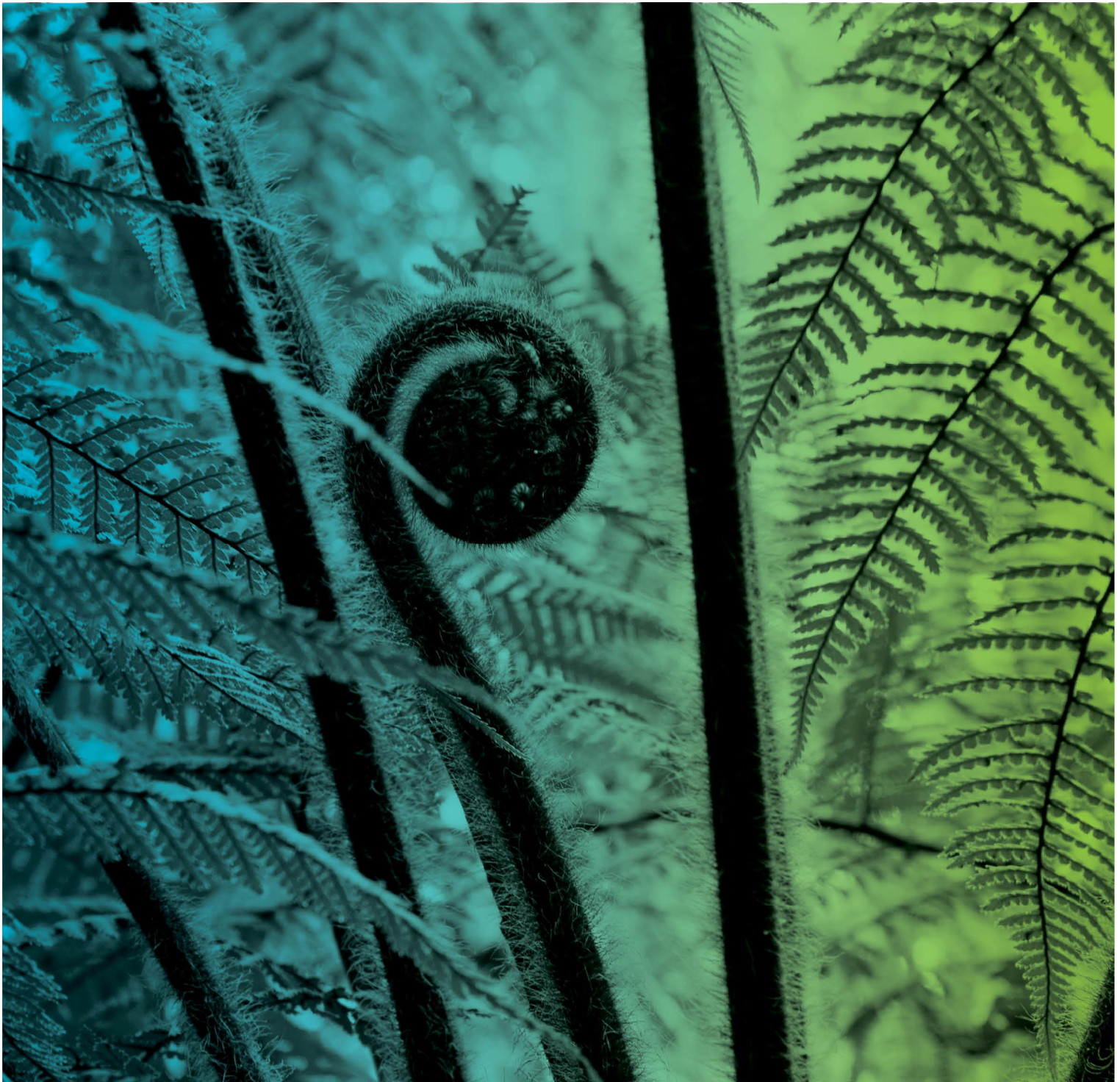


Human Carrying Capacity

Stage 3: Sustainability Indicators



Human Carrying Capacity

Stage 3: Sustainability Indicators

Prepared for

Kāpiti Coast District Council

Prepared by

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Table of Contents

1.0	Introduction	1
2.0	Planning Discussion	1
2.1	Traditional District Plan Approaches and the Kāpiti District Plan	1
2.2	Overview of Incentive Planning Methods	2
2.2.1	Incentive Zoning	2
2.2.2	Transferable Development Rights	3
3.0	Recommended Indicators and Approaches for use in District Planning	5
3.1	Electricity supply and demand	6
3.1.1	Indicator Details	6
3.1.2	Implementation	6
3.2	Transport Fuel Supply and Demand	8
3.2.1	Indicator Details	8
3.2.2	Implementation	9
3.3	Infill Housing and Apartments	10
3.3.1	Indicator Details	10
3.3.2	Implementation	11
3.4	Waste to Landfill and Cleanfill	12
3.4.1	Indicator Details	12
3.4.2	Implementation	13
3.5	Air pollution	14
3.5.1	Indicator Details	14
3.5.2	Implementation	14
3.6	Availability of Productive Soils for Agricultural Production	16
3.6.1	Indicator Details	16
3.6.2	Implementation	16
3.7	Water supply	17
3.7.1	Indicator Details	17
3.7.2	Implementation	18
3.8	Surface water quality	19
3.8.1	Indicator Details	19
3.8.2	Implementation	20
3.9	Urban Land Use Supply and Demand	21
3.9.1	Indicator Details	21
3.9.2	Implementation	22
3.10	Biodiversity	23
3.10.1	Indicator Details	23
3.10.2	Implementation	25
3.11	Summary	27
4.0	Conclusions and Recommendations	29
5.0	References	30
Appendix A		
	Environmental Indicators List	A

1.0 Introduction

AECOM and Landcare Research were engaged by Kāpiti Coast District Council to undertake a study into the feasibility of incorporating the concept of **human carrying capacity** as a means of assessing sustainability for the district, and how this may be applied through the District Plan. This report follows from the Stage 2 report by AECOM and Landcare Research entitled *'Human Carrying Capacity: Application of Concept to Kāpiti Coast District'* (AECOM, June 2011).

