150 years ago is the loss of wetlands, the conversion of scrub, shrubland and forest to rural and urban use, and the introduction of many invasive species.

Natural systems produce environmental benefits, sustain life and provide us with a measure of protection against catastrophic events. For example, a variety of native animal or plant in a reserve may make areas more resistant to erosion or fire.

The planting of ngaio and karo on Mauao, for instance, reduces fire risk as evergreen vegetation is less able to burn, while native birds assist in propagating vegetation which can stabilise steep slopes. Diversity may, in turn, have positive effects on downstream water quality and enhance landscape quality.

From a landscape perspective, the Tauranga Harbour margins and open coast retain some of their pre-European distinctiveness. They are regarded as "outstanding" and contribute enormously to the character of the District[23].

Virtually all native biological diversity has been lost from the District's flat land and developable areas and it is in these areas that revegetation and enhancement is most needed.

(23) Regional Coastal Environment Plan,Environment BOP (1995) and Tauranga District Landscape Study, Boffa Miskell Ltd (1995).

5.2 OUR RESPONSE TO THESE ISSUES

Traditionally, district councils have had a limited role in the management of native biodiversity. This role has been secondary to providing for people's immediate needs with roads, pools, libraries and other infrastructure.

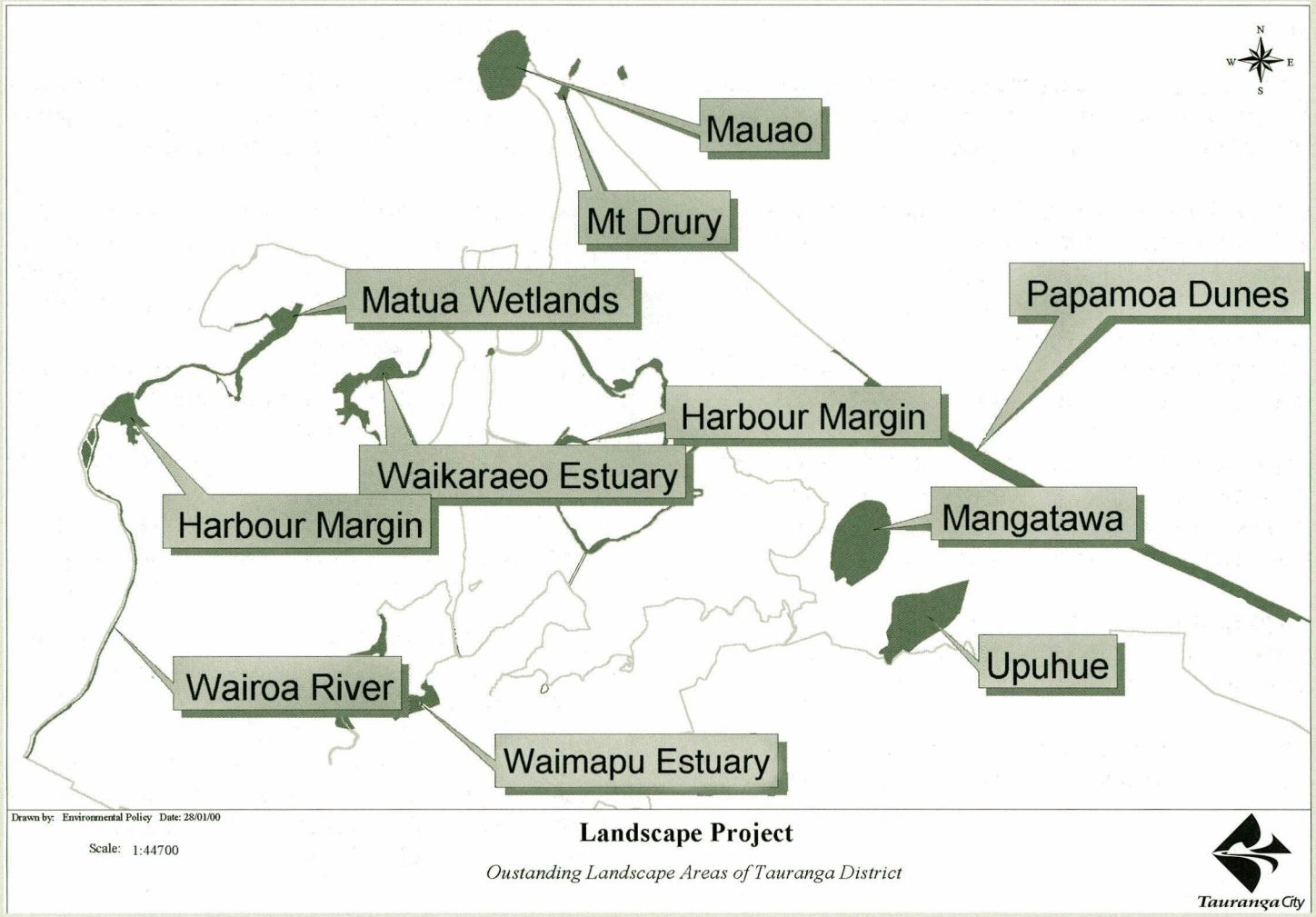
The Resource Management Act 1991 (RMA) requires district plans to address biodiversity and landscape issues. District councils are required to take a longer-term look at the consequences of community actions, such as removal of native vegetation or earthworks, which alter locally significant landscape features.

Our response to this statutory requirement has been varied. The District has an extensive series of coastal and esplanade reserves that give some protection to native biodiversity. Apart from reserve acquisition (primarily for public access rather than biodiversity), Council's main response has been regulatory.

- The District's most significant ecological areas are protected by rules in the District Plan. The Conservation Zone and special rules governing land-use in riparian areas also protect other ecologically valuable areas
- A report by Boffa Miskell (1995)[24] recommends several methods of meeting the RMA landscape requirements. These are implemented in the District Plan through zoning provisions.

Some small remnant natural areas, integral components of both biodiversity and landscape, are in private ownership. There is no comprehensive plan to protect vegetation remnants or to rehabilitate areas under-represented in the reserve system and in particular land forms.

(24) Tauranga District Landscape Study, Boffa Miskell Ltd (1995).


N
W
E
S
Mauao
Mt Drury
Matua Wetlands
Papamoa Dunes
Harbour Margin
Waikaraeo Estuary
Harbour Margin
Mangatawa
Upuhue
Wairoa River
Waimapu Estuary
Drawn by: Environmental Policy Date: 28/01/00
Scale: 1:44700
Landscape Project
Oustanding Landscape Areas of Tauranga District
Tauranga City

5.3 SELECTION AND DEVELOPMENT OF INDICATORS

Biodiversity indicators were developed, adopting the direction taken by the Ministry for the Environment and other councils, related to "state", "pressure" and "response". The following indicators were selected for Tauranga District:

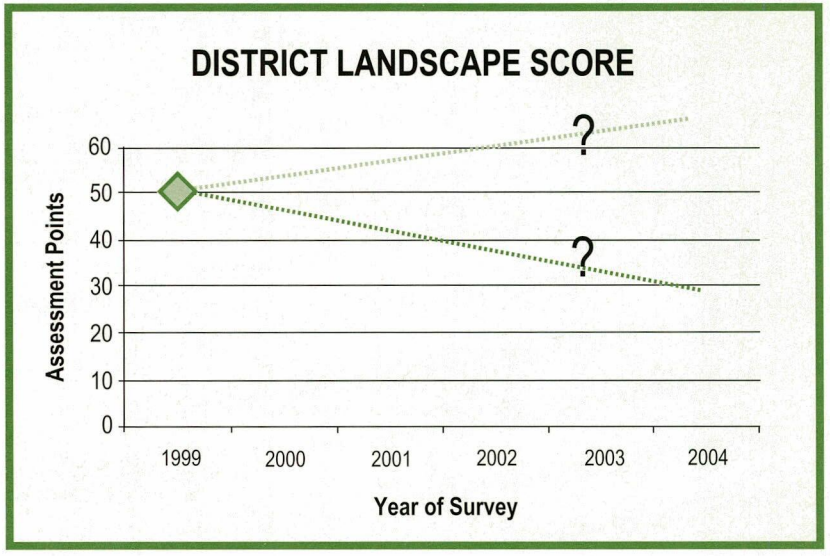
- Area and distribution of native vegetation and habitats
- Biodiversity condition
- Area of vegetation removed
- Habitat fragmentation
- The degree of formal protection of significant ecological sites.

INDICATOR 17 - DISTRICT LANDSCAPE VALUE

A comprehensive survey of landscape features was used to establish a numerical value for the District's landscape. The techniques used in the survey will be repeated annually for comparative purposes [25].

STATE

The present landscapes within Tauranga District have been benchmarked at 50 landscape points (although the margins of Tauranga Harbour rated marginally higher at 51 points). Detractors, such as illegal earthworks and dumping, were noted and contributed to the score. Although it is difficult to predict the future, in all likelihood development will see a gradual erosion of landscape quality, probably through adjacent development rather than destruction of the features themselves.



(25) Outstanding Natural Features and Landscapes, Tauranga District - State of the Environment Monitoring Programme, Boffa Miskell (April 2000).

INDICATOR 18 - AREA OF VEGETATION LOST

Detailed mapping of natural areas and habitats has been undertaken throughout the District, based on a classification system widely used in New Zealand[26]. This information is held on Council's Geographic Information System (GIS).

STATE

Since human arrival in the District, an estimated 93.2% of native vegetation has been lost. Of this, 37.5% has been to residential, industrial or commercial land use, the rest (55.7%) as horticultural, lifestyle or pastoral land. Remaining in a relatively intact form (though of widely varying ecological quality) is 6.8%.

Remaining natural areas have been evaluated and placed in the following categories:

CATEGORY	NUMBER OF SITES	AREA (HA)
Category 1	11	399.37
Category 2	25	292.8
Potential Restoration Sites	20	149.3

Category 1 sites are the best remaining examples, while Category 2 sites tend to be smaller or in a more degraded condition. Potential restoration sites generally have significant weed problems, but with active management have the potential for a major improvement in quality.

- Since human arrival, 93.2% of the District's native vegetation has been lost.

Waikareao Estuary

(26) Indigenous Biodiversity of the Tauranga District, Wildland Consultants Ltd (May 2000).

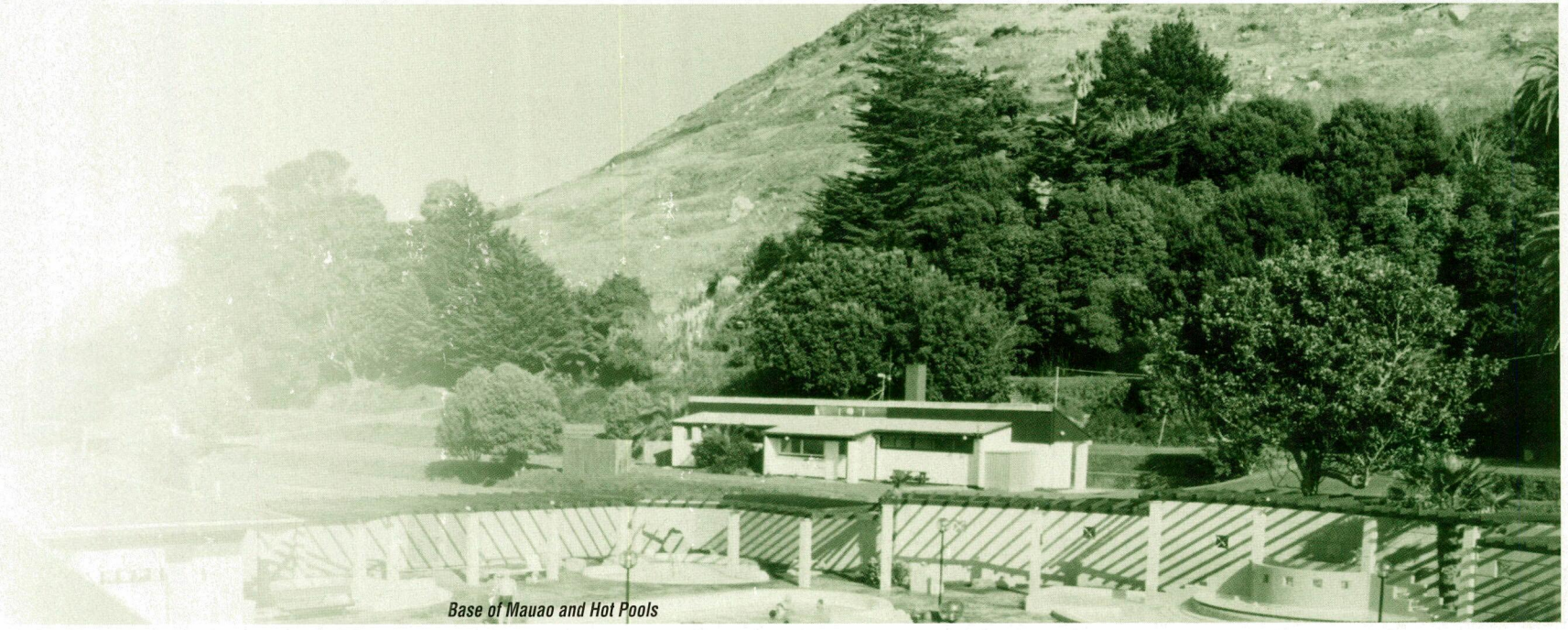
INDICATOR 19 - RESOURCE CONSENTS IN LANDSCAPE AREAS

It is sometimes difficult to evaluate landscape quality. Landscape architects believe natural forms are more pleasing than unnatural ones (for example, curves are more attractive than straight edges). As one measure of pressure on landscapes, the Council has evaluated the number of resource consents granted within or near significant landscape features.

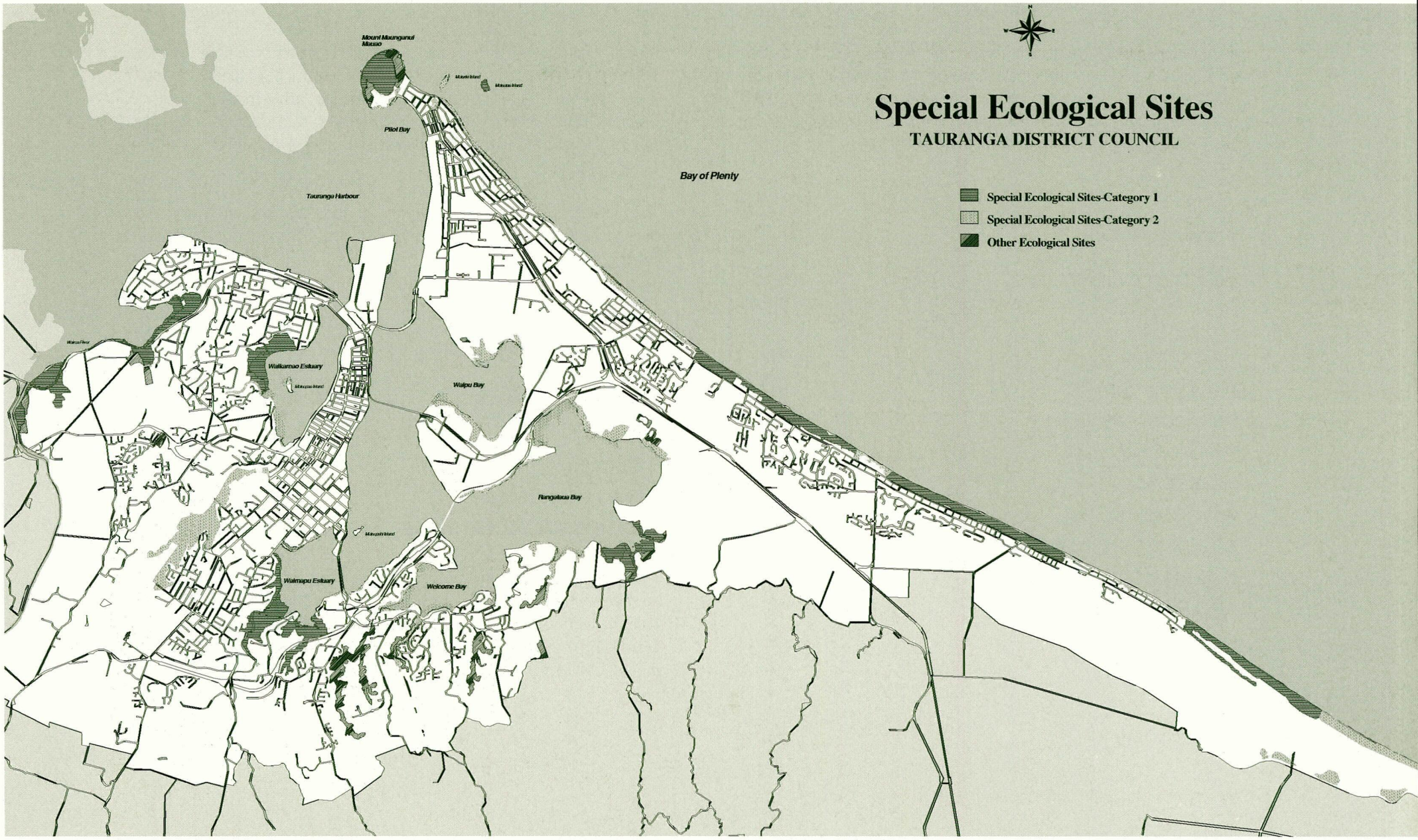
STATE

Although some adjacent subdivisions have been noted, they are not considered a significant detractor to our most important landscape features.

- There have been no significant resource consents close to the District's outstanding landscape features.



Base of Mauao and Hot Pools


Special Ecological Sites
TAURANGA DISTRICT COUNCIL
Special Ecological Sites-Category 1
Special Ecological Sites-Category 2
Other Ecological Sites
Mount Maunganui
Matakai Island
Motuotau Island
Pilot Bay
Bay of Plenty
Tauranga Harbour
Waikareo River
Waikamao Estuary
Motuopuhi Island
Waipu Bay
Rangataua Bay
Motuopoti Island
Waimapu Estuary
Welcome Bay

INDICATOR 20 - CONDITION OF SIGNIFICANT ECOLOGICAL SITES

Using a comprehensive evaluation technique, the condition of each of the District's most Significant Ecological Sites (Category 1) has been assessed. Each vegetation type or habitat was inspected and scored using a simple evaluation system[27] to provide an indication of relative ecological condition. These evaluations will be repeated systematically to reveal long-term condition trends.

STATE

The results for 1999 are:

SIGNIFICANT ECOLOGICAL SITE	SCORE (OUT OF 500)
Motuotau Island	480
Waitao Stream Saltmarsh	466
Matua Estuary-Yorke Park	453
Waikareao Estuary	420
Otira Sand Dunes	415
Waimapu Estuary	412
Kaituna Sand Dunes and Wetland	411
Wairoa River	400
Papamoa Sand Dunes	375
Poike Saltmarsh	362
Mauao	335
AVERAGE SCORE	**419**

- The average health of our Significant Ecological Sites is 419 out of 500.

(27) Indigenous Biodiversity of the Tauranga District, Wildland Consultants Ltd. (May 2000).

INDICATOR 21 - FRAGMENTATION INDEX

A simple index has been used, based on the average distance of SES sites from other natural areas, to measure fragmentation. A change in the "Fragmentation Index" will probably indicate a change in the links between natural areas. For example, if the Category 1 Fragmentation Index reduced to zero it would indicate that all Category 1 SES were now connected to other natural areas - good for the District's ecology.

The Category 1 sites are shown in Indicator 20. Category 2 sites still have ecological importance, but contain less significant native vegetation or animals (birds, insects, lizards).

STATE

The Fragmentation Index for Tauranga District is currently 204 - made up as follows:

ECOLOGICAL SITE TYPE	FRAGMENTATION INDEX
Category 1	67
Category 2	171
Potential Restoration Sites	320
AVERAGE FRAGMENTATION INDEX	**204**

Improvement in the District's ecology through restoration and enhancement of areas adjacent to ecological sites will be reflected in a decrease in the Fragmentation Index value over time. Improvement could include replanting, weed control, cessation of grazing, removal of illegal encroachments, and management of human impacts and access.

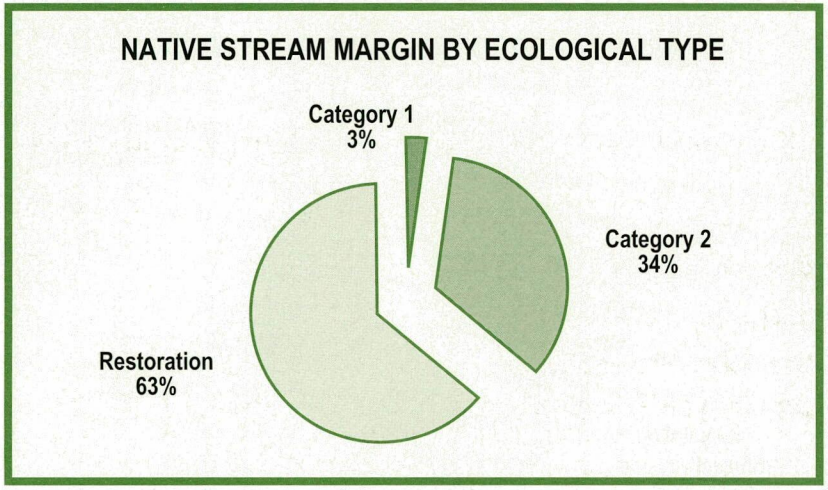
- Tauranga's ecological sites are relatively fragmented with an average Fragmentation Index value of 204 for 2000.

INDICATOR 22 - LENGTH OF RIPARIAN STREAM MARGIN

Stream, or riparian, margins are important to overall ecosystem health. Healthy riparian margins protect fish life by providing shade, filtering run-off and limiting human access, and often provide valuable links between one habitat and another (see Indicator 21 - Fragmentation Index).

STATE

There is currently 14.48km of native stream margin of ecological significance made up as follows:



- Only 3% of stream margins in the District are of Category 1 significance. Approximately two-thirds of stream margins are in a degraded state requiring restoration.
- There is 14.48km of native SES stream margin in the District.
- There is potential for considerable restoration of riparian areas.

Wairoa River margins

INDICATOR 23 - LEVEL OF FORMAL PROTECTION OF SIGNIFICANT ECOLOGICAL SITES

The Significant Ecological Sites (SES) within Tauranga District are protected to varying degrees by way of reserve status (formal or statutory protection) or zoning. Most potential restoration sites are not protected by the District Plan.

Although "formal protection" does not necessarily ensure a site will be protected or enhanced, it is considered a useful response indicator.

STATE

CATEGORY	AREA (HA)	% PROTECTED
Category 1	434.8	46.4
Category 2	289.8	41.3
Potential Restoration Sites	150.9	5.3

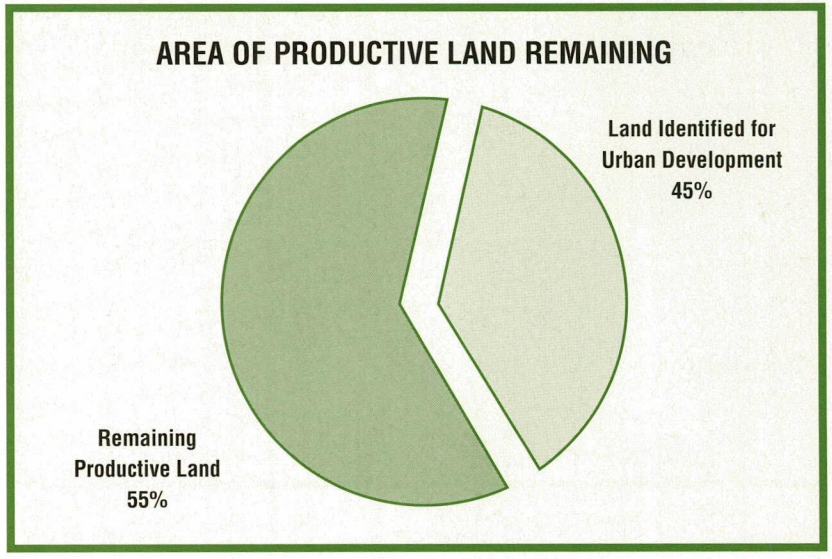
- 5% of potential restoration sites are protected.

INDICATOR 24 - AREA OF PRODUCTIVE[28] LAND ZONED FOR DEVELOPMENT

Fertile, productive land is a reasonably scarce resource. It contributes to biodiversity by supporting diverse crops and organisms and has many potential uses.

STATE

The District has 3733ha classified LUCI 1, 2 or 3[29]. Of this, 1682ha is earmarked for development and zoned commercial, residential or industrial land use in the District Plan.



- 45% of land with productive capacity in the District is earmarked for development.

(28) "Productive" means "capable of productive use" and in this context has Land-Use Capability <=3.
(29) LUCI = Land-Use Capability Index, a national measure of land use.

INDICATOR 25 - CHANGE IN THE AREA OF LARGE LOT PRODUCTIVE LAND

Areas of rural land previously used for agriculture or horticulture, such as at Bethlehem and Papamoa, have been converted into Residential and Rural-Residential Zones. This has had the effect of reducing the area of large-lot productive land with LUCI[30] values of 1-3. Urban land pressure may be monitored with this indicator.

STATE

A representative lot size for productive land is considered to be 5000m² (0.5ha or $1^1/_4$ acres). At present, 11.26% of all LUCI category 1, 2 and 3 land is in parcel sizes greater than 5000m².

YEAR (AS AT JUNE)	TOTAL AREA (HA)	% RURAL ZONED LAND IN DISTRICT	% LUCI 1-3 over 5000m²
1997	3905.3	30.5	12.21
1998	3611.9	28.2	11.28
1999	3602.7	28.1	11.26
2000	3602.3	28.1	11.25

- 3.3% (420ha) of land in Tauranga District is productive.

(30) LUCI = Land-Use Capability Index.

Rural Tauranga - Matapihi

SCORECARD: PRESSURE

The natural features, ecological areas and outstanding landscapes of Tauranga District are in relatively good condition and, on the face of indicator information, appear subject to few threats. However, this can change.

Our ecosystems are in mixed health and subject to diverse pressures. Potential restoration sites are few and not generally under any formal statutory protection. Good-quality habitats are relatively fragmented and have extensive edges and difficult shapes for ecological management. As with much of lowland New Zealand, Tauranga has some considerable challenges in maintaining or enhancing its native biodiversity.