The framework developed in Stage 2 covers the implementation of the human carrying capacity (HCC) concept, and three examples are given to illustrate the framework. However, as demonstrated by these examples, the framework requires that significant, complex issues be considered carefully, with both limits and relationships to population often being difficult to establish. While the HCC framework can be implemented, it was deemed (through discussion with Kāpiti Coast District Council) to be more practical to focus on a recommended set of 'sustainability' indicators.

In the interests of assisting in the Council's District Plan Review process, which at time of writing is well underway, in this report we provide recommendations on *environmental* sustainability indicators we consider have a high probability of being of use in the District Plan, and which can lead to, or encourage, increased sustainability in the District.

Given Council has a statutory responsibility to manage natural resources under the Resource Management Act (RMA) via the District Plan, the focus on environmental indicators is considered prudent from a statutory standpoint while also having high potential for applicability under District Plan rules. In addition to the environmental indicators reviewed in this report, there is a broad range of cultural, economic, and social indicators that could also be reviewed by Council at a later date.

The table in Appendix A presents a range of environmental indicators consolidated from three separate lists¹, along with key information about these indicators: whether they are currently measured and available at district level, who collates such data, the strength of correlation with population, whether it is potentially within Kāpiti Coast District Council's influence, the potential for the indicator to be further differentiated spatially, its overall relevance to the concept of human carrying capacity, and the heading of the section in this report that discusses it (or N/A if it is not dealt with).

Section 2 of this report covers an overview of planning considerations relating to achieving sustainable outcomes, and Section 3 details ten recommended groups of indicators – chosen from the list in Appendix A – that we deem to be most appropriate to the Kāpiti context and most suitable for implementation.

2.0 Planning Discussion

This section of the report reviews traditional District Plan approaches in New Zealand, and in a broad sense the provisions of the existing Kāpiti District Plan. It then goes on to review alternative planning approaches (such as incentive planning) used within the international and New Zealand settings. This provides background to some of the proposed District Plan approaches outlined in Section 3, the implementation of which may ensure more sustainable environmental outcomes are achieved in Kāpiti Coast District.

2.1 Traditional District Plan Approaches and the Kāpiti District Plan

Generally speaking, District Plan regulation in New Zealand tends to focus on rules that place limits on what persons can or cannot do with their property. Typically, this is in the form of rules that control what land use activities can or cannot take place "as of right" (i.e. as a permitted activity not requiring resource consent) on a parcel of land under a certain zoning, or in the form of controls that limit the extent of physical development on a site such as building height, site coverage, and density. Such methods of planning regulation pre-date the enactment of the Resource Management Act in 1991.

Some District Plans approach regulation slightly differently, with an emphasis on controlling the effects of activities rather than the activities themselves. This typically entails setting environmental performance standards. For

¹ Choosing Futures Waikato, Statistics New Zealand – Measuring NZ's Development using a Sustainable Development Approach, and Kāpiti Coast District Council Community Plan; these are presented in the Stage 2 report.

example a rule relating to residential zones might state that non-residential activities are permitted if they generate no more than 10 vehicle movements per day.

The Kāpiti Coast District Plan regulates the use and development of land within the district. As per above, it is a relatively “traditional” District Plan in that it focuses on controlling land use activities and the scope of development allowable on zoned sites, through traditional development and land use controls.

As it was developed under the RMA, the Kāpiti Coast District Plan has been developed to realise the purpose of the RMA, which is sustainable management. Beyond traditional land use activity controls and development controls, and controls such as earthworks rules and rules relating to the destruction of indigenous vegetation, it does utilise some more “adventurous” regulation such as:

- Requiring new or relocated dwellings in residential zones to install rainwater storage tanks, even where potable water supply is available;
- The provision for the Kukutauaki, Kawakahia, Smithfield Dunes, Lamberts and Ngapara Eco-hamlets.

It is noted that there is no evidence of the use of incentive planning in the District Plan.

As a result, it is considered that the District Plan’s relatively narrow use of regulatory tools could be significantly broadened to achieve better environmental outcomes. The recently released CBD masterplan for Christchurch is a strong New Zealand example of a plan that seeks to utilise a range of methods (development bonuses, fast tracking of consent processes, development contribution waivers) beyond traditional District Plan rules to achieve more sustainable environmental outcomes. Potential measures for Kāpiti Coast District Council are outlined and reviewed in the following section.

2.2 Overview of Incentive Planning Methods

2.2.1 Incentive Zoning

Historically a number of New Zealand Councils have utilised some form of “incentive zoning”: allowing the potential for additional development rights or entitlements on a parcel of land if certain amenities that are deemed to be in the public interest are provided. Early proponents of incentive zoning included the Auckland City Council and Wellington City Council from the 1970s. Influenced by larger American cities that had implemented incentive zoning from the 1960s as a means to attract investment to declining CBDs, Auckland and Wellington offered bonus floor area in their CBDs over and above District Plan limits in return for the provision of public amenities such as art work, “through site links” (i.e. a publicly accessible accessway through a privately owned site providing a shortcut between two public streets) and public plazas. Such provisions are still utilised in Auckland city, in both the CBD and the isthmus.

Over time, incentive zoning has been applied by some councils in rural settings. For example, it is not uncommon for Councils to grant rural landowners greater subdivision rights in certain rural zones, when some form of environmental enhancement is undertaken. In the former Rodney District, under the District Plan extra subdivision rights are obtainable where certain qualifying stands of native vegetation are identified and protected in perpetuity.

It is unclear whether such approaches have been rigorously tested in the Environment Court. However the reasonable prevalence of such approaches over a long period of time suggests that these approaches are appropriate under the RMA.

Within the RMA there is nothing that would appear to explicitly exclude the utilisation of incentive zoning methods. Indeed it has been argued that the RMA is an enabling piece of legislation: Part 2 of the Act, which states the legislation’s purpose and principles, is focussed on enabling social and economic well being, provided certain conditions are satisfied (including avoiding, remedying or mitigating adverse effects on the environment). Incentive zoning allows for the wellbeing of land owners to be provided for (by providing them with greater development rights) and for the wellbeing of the community to be provided for (through the public amenities provided in return for the extra development rights), while ensuring (subject to rules and criteria) that the extra rights granted through the incentive zoning do not lead to adverse environmental effects that cannot be avoided, remedied or mitigated.