The completion of the country's Biodiversity Strategy and Ministerial Advisory Committee findings on biodiversity are expected to add impetus to these challenges and raise community awareness.

SCORECARD: STATE

Surprisingly, of all our Significant Ecological Sites, Mauao is in the poorest state with lowest ecological quality. Recent fires, recreational pressures (with several hundred thousand visitors per annum) and its small size make Mauao a particularly difficult habitat to manage.

The Waikareao and Matua estuaries both appear to be in reasonably good condition. This may be due to their formal protection as reserve and wildlife refuge areas. Our coastal sand dune systems (Mount Maunganui-Papamoa-Kaituna) are in reasonable condition, but face pressures from subdivision, increased recreational usage, sand mining, and pests.

Without trend data and consideration of the costs required to maintain or enhance the status quo, it can nevertheless be said that in ecological terms Tauranga is doing moderately well. There is considerable scope for ongoing positive management of remaining natural areas. Restoration is also a high priority, with Matua saltmarsh enhancement, active Coast-Care groups, and, most recently, planned restoration of wetland areas in the Kopurererua Valley. Pest control projects are underway in parts of SES throughout the District. These include:

- Control of selected weeds (pampas, gorse) on Mauao
- Spartina control in Tauranga Harbour
- Predator control on Mauao
- Control of weeds such as boneseed, acacia and Italian buckthorn in dune areas.

- Aerial photograph showing the extent of damage to native vegetation on Mauao after fire in December 1997.

- Vegetation re-planting project on Mauao, May 1999.

NATURAL RESOURCES

Landscape	—
Productive Land	✗
Ecological Health	—
Restoration/Enhancement	✓

✓ Getting Better	— Remaining Stable
✗ Getting Worse	0 Insufficient information to assess any trend

SECTION 6: HAZARD INDICATORS

6.1 BACKGROUND

Hazards include all those aspects of the environment which pose a risk to human property or life. There are many possible hazards but only a few of these are managed by Tauranga District Council. Hazardous waste transport, ballast water, biosecurity threats (e.g., bee mite, tussock moth) are dealt with by other agencies including Environment BOP and the Ministry of Agriculture, Forest and Fisheries. Tauranga District Council has responsibilities under the Resource Management Act 1991 to manage storage of hazardous materials (where rather than how) and activities in or near natural hazards (slips, flooding, etc.).

Council's dangerous goods records include data about hazardous substance quantities and their storage. Quantities of hazardous substances in the District are increasing.

Natural hazards have been, and continue to be, studied in depth. A review of natural hazards in the District undertaken in 1995[31] made a number of recommendations:

- Peat subsidence is best addressed largely through building consents and their engineering requirements
- Further research and investigation is needed to predict and manage large-scale land slips
- Earthworks, outside subdivisions and buildings, are a potential risk, particularly when they disturb subsoils
- Flooding of low-lying land cannot be completely avoided, but can be managed if large-scale activities are controlled. In particular, control is needed to avoid unintentional damming and water displacement
- Development in areas subject to coastal hazards (i.e., on the open coast) cannot be prevented, but is best managed through policy and Council controlling limited aspects of development
- Further research is needed to better quantify risk and management. This may involve both private assessment (usually in association with a development proposal) or Council work.

6.2 OUR RESPONSE TO THESE ISSUES

Council has several responses to hazards. Usually the emphasis is on information provision and clearly identifying perceived dangers early in the planning processes.

The District Plan and other initiatives respond to hazard issues to varying degrees:

1. The Hazardous Facility Screening Procedure is a resource consent application screening process applied to businesses and industries handling hazardous substances.
2. Recommended research into land slippage and subsidence is occurring through both private site assessment and Council's review of historic landslips.

(31) Review of Natural Hazards in the Tauranga District, Tonkin & Taylor Ltd (1995).

3. Issues associated with construction on peat soils are addressed at building consent stage.

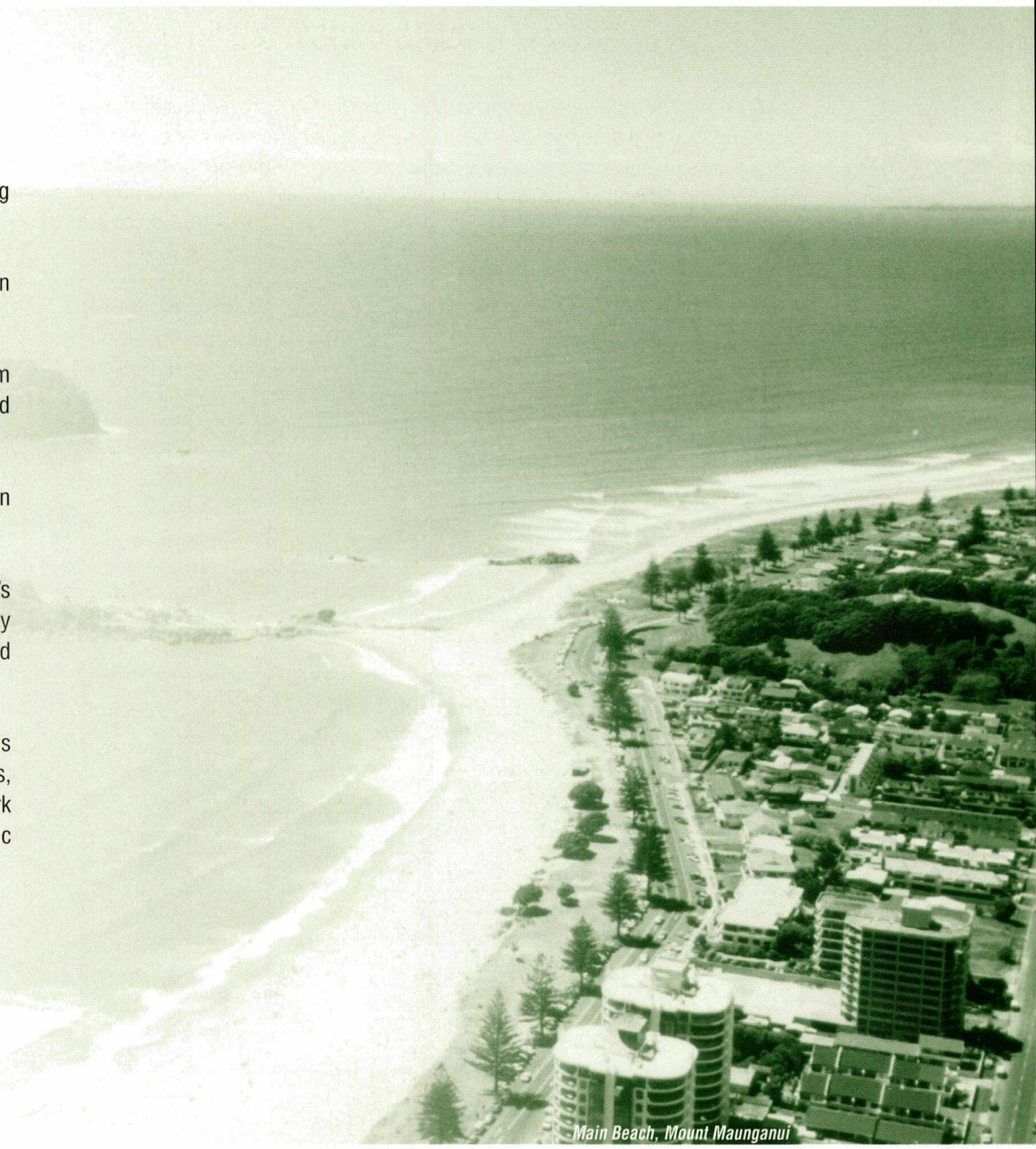
4. Other than for ecological or landscape reasons, there are no District Plan controls on earthworks not covered by a building consent.

5. Flood risk is being reviewed and is comprehensively managed under interim procedures. Council's information base on this hazard is relatively good and growing.

6. Comprehensive management of coastal hazards on the open coast has begun (although it is subject to an appeal to the Environment Court).

7. Generally, hazards data sit in property files and is "flagged" in the Council's Geographic Information System (GIS). The District is not yet comprehensively covered by these data, although geotechnical report information and borelog data are collected.

8. The sub-regional "Lifelines" project, due for completion in 2001, is investigating the vulnerability of infrastructure in Tauranga to natural hazards, including flooding, tsunami, earthquakes and volcanic eruptions. This work aims to reduce the risk of damage from natural hazards and raise public awareness.



Main Beach, Mount Maunganui

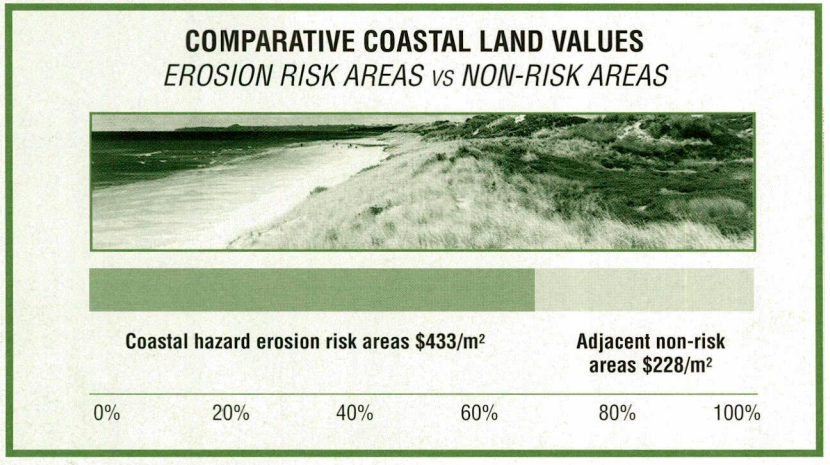
INDICATOR 26 - THE NUMBER AND VALUE OF PROPERTIES IN COASTAL HAZARD EROSION RISK AREAS COMPARED WITH NON-RISK AREAS

Natural hazards are difficult to evaluate. Most hazard events are infrequent and so observing their frequency will take a long time to reveal pressure-related trends. A more sensitive indicator is needed and to this end the density and value of development adjacent to hazard features has been chosen.

STATE

On the open coast (Mount Maunganui to Papamoa) Council has calculated coastal hazard erosion risk areas. From Valuation NZ data in 1999 there were 230 property lots with an average value of $365,657 located at least partly within the Coastal Hazard Erosion Risk and Safety Buffer zones[32]. These properties are on average valued at $433.43/m^2. The 230 property lots adjacent, but landward, of the Safety Buffer Zone are valued on average at $147,432 (equivalent to $227.90/m^2). This average value will be monitored through the Council's valuation records.

- There are 230 properties in the coastal hazard erosion risk areas
- Properties within the coastal hazard erosion risk areas have a monetary value of $433/ m^2
- Properties adjacent to, but outside, these risk areas have a monetary value of $228/ m^2.



(32) This has been determined by evaluating all parcels that are within, or bounding, the Safety Buffer Zone and applying the Government valuation figure for each rateable property.

INDICATOR 27 - VARIATION BETWEEN STORM SURGE AND HIGH-TIDE LEVELS FOR TAURANGA HARBOUR

During intense storms the level of natural tides around the harbour can be dramatically altered. Winds and barometric pressure especially can cause exceptionally high tides (storm surge).

Flooding is a risk for many properties around Tauranga Harbour. It is not a catastrophic risk for most - but the nuisance and cost of clean-up are things that need to be managed.

The effect of a storm surge can be gauged by comparing sea level records with the maximum level caused by tidal effects (i.e., the highest astronomical tide[33]).

TIDAL LEVELS - TUG BERTH, MOUNT MAUNGANUI

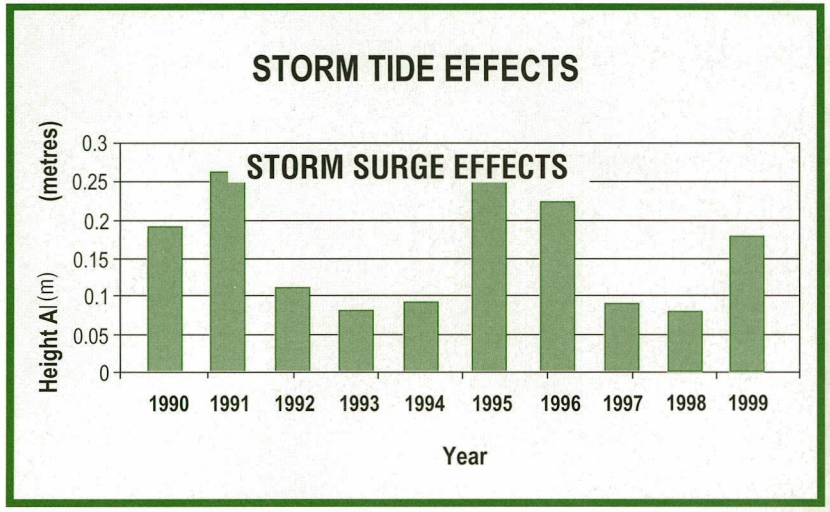
TIDAL LEVEL	MOTURIKI DATUM (M)
Highest Astronomical Tide (HAT)	1.12
Mean High Water Springs (MHWS)	0.84
Mean Sea Level (MSL)	0.07
Mean Low Water Springs (MLWS)	-0.71
Lowest Astronomical Tide (LAT)	-0.96

(33) Highest astronomical tide is the highest tide we can expect from astronomical influence alone (the highest high tide).