For example, Policy 6 of the Proposed National Policy Statement on Biodiversity released in January 2011 (NZ Government 2011) suggests that to promote the maintenance of biodiversity outside of identified areas of significant indigenous vegetation and significant habitats of indigenous fauna, and to support the resilience and

viability of populations and species assemblages within identified areas and habitats, decision-makers should, as part of a suite of initiatives:

h. consider both regulatory incentives (such as bonus development rights in exchange for protection and enhancement of vegetation and habitats) and non regulatory incentives, (such as technical advice and practical help) to support and encourage landowners to make appropriate land management decisions.

This example supports the legitimacy of incentive zoning as a means to achieve the purposes and principles of the RMA.

International Examples

Growing use has been made in the USA of incentive zoning to increase the prevalence of more sustainable development. Successful results from leading early pioneering cities such as Arlington (Virginia), Portland (Oregon), Ashland (Oregon) and Chicago (Illinois) have encouraged more cities to implement incentive zoning for sustainability.

Arlington introduced a planning scheme in 1999 that rewarded developers with additional floor area entitlements if certain minimum Leadership in Energy and Environmental Design (LEED) green building ratings were achieved for a building. Meanwhile, from the early 2000s both Portland and Chicago introduced planning bonus systems for buildings that achieved high LEED ratings² and / or implemented green roofs.

Ashland (population circa 20,000) represents the most appropriate comparison for Kāpiti, in terms of scale and issues. Their “density bonus programme” was introduced in 2003, and applies to suburban areas. Density bonuses (15%) are obtainable for developments that are built according to strict environmental standards in terms of buildings and resource use. In the four years between 2003 and 2007, 108 of 273 building permits related to developments that had utilised the density bonus scheme (Paetz, 2008). This represents a relatively high green development ratio.

2.2.2 Transferable Development Rights

“Transferable Development Rights” (TDRs) are a form of incentive planning. Their key point of difference is that rather than allowing a land owner the ability to undertake development on their land over and above what would normally be permitted on this land, in return for the provision of a public amenity or some environmental betterment, TDRs allow a land owner the rights to develop over and above usual District Plan entitlements on another site. Typically, TDRs are used in situations where, for environmental reasons, it would not be appropriate to grant additional development rights in a particular locality. Instead a site in a location deemed to be less sensitive becomes a “sink” or “receiver” of additional development rights not able to be exercised on the subject site – the “sending site”. This may be a site also owned by the owner of the sending site, or else the owner of the sender site could sell that development right to the owner of land in the receiving area. Therefore the use of TDRs can create a market where the TDRs are bought and sold.

TDRs can be used as a compensatory planning mechanism. For example, an area subject to a structure planning exercise may identify certain land as being more appropriate for development than other areas of greater ecological sensitivity in the same general location. Owner A with 10 hectares of land may be granted the right to build 10 houses, while Owner B with 10 hectares may only be granted the right to build 2 houses due to the presence of ecological features on his or her land. Such ecologically responsive structure planning processes differ from some traditional planning practices where blanket zoning is imposed over a large area. Although such blanket zoning has the benefit of being equitable (i.e. all landowners have the same development rights) it can be a very crude and environmentally unresponsive technique. The use of TDRs can address the equity issue with structure planning, at least partly, by allowing Owner B the right to sell his or her foregone development rights to another land owner.

New Zealand Examples

TDRs originated in the USA, but have had relatively limited application in New Zealand. They have been utilised by Waipa District Council in its District Plan. The Waipa TDR provisions acknowledge that there are certain locations in the district where, for a variety of reasons, sites should not be able to accommodate significant further development. These scenarios include not only sites in areas that are recognised as “Special Landscape

² It is noted that LEED ratings are awarded based on design. There are questions whether the designs actually produce the desired real-world performance.

Character areas”, but also sites that are located near airports or State Highways, where extra development could lead to “Reverse Sensitivity” effects (i.e. the extra development on the sites in a location exposed to significant noise effects may affect the viable operation of the activity generating the noise). Clearly, TDRs have been utilised by Waipa as a compensatory mechanism, to make land development restrictions more palatable to the community.

TDRs have also been utilised by Franklin District Council and Rodney District Council.

A report prepared by Environmental Management Services Limited (EMS) in 2010 for Waikato District Council provides a useful overview of the use of TDRs in New Zealand. The report, in assessing the effectiveness of TDRs, states the following:

“Both Franklin and Waipa District Councils report low levels of take-up. As a consequence there is a lack of familiarity with the provisions, both by landowners and by Council staff. The reasons for low take-up are unclear. This is significant in terms of Council’s concern to ensure that any new TDR provisions for Waikato District Council should be simple to understand and administer, and effective in producing the desired outcome.

Both Rodney and Western Bay of Plenty District Plans promote the wider application of the TDR approach by enabling transfer between Zones.

Rodney District Plan provisions (fully operative) include incentives by enabling an increased level of development through TDR provisions than would otherwise be possible within the Zone (no requirement to comply with an average lot size). Even so, and recognising that the area is one of high housing market demand, the Council only receives around 6 applications per year (with variable lot yield). This low level of demand is evident in the level of staff understanding of the plan provisions and experience of their implementation.”

Evidence suggests that TDRs have not been taken up to any significant degree by landowners. As EMS state, it is not clear why. Possible explanations include the slowing of the residential property market since 2007, lack of awareness amongst landowners of their rights to utilise TDRs, and the incentives not being attractive enough to offset the costs of utilising the opportunity. Such considerations should be weighed up in assessing the potential effectiveness of utilising TDRs in the Kāpiti District Plan.

International Examples

TDR programmes have been utilised extensively throughout the USA for environmental purposes since at least the 1980s. Well-known early programs included Montgomery County, Maryland (1980) and the New Jersey Pinelands (1981). In the 1990s TDRs were used successfully in Dade County, Florida, where TDRs helped to preserve more than 100,000 acres of everglades ecosystems outside of the Everglades National Park.

A useful review of TDRs was completed by Robert Lane in 1998. The review found the following key challenges to implementing TDR programmes:

- Finding communities that will locate receiving areas for higher-density development;
- Calibrating values for development rights in sending and receiving areas to insure a market for the rights;
- Creating a program that is simple enough to understand and administer, but complex enough to be fair;
- Developing community support to ensure that the program is used;
- Avoiding litigation and evasion.

3.0 Recommended Indicators and Approaches for use in District Planning

This section summarises a selection of indicators that we consider are relevant and most applicable to measuring 'sustainability' for Kāpiti Coast District Council. As discussed in Section 1, these have been chosen from a comprehensive list of environmental indicators, included in Appendix A.

Our approach has been to select environmental indicators we consider have potential for implementation in the District Plan. For each indicator we provide

- an aspirational, long-term goal that reflects strong sustainability principles;
- a set of measurable indicators by which progress towards the goal can be monitored;
- an analysis of the context and reasons behind the goal;
- discussion of applicability in a District Plan context; and
- identification of possible barriers to implementation.

This section then outlines existing and potential new District Plan methods that could be utilised, relative to the selected sustainability indicators. Methods other than rules can also be implemented as a means of achieving environmental outcomes (Section 75 2(b) of the RMA), and such options are also discussed where relevant.

It is noted that these methods sit within a broader District Plan hierarchy of planning approaches, with objectives and policies sitting above rule and non-rule methods (see Figure 1).

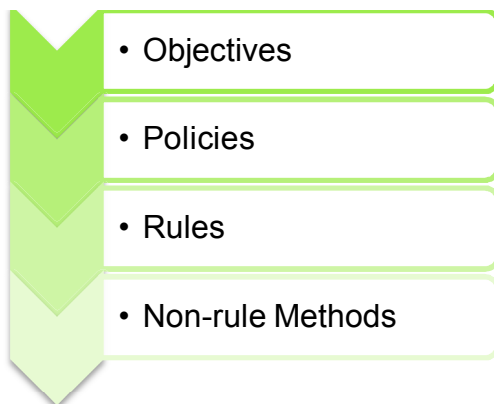


Figure 1 District Plan Hierarchy

We note that in this report we have not given consideration to specific objectives and policies relating to the indicators. The focus has been on rule and non-rule methods.

3.1 Electricity supply and demand

3.1.1 Indicator Details

Aspirational goal:

An aspirational goal would be that district electricity demand is ultimately met with 100% renewable supply. That goal can be met by progressively increasing the percentage of renewable electricity supply, decreasing the total demand via energy conservation and efficiency, or most likely some combination of supply increase/demand decrease.

Indicators: Electricity Consumption by Sector (GJ/year)
Electricity Generation in the District (GJ/year)
Proportion of District Energy Supplied by Renewables (percentage)

It is noted that all of the above potential indicators are deemed to be measurable, and data would need to be obtained both through local electricity providers and internal Kāpiti Coast District Council data.

Discussion:

Provision of constant and stable access to electricity is a critical factor underpinning quality of life and modern living standards. Based on historical trends, electricity demand is expected to increase with increasing population and also with increasing affluence, as people acquire more items requiring electricity, although the latter can potentially be offset via improvements in energy efficiency.

Because supply of electricity is a national endeavour, Kāpiti Coast District Council can probably only ever contribute a part of the solution. The main pathways to increase renewable district electricity supply include microgeneration (e.g. solar panels and small wind turbines), mesogeneration (e.g., development of wind farms), and other emerging technologies.

Limits and Relationship to Population / HCC:

The obvious limit for electricity consumption is that the proportion generated using renewables be 100%. The environment imposes no clear intermediate limits for total electricity consumption. Any intermediate limits for either total electricity consumption or greenhouse gas emissions from electricity generation must be determined using a consultative community process. As such, an aspirational long-term goal of full renewables and zero emissions is recommended, and potentially short-term goals relating to a per capita emissions level, perhaps based on world best practice. There is a strong relationship between population and electricity consumption, although many individual factors can and do influence this relationship.

Based on the above, a direct linkage to HCC is tenuous and as such a 'relative sustainability' approach is recommended.

3.1.2 Implementation

In this section we discuss potential approaches that could be implemented both through the District Plan, and via non-District Plan methods. It is noted that the non-District Plan methods could also be advocated for through the District Plan itself as a non-rule approach. District Plan options can be divided into the general headings of 'Mandated Rules' and 'Incentives'.

District Plan Options:

There are a number of possible ways Council could deliver improved sustainable outcomes through the District Plan.

- Council could encourage/incentivise or mandate (through the District Plan) microgeneration for new developments or major remodelling as part of consent rules under the District plan. An example of a mandating approach is the 'Merton' Rule in the UK. The Merton Rule is named after the Merton Council in the UK, which in 2003 adopted the first prescriptive planning policy that required new commercial buildings over 1,000 square metres to generate at least 10% of their energy needs using on-site renewable energy infrastructure. The policy was developed and implemented by officers at Merton Council. The policy has had widespread impact, with the Mayor of London and many other councils also implementing it. It has subsequently become part of national planning guidance. It has provided the unintended co-benefit of

encouraging developers to seek to maximise building energy efficiency so that the 10% requirement minimises capital expenditure on on-site renewable capital.

- Council could also contribute to a reduction of electricity demand (following international best practice) and encourage/incentivise/require installation of “best available technologies” at time of construction and/or remodelling/repair that lead to reduced energy consumption and greater energy efficiency. For example, the consumption of electricity in New Zealand residential housing is primarily for space heating (34%), water heating (29%), refrigeration (10%), and lighting (8%) (Isaacs et al. 2006). Of these, space and water heating and lighting can be influenced through design requirements on new housing. Space heating and lighting requirements can be reduced by passive solar design. Water heating can be influenced by the installation at build time of solar hot water heating systems and short runs on hot water pipes.

[Note: It is considered that it may be legally (and politically) difficult to introduce a District Plan rule mandating all new houses or commercial buildings over a certain area to comply with a certain electricity consumption standard over and above the Building Code, as this may contravene the NZ Building Act which only requires buildings to comply with the minimum requirements of the Building Code. Legal advice should be sought to confirm this]

- The District Plan could include a rule that allows greater development rights in certain zones where buildings meet certain minimum green building requirements, such as a minimum **Homestar** rating (a residential green building rating tool recently released by the New Zealand Green Building Council) or Greenstar ratings for commercial buildings. We are unaware of any Councils in New Zealand that provide District Plan incentives for development meeting a certain minimum green building rating for *housing*, although the recently released draft CBD masterplan for Christchurch proposes District Plan incentives (building height, floor area bonuses) for buildings meeting specified green building ratings.
- Assessment criteria for developments requiring resource consent could include the extent to which both passive solar design and energy reducing technologies are utilised. Council could also consider developing permitted activity standards relating to passive solar energy performance. That is, the District Plan specifies a particular performance standard relating to passive solar energy design that all developments must meet to avoid triggering the need for resource consent approval.
- Height in relation to boundary development controls should be retained, not only for their amenity benefits, but because they allow protection of access of neighbouring properties to the solar energy resource. Some Councils in New Zealand apply the same recession plane control for all boundary orientations, and Kapiti's District Plan adopts this approach with a recession plane taken from 2.1m above ground level at an angle of 45 degrees, whatever the orientation. Other Councils apply more restrictive recession plane controls on the southern boundaries of sites (balanced by less restrictive controls on the northern boundaries of sites plans) in order for the rules to better reflect solar orientation. Kāpiti Coast District Council could consider such an approach.