STATE

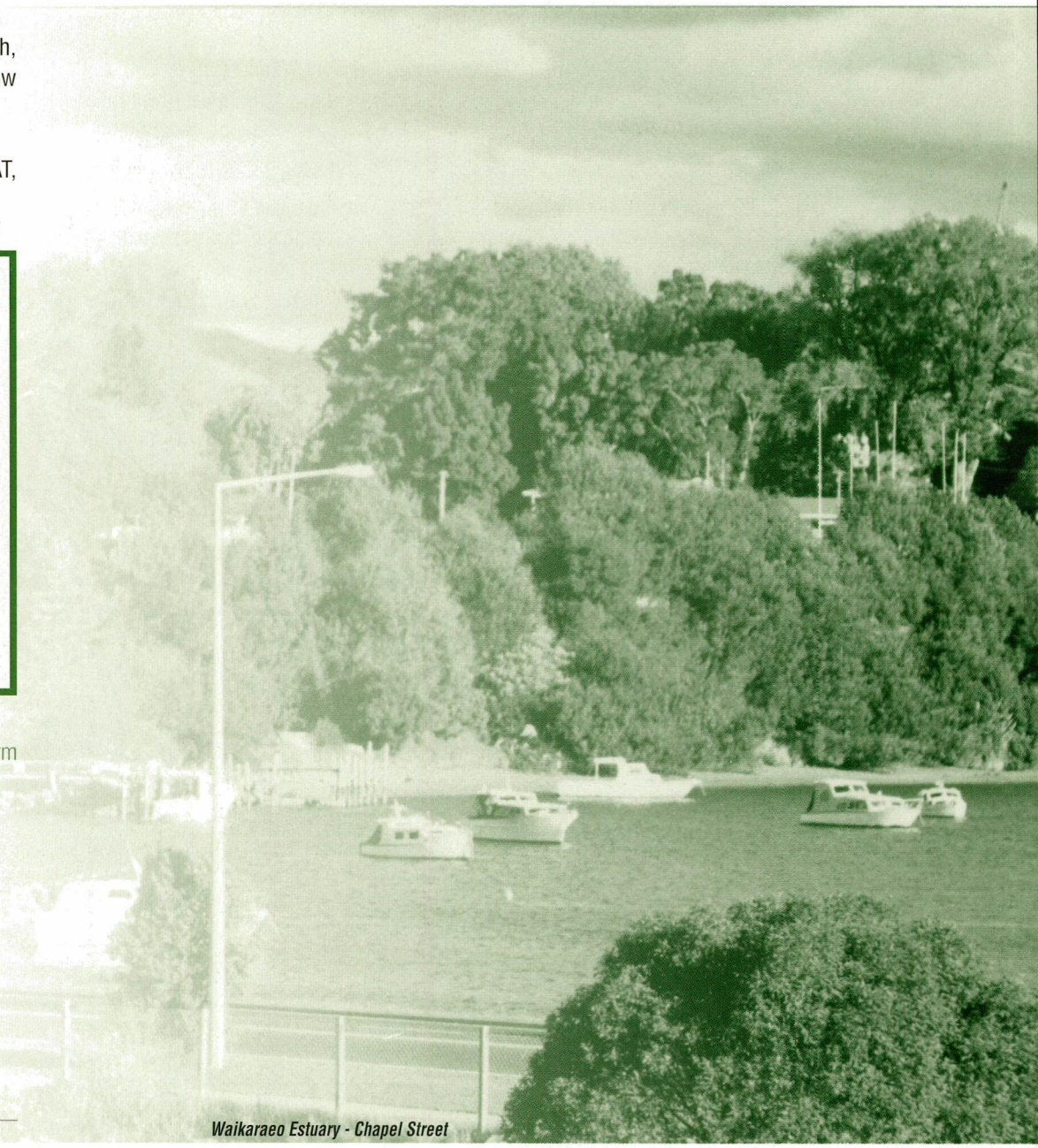
In the decade 1990-2000 the maximum sea level recorded at the Tug Berth, Salisbury Wharf, was 0.27m above the highest astronomical tide [34] (1.31m below the current allowable building level of 2.7m Moturiki datum).

The maximum storm surge level ever recorded has been 0.47m above HAT, equivalent to 1.59m above Moturiki datum.



- The maximum increase in harbour water levels during storm events (the storm surge component) in Tauranga Harbour over the last decade has been 0.27m.

(34) Storm Surge Inundation Study for Tauranga Harbour, Tonkin & Taylor Ltd (December 1999).



Waikaraeo Estuary - Chapel Street

INDICATOR 28 - PREDICTED SEA LEVEL RISE

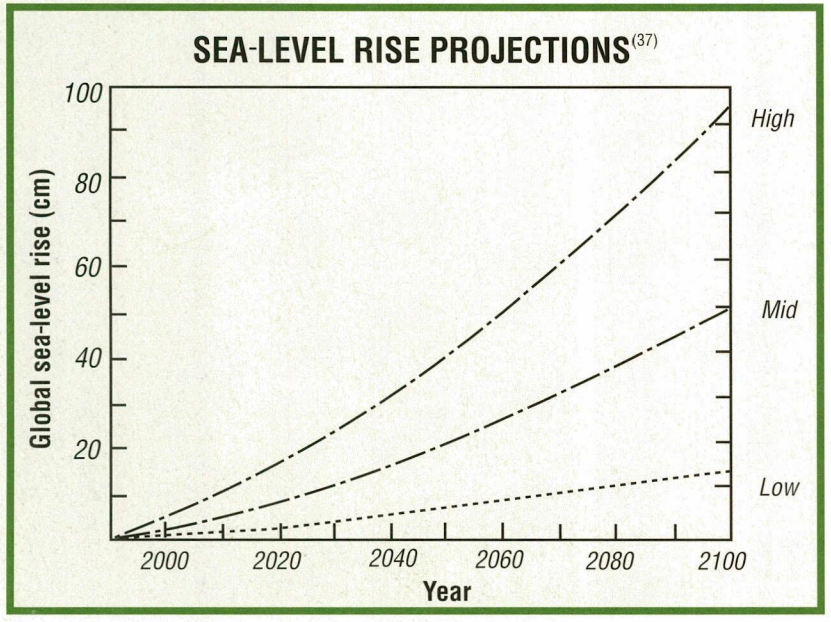
Sea levels in New Zealand are predicted to rise between 2 and 35cm by the year 2050[35], with a probable 0.49m rise by 2100. This rate is 1mm a year less than the global sea-level rise projections.

Around northern New Zealand, including Tauranga, sea-level rise has levelled off since the climate shift in the mid-1970s. This recent decline in the rate of sea-level rise is because of the moderating effects of the El Nino weather pattern since 1976. The following decade may see increased rates of sea-level rise[36] for the Bay of Plenty coastline. Sea-level rise will increase coastal hazard risks such as storm surge, flooding and beach erosion.

STATE

Sea-level has been measured for the past 40 years from the tide gauge near Moturiki Island. Tide gauges also record water levels at the Tug Berth (Mount Maunganui) and at Sulphur Point. Three additional tide gauges are to be placed around the harbour margins in 2000 to determine local harbour effects.

- Sea level is predicted to rise between 2 and 35cm by the year 2050
- The rate of sea-level rise is expected to increase in the next decade.



INDICATOR 29 - PROPERTY OWNERS WHO CONSIDER LANDSLIP HAZARD A CRITERIA IN SITE EVALUATION

Tauranga is built upon a relatively stable soft substrate. However, most houses on hills sit on top of light volcanic ash material. In extreme rainfall these ashes can "float" on top of the harder base, with potential landslip risk. Slips have occurred in recent years along the Matua and Maungatapu peninsulas from a combination of geological weakness and groundwater pressure affected by stormwater disposal.

A useful measure of hazard risk is people's awareness of the issue.

STATE

The community has not yet been surveyed on this topic.

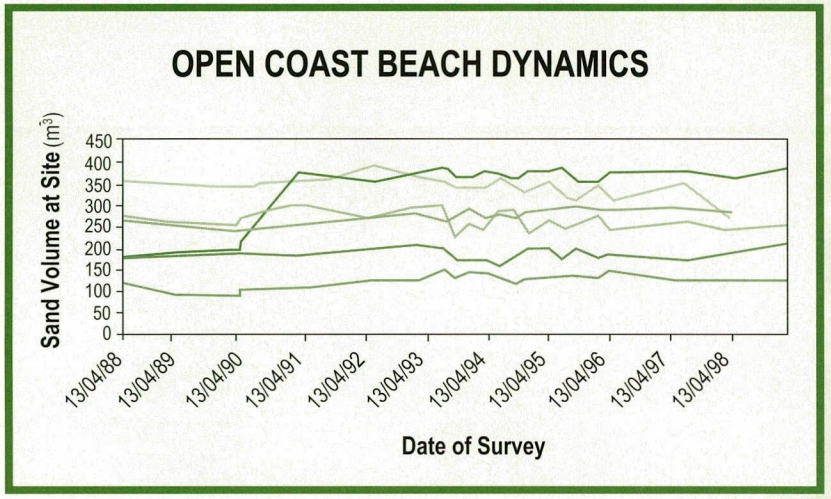
(35) Climate Change Scenarios are listed on internet site http://katipo.niwa.cri.nz/ClimateFuture/Scenarios.htm#Scenarios for Sea Level.
(36) The Science of Climate Change. Summary for Policymakers, and Technical Summary of the Working Group 1 Report, Geneva, IPPC (1996).
(37) What's Happening with Sea-level Rise? Coastal News, Bell (1999).

INDICATOR 30 - CHANGE IN SAND VOLUMES ON COASTAL BEACHES

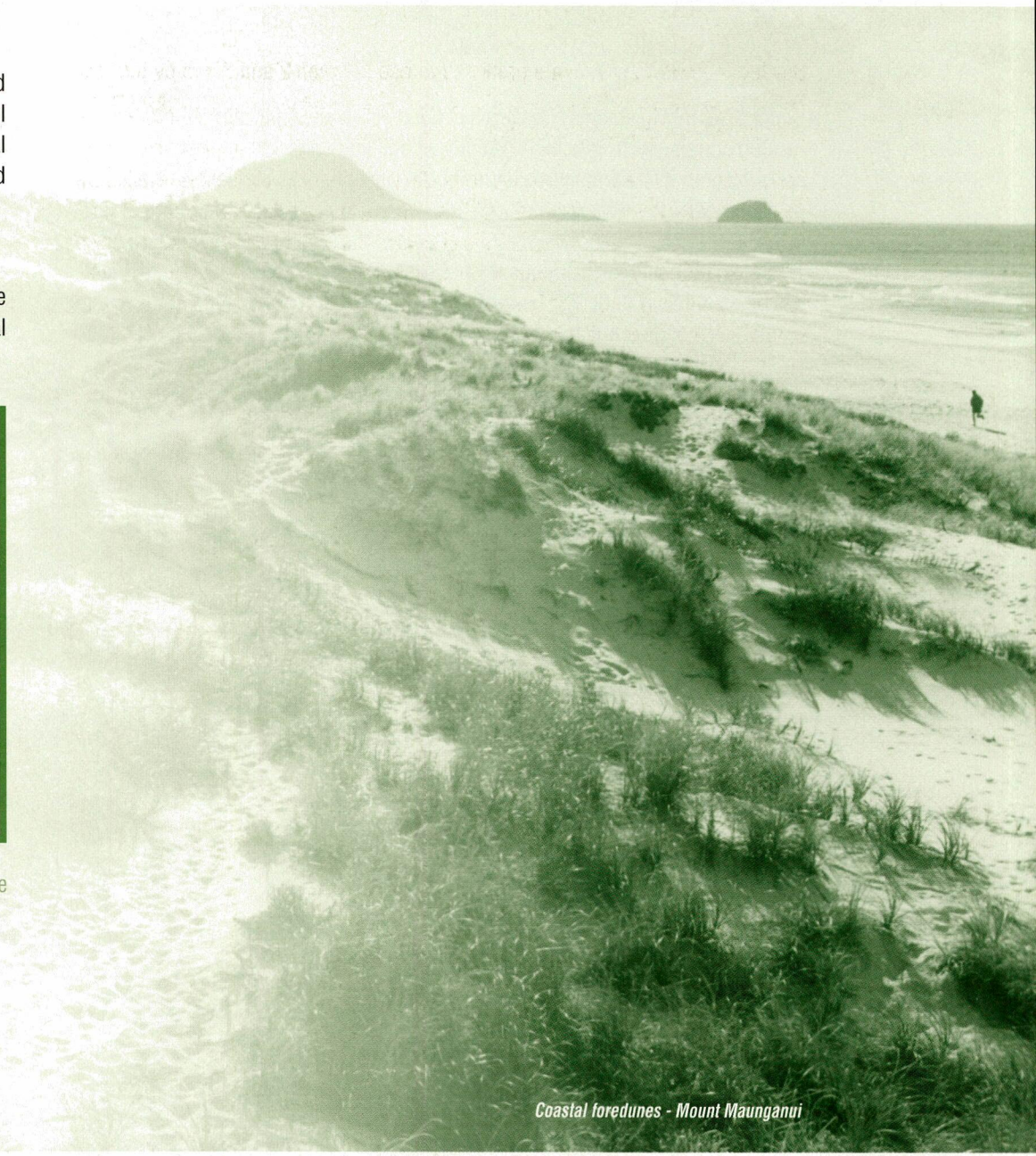
On the open coast, sand dunes physically protect the substantial investment behind them from storm damage. Sophisticated computer modelling has allowed Council to calculate risk based largely on the volume of sand in the dunes. Physical measurements of sand volume have occurred for a number of years along selected survey points. These measurements are reported in this indicator.