Non-District Plan Options:

As discussed above, these options could potentially be implemented either as part of the District Plan (as a non-rule method) or independent of the District Plan.

- Council could continue to work independently and with community groups to promote energy awareness and energy conservation behaviours by residents. It could also partner with businesses to help offset the costs of periodic energy audits to help business reduce energy consumption and therefore costs.
- Council could consider introducing rates rebates to businesses and residences that self-report energy consumption and show improvements in energy consumption patterns in some way.
- Council could work with the electricity industry to keep abreast of and evaluate potential opportunities and perhaps incentivise the industry to undertake projects via assistance with funding or reduced consenting costs.
- Council could lobby central government to increase the minimum sustainability requirements of the Building Code

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32³ of the RMA.

- Data: The main difficulty with these indicators is that electricity consumption is measured by the electricity companies, thus data may not be accessible for reasons of commercial confidentiality and privacy. This need not prevent implementation of measures to reduce consumption, but may prevent monitoring to determine effectiveness, which may in turn generate resistance to implementation.
- Mandated District Plan Provisions: If increased cost is incurred by developers, this may meet resistance and an unwillingness to pay.
- Incentives: The degree to which development incentives will realise greater delivery of more energy efficient development is potentially unclear.
- Resource Consent Assessment Criteria: The extent to which assessment criteria will be strong enough to achieve meaningful results should be considered carefully.
- Development Controls: Development controls should allow protection of access to the solar resource, however this needs to be balanced with the reasonable development rights of neighbouring properties. In particular consideration of a more restrictive recession plane control for the southern boundary of development sites needs to be carefully considered, as such controls can lead to over-restriction on development, and make intensification goals harder to achieve.
- Legal Issues: It is unclear whether Council can *mandate* through the District Plan (via permitted activity standards) for all new buildings to satisfy a green building standard higher than the requirements of the Building Code - which specifies the minimum legal building requirements with regard to building energy and environmental performance - and there is no evidence of such an approach being proposed by a Council, let alone adopted. The Merton approach is perhaps more likely to be legal, as the requirement relates more to energy sourcing as opposed to building standards. Within the Purpose and Principles of the RMA, Council in exercising its functions is required to have "particular regard" to "*the benefits to be derived from the use and development of renewable energy*". It is considered that this provides a statutory basis for Council to consider applying an approach similar to the Merton approach, subject to Section 32 analysis of the costs and benefits of such a provision.

3.2 Transport Fuel Supply and Demand

3.2.1 Indicator Details

Aspirational goal:

Council has recognised Peak Oil as a significant global issue that will have a significant impact on the District. Similar to electricity, the ultimate goal will be a transition to 100% renewable fuels used for transport within the district. Given Council cannot control where fuel is purchased (i.e. from inside or outside the district), where it is used (inside or outside the district), or how much is purchased/used, a potential aspirational goal would be to transition eventually such that all transport fuels sold within the district are renewable. In other words, Council helps guarantee that transport fuels available within the district are renewable at point of sale.

Indicators:

- Proportion of Renewable Transport Fuels Sold in the District (percentage)
- Fossil fuel consumption per capita (GJ/person/year)
- Greenhouse gas emissions from transport fuels (tonnes/year)

It is noted that:

- a) This indicator is deemed to be measurable, and data would need to be obtained both through local fuel retailers.

³ Section 32 under the Resource Management Act, requires robust, verifiable cost/benefit analysis to be undertaken prior to any amendments to an existing District Plan or the development of a new District Plan.

- b) This indicator relates closely to other indicators such as 'Infill Housing and Apartments' (Section 3.3) and 'Urban Land Use Supply and Demand' (Section 3.9). For example, the encouragement of more intensified housing will likely have a flow-on effect of reducing overall transport fuel use.

Discussion:

Given that fossil fuels are non-renewable, the percentage of renewable sources used must eventually increase to 100% regardless of what Council does or does not do. The key issues around Peak Oil and fossil fuel depletion lie more broadly in the speed of the transition. Research suggests that a lack of early action could have substantial consequences as a result of impacts to transport costs and climate change. Decline of fossil fuel supply at faster rates than (global) society's ability to adapt (e.g., develop new sources, replace or retool infrastructure) would substantially increase transport costs and disrupt the global supply chains essential for the smooth and efficient functioning of international commerce. Continued reliance on and, worse, growth in fossil fuel use will exacerbate climate change and render the goals of "acceptable" climate change untenable, with potentially catastrophic consequences. These issues are discussed in more detail in the Stage 2 report.

Limits and Relationship to Population / HCC:

Total consumption of transport fuels generally increases with increasing population and development, although per capita usage rates can decline, especially if more compact forms of development reduce the need for driving. Temporary declines and plateaus are also seen, usually in conjunction with periods of economic slowdown or recession. As with some other indicators, the only clear hard limit imposed by the environment is of zero use of fossil fuels, and any intermediate limit must be established by community consultation or with reference to world best practice. We therefore recommend use of a relative sustainability approach with these indicators until such limits are established.