STATE

Over the 11 years of monitoring a state of relative stability is evident along the open coast. This may be due to the cyclic effect of El Nino with less erosional storms occurring.



- The beaches along the Mount Maunganui-Omanu-Papamoa coastline have been relatively stable over the last 11 years.


Coastal foredunes - Mount Maunganui

INDICATOR 31 - NUMBER AND SIZE OF LAND PARCELS IN FLOOD-RISK AREAS COMPARED WITH NON-RISK AREAS

Council's GIS[38] maintains a database of flood-risk areas. The data are incomplete, making comparisons difficult. Currently all building consents in flood-risk areas are subject to management measures so risk is unlikely to increase as a result of development.

This indicator will look at trends in subdivision within flood-risk areas. Its value will be as much in noticing change in patterns as recording change in the extent of flood- risk areas. Until flood-risk data are complete, an evaluation of the shifting patterns of flood risk is difficult.

STATE

There are 33,694 land parcels in the District and 5.76% of these are in areas considered at risk of flooding[39]. The average size of flood-risk parcels is 1980m^2. The average size of all parcels is 2088m^2.

- Nearly 6% of land in Tauranga is at risk of flooding.

(38) Geographic Information System, a computerised means of analysing information on the natural and physical resources and land development of the District.
(39) Flood risk assumes no on-site mitigation. Building permits are not issued if adequate mitigation cannot be achieved.

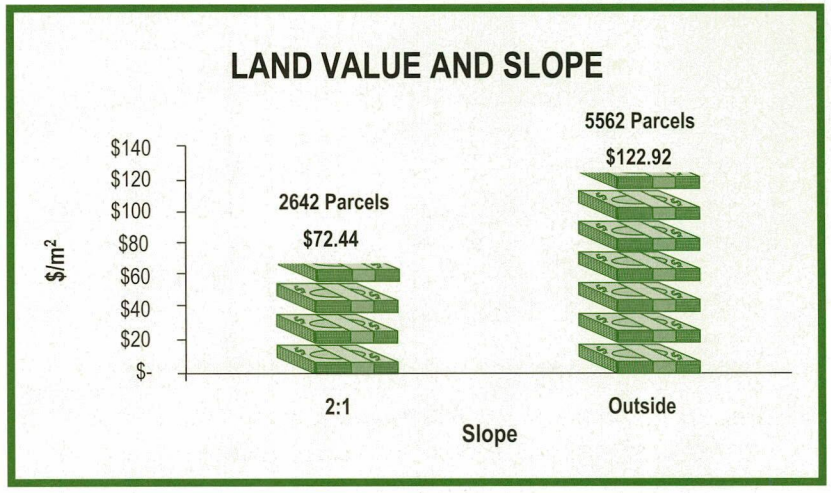
INDICATOR 32 - NUMBER OF LAND PARCELS ON STEEP SLOPES AND THEIR VALUE RELATIVE TO LESS STEEP LOTS

This indicator comprises two indicators. The first, number of land parcels on steep slopes, gives information on how heavily developed potential risk areas are. The second, land value, provides an insight to people's choices on capital return in known hazard risk areas.

STATE

There are 2642 land parcels within or adjacent to 2:1 (very steep) slopes occupying a land area of 1157 ha. Within 75m[40] of these steep sites there are 5562 sections which occupy 1207 ha.

The values of these slope-related land parcels per square metre are shown below:



(40) 75m is the safety hazard distance based on the potential slope failure of a 25m-high piece of land with a 2:1 slope, and allowing for a 50% factor of safety.

SCORECARD : PRESSURE

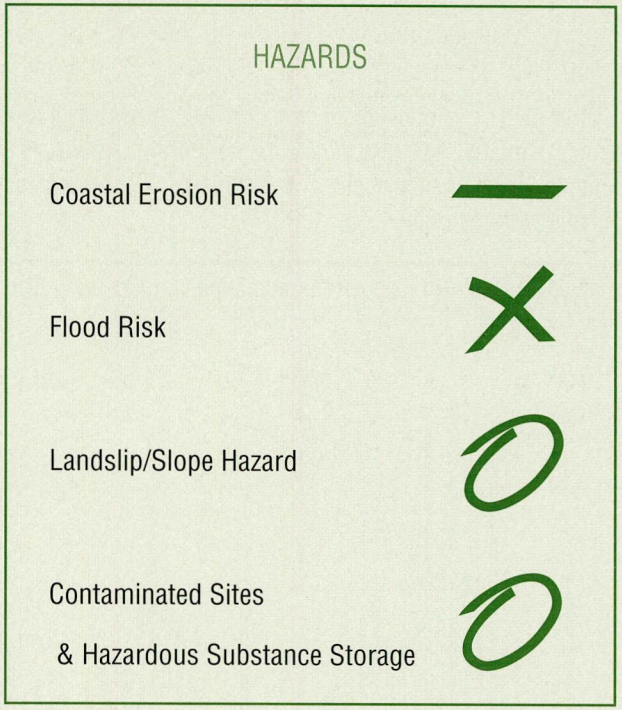
Management of natural hazards is, at best, an inexact science. It requires complex systems and research to accurately determine if hazard pressures are increasing or decreasing.

Although there are many compounding factors, the findings in this report for 1999/2000 indicate a degree of market resistance to development on steep slopes; possibly because recent history has provided examples of property damage from land slips. However, there is evidence to suggest that no similar resistance can be found in open coastal locations where coastal hazard risks are significant and very real[41].

SCORECARD : STATE

Comprehensive systems are in place to ensure new development takes into account hazard-risk prone areas. If hazards are then realised in risk areas, the owners knowingly bear the risks. Growth pressure and development needs for land will, irrespective of engineering and construction methods, probably increase the community's exposure to natural hazard risks. These risks are reasonably well known, with varying degrees of quantification. The best example is the establishment of coastal erosion hazard zones along the Mount Maunganui-Papamoa coast, requiring setback distances for new houses based on the likely occurrence of coastal erosion over the next 100 years.

(41) Unlike other hazards, the risk of coastal erosion and flooding varies with season and year due to natural variations such as storm events and the magnitude of effect.

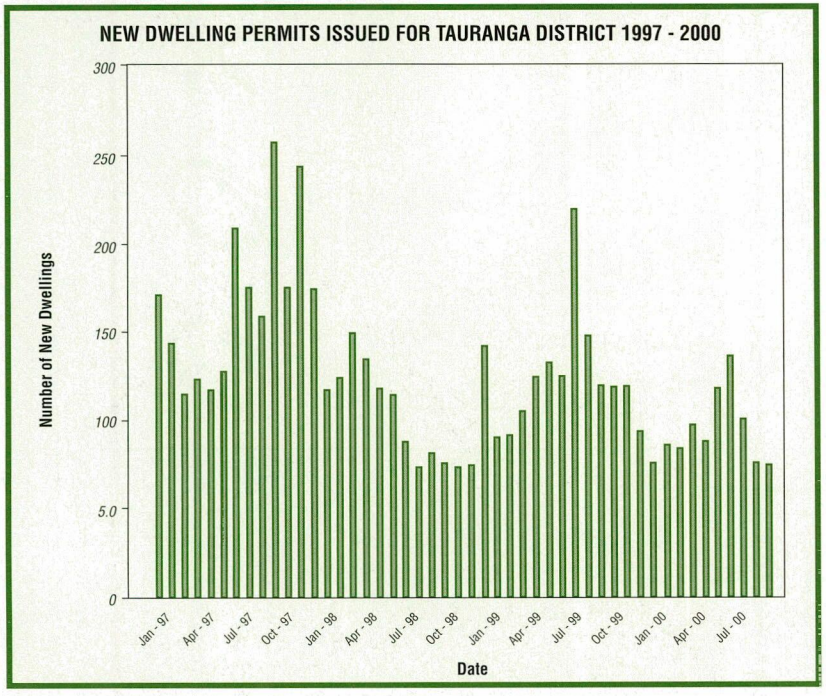


✓ Getting Better
— Remaining Stable
✗ Getting Worse
0 Insufficient information to assess any trend

SECTION 7: PHYSICAL RESOURCES

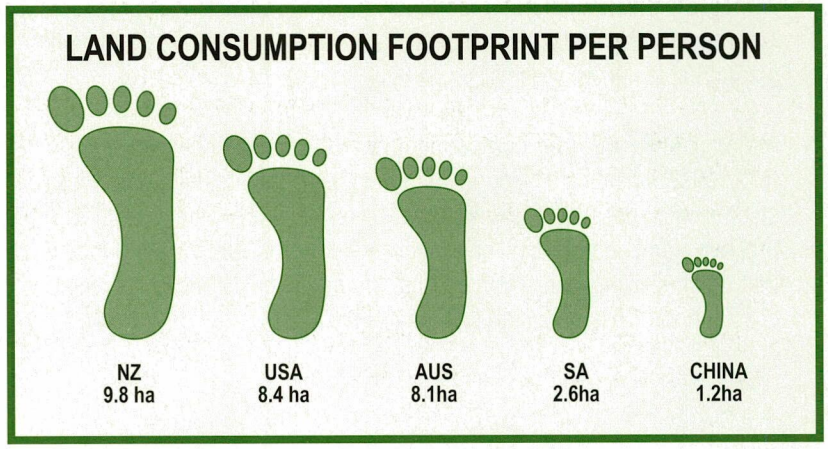
7.1 BACKGROUND

At the time of writing, it is considered the District's growth will continue at a steady rate (approximately 110 new dwellings per month). As well as generating private and public environmental costs, growth presents opportunities to develop more sustainable patterns of land use.



It has been estimated that New Zealand's lifestyle results in consumption levels equivalent to 4 times the land area of underdeveloped countries (we require about 5 ha for each person to sustain our lifestyles, compared with a global average of just over 1 ha per person).

This land footprint is to produce our food, raw materials, power and other consumables - as well as to house, transport, service domestic needs and dispose of waste[42]. When other resources are also considered (such as marine fishery areas and additional forest to absorb carbon dioxide emissions), New Zealand's footprint grows to 9.8 ha per person.



The State of New Zealand's Environment report summarises the dilemma: "If everyone [on Earth] currently aspired to our level of land affluence the world would need 28 billion hectares of productive land. That is twice the Earth's land area and about 5 times the area currently used for production".

In New Zealand we are privileged to have plenty of land. The quality of our natural environment is one of our key advantages. In Tauranga, rapid growth and increasing demands by the community for new infrastructure and services need to be carefully weighed against the long-term future of the community, and particularly our children's future welfare.

One of the most important measures of Tauranga's legacy to future generations is the rate at which raw materials are consumed. As more development occurs the potential for alternative use is lost. This loss of resources may well mean that future generations, while benefiting from the District's current development, may not have the opportunity to make choices on future resource development.

(42) State of New Zealand's Environment, Taylor, R. and Smith, I., Ministry for the Environment, GP Publications (1997).

Few data exist upon which to assess the rate of Tauranga's resource consumption. However, we do know:

- Residential land use found in some of the newer subdivisions is of low intensity. Covenants prevent many of these from being intensified
- Rates of vehicle ownership continue to rise. Vehicle ownership and the numbers of trips taken are strongly correlated
- District transportation strategies are based on improving motor vehicle accessibility. Convenient use and access to vehicles encourages low-density development and increased vehicle trips. Initiatives to enable greater cycling and walking face significant barriers because of the "ease" of private motor vehicle travel
- Our population is ageing. This pattern looks set to continue, with increasingly higher proportions of elderly. With this comes a change in lifestyle requirements, consumption and mobility.

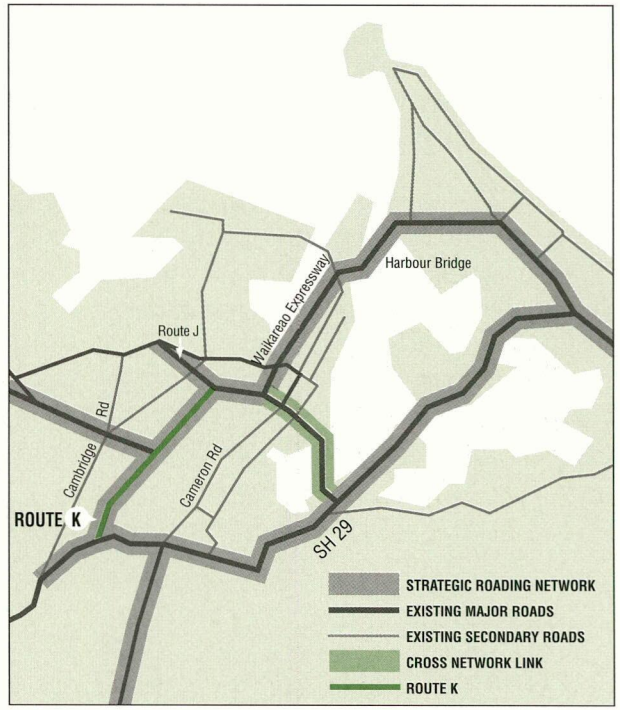
7.2 TRANSPORTATION - HOW ARE WE DOING?