3.2.2 Implementation

District Plan Options:

Assuming that the global (i.e. outside the district) supply of renewable transport fuels will continue to increase, Council's main objective could be to reduce the rate of growth or (more boldly) hold constant the amount of non-renewable transport fuel used in the district. The main mechanism to achieve this objective would be via spatial planning to reduce the use of transport fuels in local transportation. Potential methods could include:

- Mixed use developments in which residential, manufacturing, commercial/retail uses are co-located or situated in close proximity to reduce the need for commuting by car. Development bonuses for mixed use developments with minimal (e.g., no more than one parking space per unit) or no parking spaces could be considered. Maximum parking requirements could also be applied.
- Development could also seek to be focussed more around train stations and other key public transport nodes and corridors. As above, development bonuses for low / no parking developments could be considered, as well as maximum parking requirements.
- Allowing new developments on hilly terrain discourages walking and cycling as means of transportation, so consideration could be given to location of new developments based on terrain.
- Reduce car parking in commercial centres: while this may not be in the best interests of retailers, it would encourage other modes of transport and potentially also reduce 'unnecessary' consumption.

Ultimately there is a significant lifestyle factor in the consumption of transport fuels. That is, most residents have considerable control over how they travel and where they live (which can determine available transport options). Council initiatives can only shift the attractiveness and perceived requirement for use of private vehicles, without actually being able to control these.

Non-District Plan Options:

As discussed above, these options could potentially be implemented either as part of the District Plan (as a non-rule method) or independent of the District Plan.

- Encouraging the enhancement of safe and attractive cycling and walking networks.
- Education to encourage uptake of non-fossil fuels
- Financial incentives to encourage uptake of non-fossil fuels

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32 of the RMA.

- Data: Consumption of transport fuels may be difficult to measure, and is made more difficult by the boundary issues discussed previously in this report: how to separate out transport by residents and non-residents. As such, some method of estimation is likely to be required. It might be possible to estimate how different parts of the district are inclined to generate vehicular travel of various sorts according to criteria such as population density, proportion of commuters, and socioeconomics.
- Mandated District Plan provisions: Maximum parking controls may face significant developer / land owner opposition. Consideration of terrain as a factor in residential rezoning or redevelopment needs to be balanced with consideration of potential environmental advantages of developing on such terrain (for example the soils on hilly terrain may typically have less productive soils than on flat terrain)
- Incentives: Even if incentives are offered to developers for low / no parking development schemes, such incentives may not be readily taken up for a number of reasons, including market demand dictating the provision of a certain parking provision (divorced from any District Plan minimum parking requirement). Conversely they may be viewed favourably by developers given that parking requirements often increase the costs of development, requiring expensive basement development. The idea needs to be tested with developers.
- Key Section 32 considerations include:
 - The extent of market demand for mixed use development as well as development with no or low parking provision
 - The impact of no / low parking requirements in mixed use / TOD developments on on-street parking availability
 - The extent to which more mixed use zoning may lead to excessive residential development versus commercial development in commercial areas
 - Potential amenity impacts of more mixed use / higher intensity environments
 - The extent to which terrain consideration unduly limits land development considerations, and overlaps with other planning issue considerations

3.3 Infill Housing and Apartments

3.3.1 Indicator Details

Aspirational goal:

With a strict limit on available land in the district, and with a desire to protect rural productive capacity, an appropriate aspirational goal is that all new residences are constructed on existing urban land. This can be achieved by a combination of infill housing, multistorey housing, and construction of apartment buildings.

Indicator: Proportion of all new dwellings that are constructed on existing zoned urban land (percentage)

It is noted that:

- a) This indicator is deemed to be measurable, and data would need to be obtained from Kāpiti Coast District Council sources. Infill housing and apartments can be measured directly from council records of approved building consents. The appropriate measure is the proportion of new housing that is infill or apartments, rather than the total number.
- b) This indicator also relates to the indicator 'Urban Land Use Supply and Demand' (Section 3.9)

Discussion:

Increasing infill housing targets a wide range of local council objectives, including reducing requirements for additional engineering infrastructure (roads, sewerage, electricity, potable water, telecommunications, etc.) and protection of rural land for productive purposes. It also potentially reduces travel distances and increases the

viability of public transportation and other services that depend on population density. Infill housing can also result in the building of smaller houses (although not necessarily so, especially if plot ratio controls are not applied), which bring a range of sustainability benefits, and provides properties better suited to the increasing numbers of people living alone and an ageing population with less demand for larger sections. On the other hand, as sections become smaller, space for items such as clothes lines is lost (potentially increasing use of dryers), as is recreational space (potentially leading to more travel to access such space). In addition, space for composting of food waste is reduced. We suggest that council continue to encourage infill housing, but that additional thought be given to ways in which space can be retained for important activities such as composting and clothes drying, potentially through communal systems.

Council could consider adopting plot ratio controls to help prevent “overbuilding” on small lots (ie. houses that are very large relative to lot size), which could improve amenity as well as allowing greater provision for the retention of space on site. Plot ratio controls limit the amount of floor area built on a site relative to site area. For example a plot ratio of 0.4 would mean that for a site of 500 square metres, 200 square metres of floor area could be built ($500 \times 0.4 = 200$). At present on a 500 square metre site a house in excess of 300 square metres could potentially be built.

With smaller houses, the proportion of total floor area occupied by a garage is larger. Dovetailing with the goal of reduced transportation, consideration could be given to supporting the construction of more smaller houses without garages. These could be aligned with existing or new bus routes with frequent departures.

Increased population density can bring social benefits such as reduced isolation, greater cohesion, and enhanced community spirit. However, ‘housing estate’ experiments in the 1960s and 70s in Europe have shown that increased density can also introduce social problems. Careful research of international best practice is therefore necessary to learn from the failures and successes of other municipalities.

As infill housing continues, sections available for subdivision within existing urban boundaries will naturally reduce in number. Conversely, as large urban sections become scarcer, continued demand for these sections is met instead by even larger sections in rural areas. The goal of increasing infill and apartment dwelling is clearly linked to the land-use and soil protection goals.

Limits and Relationship to Population / HCC:

Infill housing and apartments are direct responses to increasing population, but are not necessarily a direct result of population growth. Rather they result from Council initiatives and market forces, so the relationship between the indicator and population is complex. While it is possible that all new dwellings could be constructed on existing zoned urban land (i.e., the indicator is at 100%), this level cannot be sustained as population grows and existing opportunities for infill and apartments are exhausted. In addition, there will always be pressure from the market for supply of larger sections on the periphery of existing urban areas. We therefore recommend that these indicators be monitored using a relative sustainability approach.

3.3.2 Implementation

District Plan Options:

To discourage urban sprawl, greater targeted infill development could be facilitated by the District Plan. Given Kāpiti’s clearly appreciated lower density character, consideration could be given to:

- “Invisible Density” – Accrual of additional infill units in a manner that is “invisible” – eg. conversion of existing single household units into two units within the existing building envelope, allowance for two small duplex units (equivalent in bulk and scale to one large single house) on one site
- “Hidden or Gentle Density” – Allowance for minor household units subject to development standards and design criteria. Development standards could include maximum floor areas. Throughout New Zealand practice varies, with maximums typically set between 50 to 70 square metres. A 50 square metre maximum only allows for a very compact studio type of living space – around 65 square metres would be necessary to facilitate a 1.5 bedroom living unit, with the additional 15 square metres generating minimal impact on amenity subject to compliance with other standards such as building height, yards, open space etc. Parking requirements should either specify a minimum of one parking space or none if the site is located in reasonably close proximity to key public transport nodes

- In addition, Council should give further consideration to greater facilitation of low rise apartment development in appropriate locations, subject to clear development and design standards. In addition assessment criteria for higher density developments could include consideration of the degree to which communal areas for clothes drying, composting, tree planting etc. are provided. Development bonuses could be considered for implementation of certain environmental features such as green roofs.

Non-District Plan Options:

Some potential non-rule options are as follows:

- Changing approach to development contributions – for example charging on a per hectare basis rather than a per unit basis, or allowing development contribution remissions for houses below a certain size. For example, Christchurch City Council provides a 1% discount in development contributions for every 1 square metre reduction in floor area of a household unit below 100 square metres. For example, an 80 square metre unit would receive a 20% discount, a 65 square metre unit a 35% discount. Either of these approaches helps to incentivise more intensive use of land, and also recognise that smaller units will typically generate less impact on infrastructure, on average, than larger houses.

Considerations for Implementation:

Land developers have been meeting demand for smaller sections for some time, but there is little demand in New Zealand, outside central Auckland and Wellington, for apartment-style dwellings. Apartments must be well appointed to attract buyers and have good commercial facilities within walking distance. The continued availability of rural residential subdivisions is contrary to the aspirational goal of all new dwellings being on existing urban land.

Key Section 32 considerations include:

- the extent to which new approaches to infill may or may not adversely affect residential character and amenity values
- infrastructure capacity in areas potentially subject to new infill provisions
- Amenity and character impacts of greater apartment zoning
- The extent of amenity impacts of development utilising bonuses over and above permitted development standards

3.4 Waste to Landfill and Cleanfill

3.4.1 Indicator Details

Aspirational goal:

The sustainability issues associated with waste to landfill and cleanfill include depletion of resources (e.g., construction materials) and depletion of landfill space (such that new landfill space, often more distant, is required sooner). Many inefficiently used (and therefore wasted) construction materials come from outside the district. An appropriate aspirational goal is to reduce waste to cleanfill and landfill to zero.

- Indicators:**
- Construction waste to landfill (tonnes/yr)
 - Domestic Solid waste disposed to landfill (tonnes/yr)
 - Construction Waste disposed to cleanfill (tonnes/yr)
 - Proportion of population with access to kerbside recycling (percentage)
 - Proportion of packaging waste recycled (percentage)
 - Proportion of recycling by material (percentage)
 - Total waste recycled (tonnes/yr)

It is noted that all of the above potential indicators are deemed to be measurable, however it is unclear exactly who is responsible for collecting data (see Appendix A).

Discussion:

Existing recycling schemes have led to a significant reduction in the amount of waste making its way to landfill. However, recycling rates can be improved further, and various measures are available to incentivise this. While recycling is good for reducing our use of resources and landfill, not all products can be recycled and there is a limited number of recycling loops through which materials can be put. Reduction is clearly a superior option to recycling, and reduction of consumption of short-lived goods and reduction of packaging are two clear opportunities for reduction of resource depletion and the use of landfills.

Significant construction waste goes to both landfill and cleanfill, and this could be reduced by finding low-effort ways for tradespeople to reduce, reuse and recycle their construction waste, and also by encouraging renovation over demolition of older structures. In addition, off-site prefabrication of buildings including houses tends to enable greater efficiencies in the use of materials, and this could be encouraged.

Limits and Relationship to Population / HCC:

The amount of waste is obviously a strong function of population, although this relationship is complex. For example, at low population levels recycling collection and management schemes are less viable, while at higher population levels there is potential for less community mindedness leading to lower recycling levels. With current packaging, production methods, and construction materials, there are many waste materials that cannot be recycled economically.

While an aspirational goal of zero waste to landfill/cleanfill can be undertaken, annual limits must be defined based on when that the District aims to achieve that goal, reducing the annual limit every year. These choices will probably be connected with the remaining capacity of existing landfills/cleanfills and the available options for reducing, reusing, and recycling waste. Until these have been established by the community, we recommend the use of a relative sustainability approach to monitoring waste reduction.

3.4.2 Implementation**District Plan Options:**

It is considered that there are limited District Planning methods to address this indicator.

Possibilities could include:

- Encouragement of reusing existing buildings over demolition by providing for “invisible density” (see above).
- Continued limited regulation of home relocations in residential areas, to allow for reuse of dwellings . At present the District Plan provides for the relocation of dwellings by way of controlled activity resource consents, with assessment considering factors such as the condition and appearance of the building (conditions can be imposed with regard to these matters)
- Providing District Plan development incentives for buildings that achieve high Greenstar ratings requiring substantial recycling on-site of existing materials. Examples of incentives include building height or density bonuses.
- Including recycling of demolished materials on-site as an assessment criteria for assessing resource consents for developments

Non-District Plan Options:

Some potential non-rule options are as follows:

- Financial incentives for recycling by citizens (eg deposit refund scheme for containers),
- Education and awareness programmes
- Council taking the initiative and leading by example or supporting community lead initiatives (eg elimination of plastic bags)

Considerations for implementation:

We understand that very little data is collected in New Zealand on the composition of waste to landfill and cleanfill. The Ministry for the Environment has commissioned surveys of the waste stream every few years, and these

surveys have small sample sizes with consequent high uncertainties. More data may be required to monitor progress on these indicators.

The viability of financial incentives for recycling is questionable.

Key Section 32 considerations include:

- The extent of amenity impacts of a particular development which utilises bonus rights to build over and above permitted development standards.
- The degree to which assessment criteria can impact on overall waste reduction.