Transportation systems provide lifelines between different parts of the built environment, connecting the city's inhabitants with the things they need - such as food, shelter, work and recreation. The transportation system is important to businesses as it enables them to receive goods and services from their suppliers and access their markets. The road links to the port, airport and rail system are important for business.

Tauranga is a low-density city. An important consequence of this is that it is difficult to provide an effective and efficient passenger transport system, so we can expect people and businesses to continue to rely on the motor vehicle to access the places where they live, work and play. If we continue to build a city with a low-density urban form and want to ensure that the environment is not degraded as a result of vehicles, increased funding will be required to address air, water and noise pollution, as well as other environmental effects.

The growth of the city and the increased reliance on the motor vehicle due to the low-density urban form will result in increased congestion. Overcoming this congestion will require either considerable efforts to find alternatives to people using cars or to increase spending on building more roads.

Recent initiatives to alleviate traffic congestion has seen construction start on Routes J and K, the former bypassing Waihi Road as part of State Highway 2, and the latter linking State Highway 29 at Tauriko with Judea and the Waikareao Expressway (Route P). These new arterial roads will complete the ring road system around Tauranga and assist in removing inter-regional traffic from the city and residential roads. Continued monitoring of key selected routes should indicate success or otherwise in relieving some of the traffic congestion on our roads.



While Tauranga needs quality transportation systems, as we are socially and economically dependant on good mobility, there is a cost to present and future generations.

7.3 OUR RESPONSE TO THESE ISSUES

Urban areas face complex resource issues. At present most local authorities are reliant on communities developing their own solutions through market/private actions.

Currently:

- Planning provisions in the District Plan enable some urban consolidation. Very high densities are difficult because of unknown infrastructure constraints, but work is underway to determine whether increasing residential densities could be managed to achieve satisfactory environmental outcomes

- There are increasing levels of public investment in transportation for private motor vehicles. Whether today's vehicle dependency will be matched in 20 years is not known. It is probable, given the current level of public subsidy of roading, that demand will remain reasonably high

- About 50% of new dwellings are in established residential areas (infill). Growth into "greenfield" areas represents the remainder. The future mix of housing supply will be influenced by plans to release more greenfield land to meet housing choice and market preferences

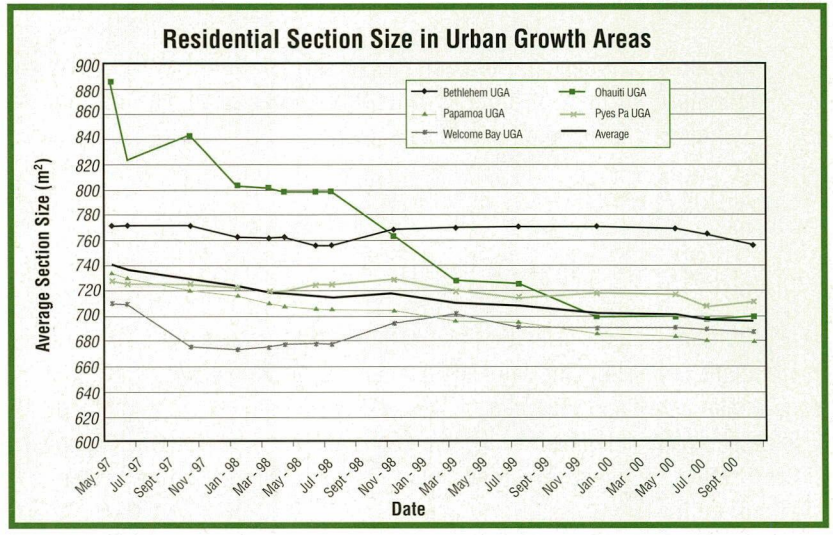
- There is anecdotal evidence of housing market preference for proximity to services (i.e., walking distance to shops). This is countered by market expectations for low-density, detached, suburban development.

INDICATOR 33 - CHANGE IN AVERAGE RESIDENTIAL SECTION SIZE IN URBAN GROWTH AREAS

Residential density is one of many determinants in the pattern of urban resource use and consumption. Other determinants include income, access to various forms of transport and the design of neighbourhoods.

STATE

Tauranga District contains five Urban Growth Areas; Bethlehem, Papamoa, Pyes Pa, Welcome Bay and Ohauiti. On average, "developed"(43) residential lots in the Urban Growth Areas are getting smaller by 14m² a year. This reflects the smaller section sizes created in new subdivisions.



- Residential lots in Urban Growth Areas are on average getting smaller by 14m² each year.

While smaller section sizes can affect amenity values, they mean better urban land use, as more people can live in our greenfield (UGA) areas.

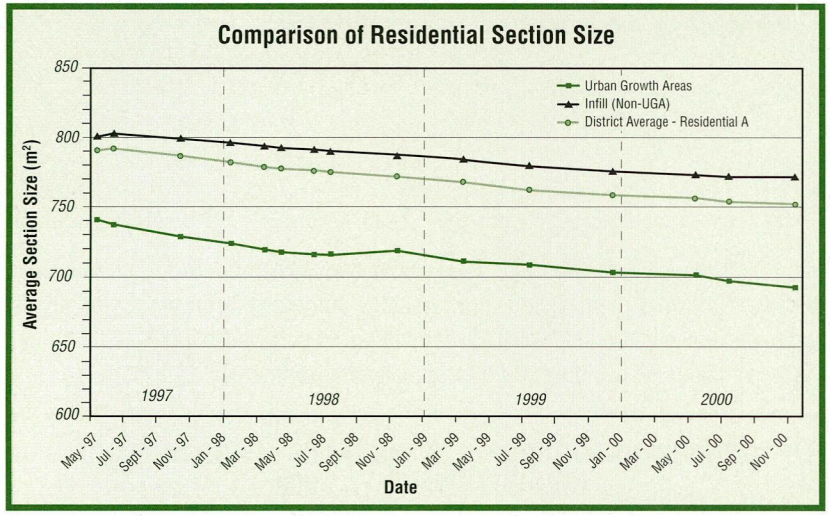
(43) "Developed" equates to lots less than 2000 m² in existing urbanised areas of Tauranga.

INDICATOR 34 - DIFFERENCE IN RESIDENTIAL SECTION SIZE BETWEEN URBAN GROWTH AREAS AND INFILL AREAS

Urban sprawl is considered as poor planning in much of the developed world. In New Zealand our less densely populated country may reduce a need to debate the issue. This indicator looks at the trend in residential section size between Urban Growth Areas (greenfield development) and the existing areas of Tauranga (infill development).

STATE

Comparing the developed residential section size (i.e., lots <2000m^2) in Urban Growth Areas with those of Infill areas shows the average size of UGA residential lots is 93% of the District average for residential areas of Tauranga.



Except for 1998, development in UGAs has shown a trend for smaller lot sizes than previous, resulting in an overall decrease in the average section size of developed residential lots. Correspondingly despite the trend for infill development to create lots substantially less than the average (commonly 325m^2 and as low as 100m^2), the historical size and number of sections in existing suburbs of Tauranga means that sections in non-UGA (infill) areas remain on average larger than developed lots in Urban Growth Areas, although the trend is of decreasing size.

- As at October 2000 the average residential section size in UGAs is 692m^2 compared with 751m^2 throughout the District
- Since 1997 the average residential section size for the District has continued to decrease at a similar rate in both UGA and infill areas.

New housing development - Welcome Bay

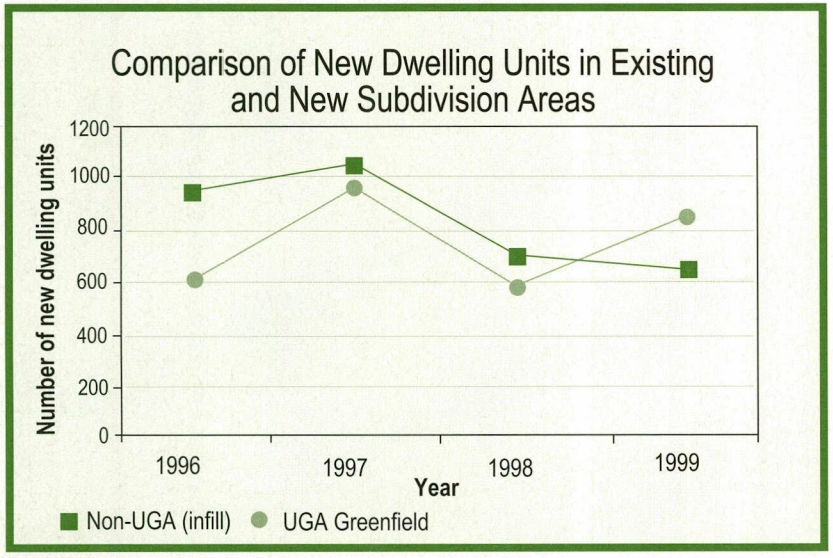
INDICATOR 35 - RATE OF LAND DEVELOPMENT IN INFILL AND URBAN GROWTH AREAS

Urban Growth Areas are all located on the fringe of Tauranga. They were designed to provide people with housing choice and generally have fewer services and greater travel distances to those services. In established residential areas infill occurs when existing residential properties are subdivided or higher-density development occurs (e.g., apartment blocks at northern Mount Maunganui).

The rate of development of Urban Growth Areas is considered a good pressure indicator as it reveals something of the housing market's preference for low-density development, and Tauranga's urban form.

STATE

On average, the rate of development in infill areas is declining faster than Urban Growth Areas. Historically, the "release" of Urban Growth Area land for development has resulted in accelerated development. It is uncertain whether this will occur in the future.



- Development within infill areas is slowing which is probably due to less land being available for subdivision and housing within these areas.

INDICATOR 36 - HOUSING DENSITIES

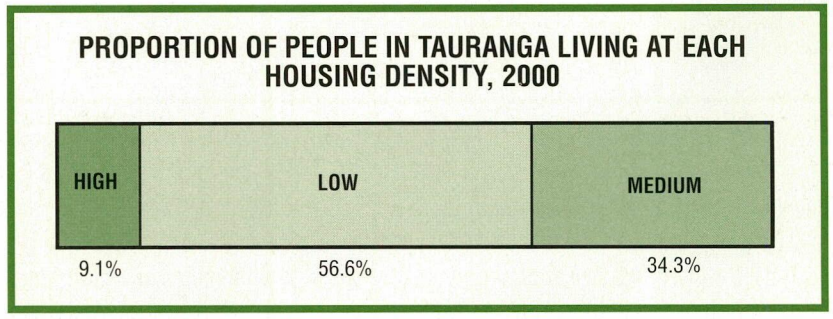
This simple indicator illustrates housing density patterns in Tauranga (i.e., the number of people living in low-, medium-, and high-density neighbourhoods). The density standards are derived from international research[44]. Low density equates to 0-15 dwelling units per hectare (du/ha), medium density 10-15 du/ha, and high density 15+ du/ha. These densities are the average number of houses in a hectare of land allowing for roads, neighbourhood reserves and associated infrastructure.

STATE

Tauranga's housing densities as at March 2000[45]:

TYPE OF HOUSING DENSITY	NUMBER OF RESIDENTS IN EACH NEIGHBOURHOOD
High	7,859
Medium	29,617
Low	48,930

Most District residents continue to live in low-density neighbourhoods. However, the advent of apartment-style living, greater numbers of retirement complexes, and higher-density provisions in the District Plan, is reflected in increased numbers of people living in medium- and high-density environments.



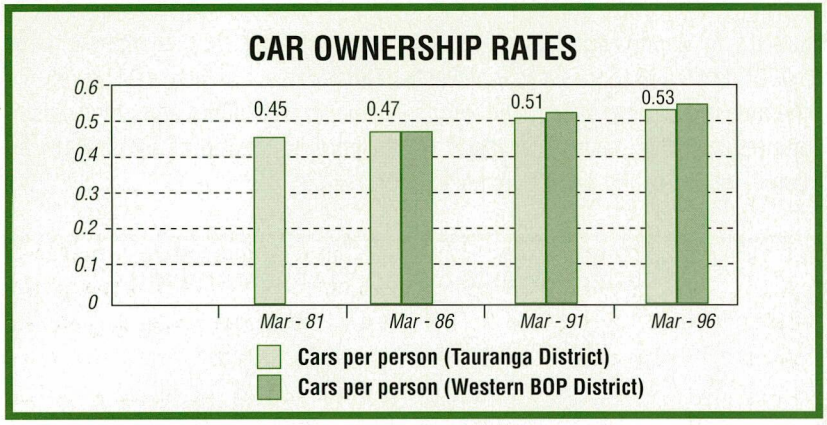
- 57% of Tauranga residents live in low-density neighbourhoods.

(44) Winning Back the Cities, Newman P. and Kenworthy J., Pluto Press, Leichardt (1992).
(45) Based on March 2000 estimated population figures and the number of people in each dwelling unit (house, apartment, unit, etc), Tauranga District Council GIS.

INDICATOR 37 - RATE OF INCREASE OF CAR OWNERSHIP

Car ownership is increasing in the Western Bay of Plenty subregion.

The level of car ownership provides an insight to future transport and environmental issues. The convenience of car ownership affects public transport options (a properly functioning public transport system is currently not an economically viable option in Tauranga) and increases congestion and pollution problems, which have become apparent in larger cities such as Auckland and Wellington. Air pollution monitoring by Environment BOP has already shown that major traffic intersections in Tauranga, e.g., Eleventh Avenue, exceed recommended emission guidelines.



STATE

The rate of car ownership in the District is increasing at an annual rate of 5.9 new cars per thousand people based on Census figures [46]. This equates to 50 new cars on the road each year regardless of increases in the District's population.

- The rate of car ownership is increasing at an annual rate of 5.9 new cars per thousand people.

(46) Statistics NZ 1981, 1986, 1991, 1996 New Zealand Census.

Historic Village

INDICATOR 38 - AVERAGE (TRAVEL TO WORK) VEHICLE OCCUPANCY RATE

Vehicle occupancy rate is a measure of the number of people in each car as they travel to work. In a perfect world cars would be fully occupied (four or five people per vehicle) resulting in less traffic congestion.

STATE

- In Tauranga District vehicle occupancy rate is 1.1 persons per vehicle[47].

(47) Statistics NZ 1996 Census.

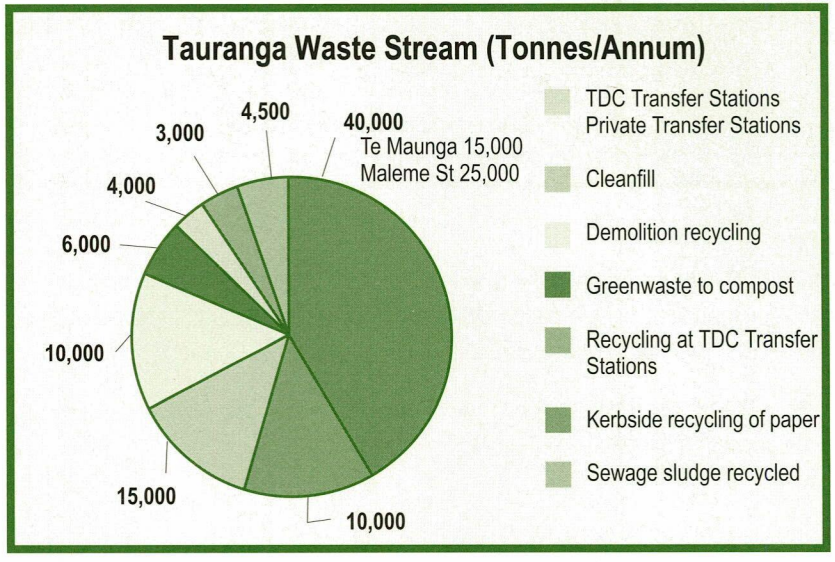
INDICATOR 39 - WASTE PRODUCTION PER RESIDENT

The amount of waste produced is a good measure of consumption and is a very direct environmental indicator. Waste production is not a matter over which the District Council has direct control. In New Zealand the average amount of waste generated per person is 900kg a year.

STATE

Tauranga residents generate 92,500 tonnes of waste each year. As a result of competitive pricing, Council's transfer sites currently receive 44% of the total domestic waste stream for Tauranga District. The waste disposal industry is highly competitive, with waste disposed of to a number of sources.

Council's Te Maunga and Maleme Street transfer stations receive approximately 15,000 and 25,000 tonnes a year of waste. Thirty percent of the waste by volume generated in Tauranga is recycled, principally paper, cardboard and green waste. Comprehensive kerbside recycling[48] would increase this figure by only 1% by volume, while costing $400 a tonne to achieve.

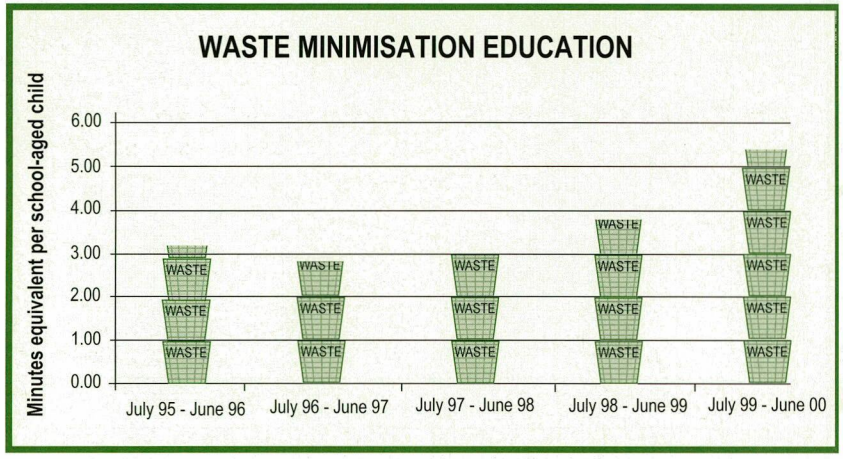


(48) Comprehensive kerbside recycling includes aluminium cans, tin cans, and plastic bottles, estimated to generate only 1150 tonnes per annum.

INDICATOR 40 - AMOUNT OF WASTE MINIMISATION EDUCATION PROVIDED TO OUR SCHOOLCHILDREN

This indicator reports on the amount of Council Waste Minimisation Education Programme provided to schoolage children in the District. The education of children on environmental issues is a means of raising environmental awareness, although the degree to which this can be measured is questionable. In the absence of other indicators, minutes per schoolage child provided by the Council-funded programme is reported.

STATE



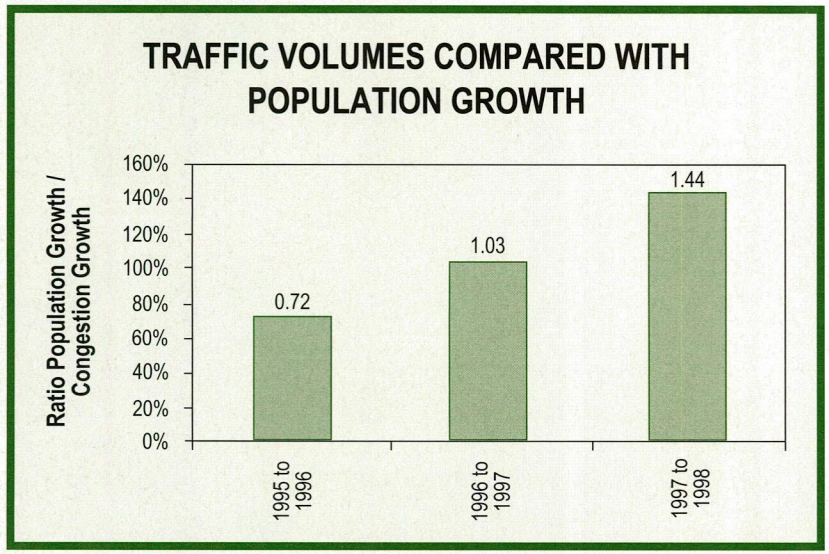
- Waste minimisation education provided to Tauranga schoolchildren has increased over the last four years with an average of over 5 minutes per child in the 1999/2000 year.


Old Cambridge Road Landfill

INDICATOR 41 - INCREASE IN TRAFFIC VOLUMES COMPARED WITH POPULATION GROWTH

A common rule of thumb is that traffic volume growth rates increase directly proportional to the rate of population growth. This is not, in fact, entirely correct. What usually happens is that as roads become more congested, people look for alternative routes, start using alternative transport modes or change their travel patterns.

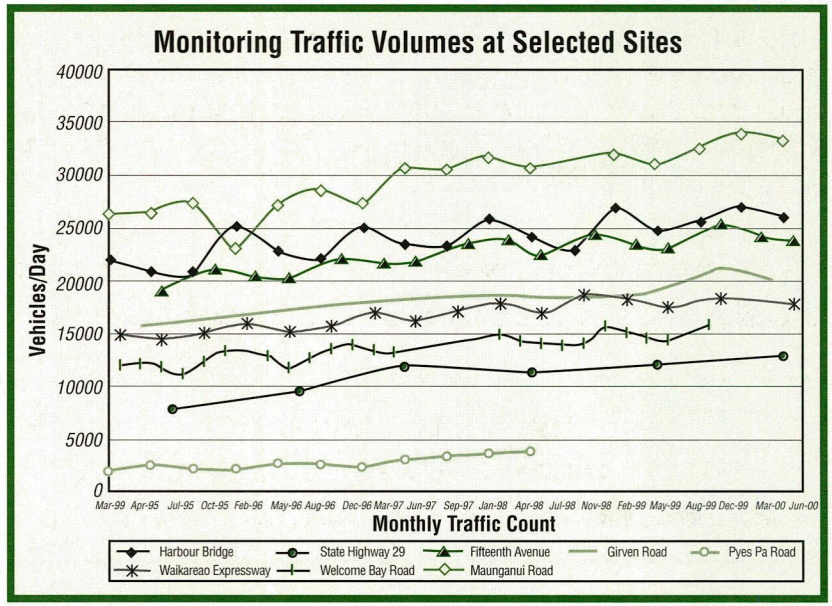
This indicator tracks the increase of traffic volume measured in vehicles per hour along selected traffic routes[49] and compares this with population growth (assumed to be distributed evenly across the District).



STATE

The rate of increase in traffic volumes (at peak times on selected routes) lags population growth. The ratio of population growth to traffic growth is currently 1.44.

This is in contrast to vehicle ownership rates, which are increasing at the rate of population growth.



- The rate of traffic congestion on Tauranga roads is increasing at a lesser rate than population growth.

(49) Traffic routes monitored are: Cameron Rd northbound, Cameron Rd southbound, Chapel St Causeway northbound, Chapel St Causeway southbound, Harbour Bridge northbound, Harbour Bridge southbound, Waihi Rd eastbound, Waihi Rd westbound, Waikareao Expressway northbound, Waikareao Expressway southbound.

(50) Excluding routes funded by central government.
(51) Road lengths have been doubled to ensure consistency with footpath data (a footpath can run on both sides of the road and therefore have twice the length of a road).

INDICATOR 42 - AMOUNT OF PUBLIC ROAD[50] PER RESIDENT

An indicator of our urban development and response to traffic pressure is the relative investment made in roads and footpaths. It does not include carparks or other sealed vehicle areas or State Highways 2 and 29 that pass through the District.

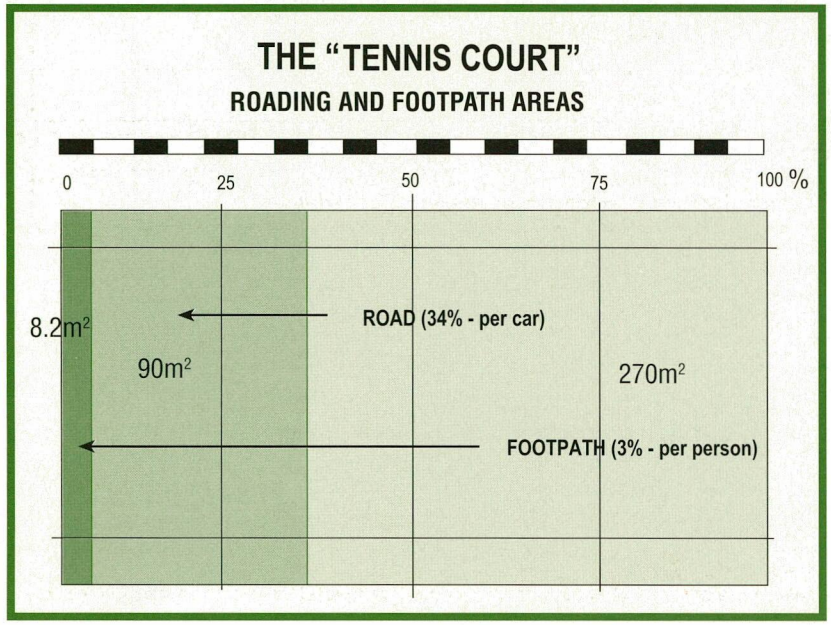
This indicator is also a measure of pedestrian accessibility. Within 500m of a destination it is assumed that people use footpaths. Greater than 500m away, people use cars or other motorised forms of transport.

In the 1970s Council did not require footpaths on all roads as it was assumed people could walk on grass verges/berm. Traffic volumes in the District have increased significantly since then and new subdivisions require at least one side of the road to have a footpath, with main collector roads required to have both sides paved.

STATE

For every resident in Tauranga there is 46m^2 of road surface and 8.2m^2 of footpath.

For every 1m of footpath there is approximately 1.9m of road equivalents[51].



- Local roads in Tauranga occupy an area that equates to 46m^2 of road seal per person, while footpaths are 8.2m^2 per person.

Waihi Road Traffic

SCORECARD: PRESSURE

Tauranga has a high population growth which creates pressure on District resources.

This section of the report shows that low-density suburban development is a dominant land-use pattern. Unless business/ employment areas become established in these new growth areas for local, convenient vehicle trips, car dependence in the District will continue to be high.

The pressures being exerted on the District's physical resources are extreme and unlikely to abate in the near future. Transportation is the most challenging among these given the urban land-use patterns emerging.

Some positive signs are appearing, with successful water consumption minimisation and stormwater quality programmes in place.

In terms of waste reduction, Tauranga has achieved a reduction level of 40% in the last five years, far in excess of that achieved in other parts of the country(52).

SCORECARD: STATE

Rates of private car ownership continue to increase. The District is developing at a reasonably low density (especially in Urban Growth Areas). Rural areas that provide a green contrast to the urban environment are under constant pressure.

(52) Tauranga District Council Waste Management Activity - Preliminary Review, Tong & Associates Ltd (June 2000).

SECTION 8: WHAT ABOUT COUNCIL?

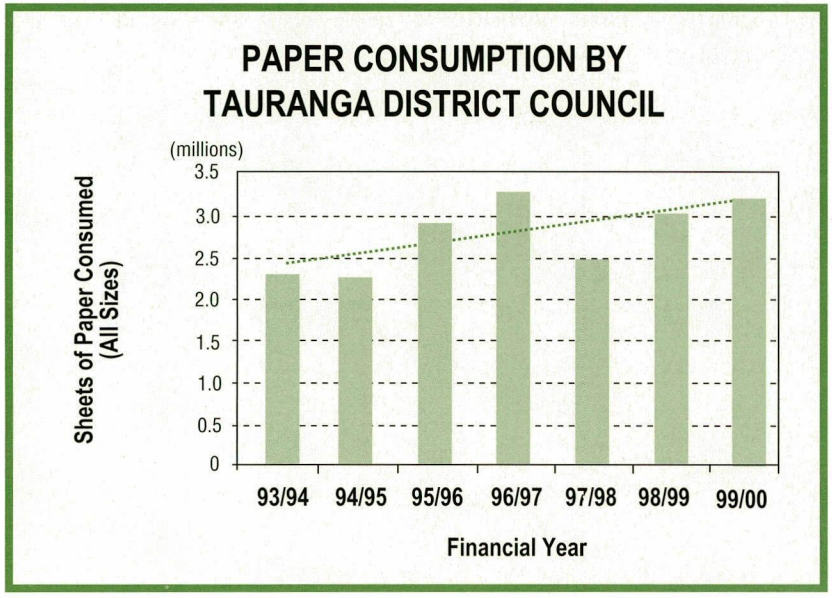
The following set of indicators reflect the performance of Council.

INDICATOR 43 - COUNCIL'S PAPER CONSUMPTION

Paper is extremely easy to conserve. Use of electronic media, photocopying both sides and recycling used paper for scrap use, all contribute to keeping overall paper consumption down. Judicious use of paper in the first instance though, is the main means of keeping volumes down.

STATE

Council consumes a large amount of paper and has no formalised internal paper conservation strategy. Many staff individually conserve paper and at least one cleaning contract requires waste paper to be recycled. However, the efforts of the individual tend to pale into insignificance beside the huge volumes in question.

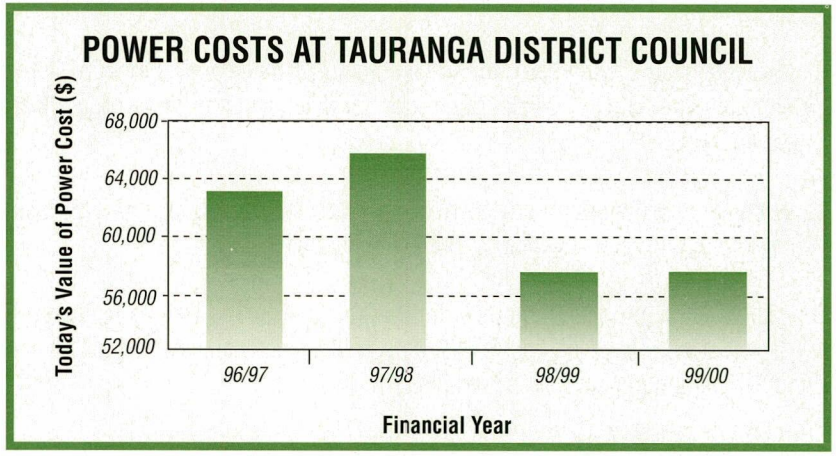


INDICATOR 44 - POWER CONSUMPTION IN COUNCIL'S WILLOW STREET PREMISES

Power is another easily conserved resource. Council makes every effort to ensure energy consumption is moderated.

STATE

Air-conditioning and a reasonably inefficient building design mean that power is consumed reasonably heavily in the Willow Street premises. The cost reduction of 1999/2000 is attributed to a mix of conservation measures and power tariff adjustments.



Power consumption has been variable in the past four years. In the 1999/2000 year the cost of power was $58,000.

kwh better

SECTION 9: SUMMARY - STATE OF THE TAURANGA DISTRICT

9.1 ENVIRONMENTAL PRINCIPLES

The initial reporting process experienced difficulty in summarising, with one of the key obstacles being the sheer amount of data required to get even close to describe the real world. Data alone cannot describe real world complexity and no amount of analysis will help to accurately predict some future environmental changes. However, by applying basic principles the environment can be managed so that the likelihood of adverse change is lessened. These principles are:

1. Natural systems tend to be more robust than man-made ones. Larger systems are more robust than smaller ones, and compact systems more robust than expanded ones

2. Without opportunities for change to occur, it cannot occur. Planning is as much about creating opportunities as managing change

3. Energy binds our planet together, but burning energy reduces its usefulness. Growing mountains of waste, changing environment quality and increasing fuel consumption are the end results of this principle.

9.2 ENVIRONMENTAL PERFORMANCE

Applying these principles to each indicator sees a setting of a target value, and a target versus actual value calculated. For example, 65% of people have access to a Commercial Zone within 500m (as the crow flies). Principles 2 and 3 suggest the closer people are to employment opportunities the better - 75% has been established as the target value for this indicator. This means we are within 14% of the target value.

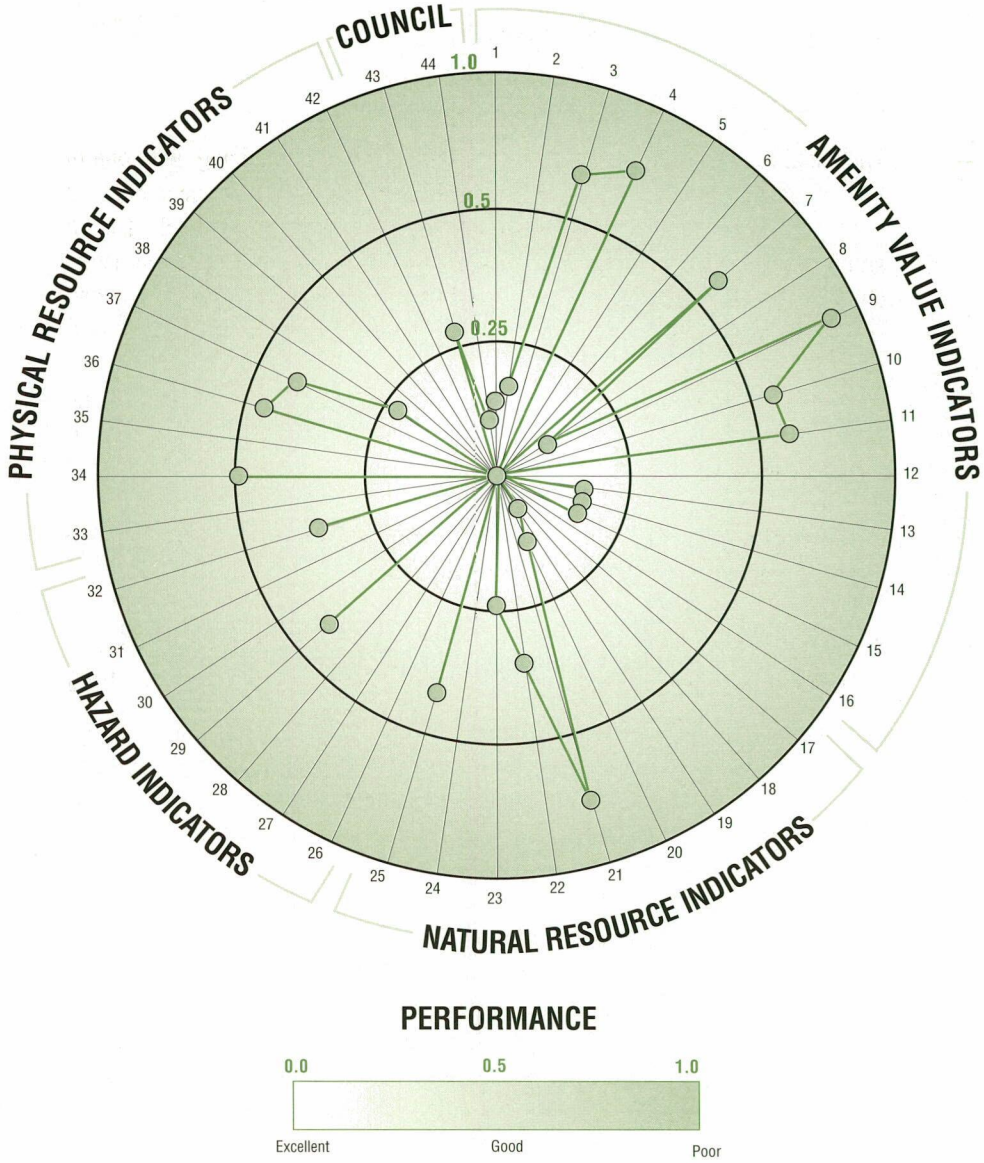
The "Environmental Scorecard" graph (page 55) illustrates the District's environmental performance. The closer to the centre of the scorecard an individual indicator is, the better the performance for that measure of the District's environment.

Ongoing monitoring of the indicators and data collection will enable comparisons to be made in future years of the environmental state of Tauranga District.

ENVIRONMENTAL SCORECARD

HOW WELL IS TAURANGA DOING?

This diagram summarises the state of Tauranga District's environment. The closer an indicator value is to the "bullseye", the better the environmental performance.



1: Section size change
2: Occupied area
3: Streetscape satisfaction
4: Noise dissatisfaction
5: Noise infill
6: Port/Airport growth
7: Privacy dissatisfaction
8: Access to services
9: UGA facilities access
10: Reserve appreciation
11: Unhappy with housing density
12: Tree appreciation
13: Tree density
14: Long-term noise levels
15: Level of access
16: Value of views
17: Landscape value
18: Landscape degradation/enhancement
19: Native vegetation loss
20: Condition of ecological sites
21: Ecological fragmentation
22: Length of stream margin
23: Ecological protection
24: Productive land zoned development
25: Change in productive land
26: Properties in coastal erosion areas
27: Storm surge levels
28: Sea-level rise
29: Landslip hazard consideration
30: Change in beach volumes
31: Flood risk properties
32: Properties on steep slopes ratio
33: Change in UGA section size
34: Infill vs UGA section size
35: UGA development growth
36: Housing densities
37: Car ownership
38: Vehicle occupancy
39: Waste production
40: Waste education to children
41: Ratio population growth to traffic
42: Area of roads
43: Paper consumption - Council
44: Power cost - Council

GLOSSARY OF TERMS

Accessibility the degree to which facilities and services can be accessed

Amenity Values natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes

Biodiversity the variability among living organisms

Ecosystem any system of organisms interacting within their natural and physical environment

El Nino warm weather cycle which affects sea level

Environment includes ecosystems and their constituent parts, people and communities, all natural and physical resources, amenity values, and social, economic, aesthetic and cultural conditions

Fragmentation the cutting-up of natural heritage areas into small separate pieces commonly by historical land development

Geographic Information System (GIS) a computerised means of analysing information on the natural and physical resources and land development of the District

Greenfield subdivision new subdivision creating sections for residential use from areas which were formerly rural or open land

Indicator an information tool, summarising data on an environmental issue to indicate a status and/or trend to assess performance

Native vegetation flora (plants) which naturally occur in Tauranga District

Infill subdivision further subdivision of land that has already been subdivided into urban allotments (sections)

Infrastructure utility networks, links and parts of facility systems, such as transport infrastructure (roads, rail, parking, etc.) or water system infrastructure (pipes, pumps, treatments works, etc.)

L_{10} average maximum sound level - measured as the sound level which is equalled or exceeded for 10 percent of the total measurement time

L_{95} average minimum sound level or background sound level - measured as the sound level which is equalled or exceeded for 95 percent of the total measurement time

Moturiki Datum the survey reference datum of mean sea level commonly used in the Bay of Plenty

Natural heritage the native flora and fauna of Tauranga District, including aquatic and terrestrial natural ecosystems

Proxy an indicator which is an indirect determination of the environmental issue being monitored

Riparian margin a strip of land adjacent to a stream, river or wetland

Storm surge elevation in sea level caused by a coastal storm (combined effects of wind, waves and tide)

Streetscape the visual appearance of a street and its surrounds

Urban Growth Area planned growth areas for housing and services on the fringes of Tauranga. There are five of these; Bethlehem, Papamoa, Welcome Bay, Ohauiti, Pyes Pa

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