3.5 Air pollution

3.5.1 Indicator Details

Aspirational goal:

A goal associated with air pollution should combine a minimisation of emissions with a minimisation of exposure to these emissions. Air pollution effects are both acute and chronic. Acute effects affect more sensitive portions of the population, such as elderly residents or those with existing respiratory problems, and affect their quality of life. Chronic effects result from accumulated exposure over a lifetime and can limit quality of life over time via manifestation of various respiratory conditions or, in the worst cases, cause premature death. Council should work with relevant stakeholders to determine an appropriate goal.

Indicators: Particulate matter in sampled air (PM10)
Heavy vehicles passing through residential areas (count/day)
Mature trees in urban areas (trees/ha)

It is noted that all of the above potential indicators are deemed to be measurable, with data likely being available through Kāpiti Coast District Council or the Wellington Regional Council. The particulate matter indicator relates to the transport fuels indicators.

Discussion:

Major sources of air pollution include the use of fires for home heating and exhaust from motor vehicle engines. While the central government has relaxed the requirements for local councils to reduce air pollution by requiring clean heating, Kāpiti Coast District can choose to implement the regulations sooner than required and can do this in conjunction with the central government's home energy efficiency subsidy scheme.

Regarding vehicle emissions, all vehicles entering New Zealand are required to meet emissions standards set by the Central Government. In addition Central Government has acted to reduce the content of sulphur and other pollutants in petrol and diesel fuel. Kāpiti Coast District Council could contribute to enhanced vehicle performance and reduce emissions by raising awareness and encouraging vehicle owners to have their vehicles tuned. It is possible that simply making individual drivers aware of the smoke from their exhausts – often invisible to the driver – may be sufficient to encourage them to have their engine tuned. Longer-term measures include disallowing heavy vehicles from certain suburban areas, the planting and maintenance of more berm trees in residential areas to absorb pollutants, and ensuring that heavy traffic corridors have wide berms such that houses are further from the source of pollutants.

Limits and Relationship to Population / HCC:

Generally air pollution increases as population increases, particularly if new residents exhibit the same behaviour as existing residents or behaviour with higher air pollution consequences (e.g., more driving, more open fires). However, there are a number of factors that reduce the strength of the relationship between population and level of air pollution, including pollution from industrial sources, newer housing tending to have cleaner heating, tighter regulations on open fires over time, greater awareness, etc. Air pollution limits are defined by central government guidelines and enforced by regional councils according to the number of exceedances.

3.5.2 Implementation

In this section we discuss potential approaches that could be implemented both through the District Plan, and via non-District Plan methods. It is noted that the non-District Plan methods could also be advocated for through the

District Plan itself as a non-rule approach. As summarised in Table 2, District Plan options can be divided into the general headings of 'Mandated Rules' and 'Incentives'.

District Plan Options:

There are a number of possible ways Council could deliver improved sustainable outcomes through the District Plan.

- The District Plan could include a rule that allows higher densities in certain zones where dwellings meet certain minimum green building requirements, such as a minimum Homestar rating requiring strong passive heating approaches, therefore minimising the need for polluting woodburners.
- Zoning for more mixed use development and higher densities at key public transport nodes could reduce the use of automobile transport and exhaust pollution.
- Incentives for retention of existing trees or planting of new trees could be provided for, particularly as general tree protection rules are prohibited from 1 January 2012.
- Assessment criteria, relating to the retention or planting of trees, could be included in the District Plan to allow Council to consider these issues when assessing resource consent applications for certain activities
- Tree protection rules for individual trees or groups of trees in rural areas could still be applied.

Non-District Plan Options:

The following options could potentially be implemented either as part of the District Plan (as a non-rule method) or independent of the District Plan.

- Council could work with the community around the use of home fires and provide education and / or incentives for alternative heating approaches.
- Where trucks drive through residential areas and there are viable alternative routes that pass through areas with less residential land use, Council could seek to work with transport companies and associations to encourage the use of these alternative routes.
- Council could seek to plant more trees in berms and reserves.

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32 of the RMA.

- Data: Because of expense, air pollution is currently measured at a limited number of sites in the district, and these may be insufficient to track exposure trends.
- Incentives: The degree to which development incentives will realise better retention of existing trees, and more planting of trees, is unclear. Furthermore, how much incentive needs to be offered for developers to take up the opportunity, and what impact the additional development rights may have on the local environment, particularly with regard to amenity values, will need to be carefully considered.
- Rules: The extent of market demand for mixed use development will need to be considered, along with the potential risk that more mixed-use zoning may lead to excessive residential development over commercial development in commercial areas, and as a consequence, partly nullifying the benefit of mixed-use zoning.
- Resource Consent Assessment Criteria: The extent to which assessment criteria can achieve meaningful results should be considered carefully, given that a single criterion is often one of many that needs to be weighed up on a discretionary basis.

3.6 Availability of Productive Soils for Agricultural Production

3.6.1 Indicator Details

Aspirational goal:

Kāpiti Coast District has a limited amount of soils of various types. Continued expansion of urban and residential areas into rural land used for agricultural production will slowly reduce the total area available for production and could in some cases reduce future options for production. In addition, poor land management might also degrade soil quality. The community and Council ultimately need to decide together how much land (and in what condition) to maintain for sustaining local agricultural production, and decide on appropriate goals.

Indicators: Area of Land by Potential Agricultural Production Class (ha)

It is noted that this indicator is deemed to be measurable, and data would need to be obtained both through national datasets (Land Resource Inventory) and local Kāpiti Coast District Council data. The indicator relates strongly to two other indicators: Infill Housing and Apartments, and Urban Land Use Supply and Demand.

Discussion

The community and Council should jointly consider the types of food production they most want to protect in their district. This includes consideration of those foods that are best produced locally for local consumption (e.g., vegetables). Soils on which these foods could be grown without the need for substantial management and input should be protected from future urban development through the introduction of variable subdivision limits based on how strongly it wishes to protect different classes of soils in the district. A typical approach would be to protect soils based on land use capability (LUC) ratings in the Land Resource Inventory by matching availability to desired production. Other methods could also be used to assess soil and land suitability for different types of agricultural production.

In addition to the protection of productive soils, consideration should be given to methods by which the impacts on soils of the construction of buildings might be reduced. It is not uncommon for soil to be poorly treated during construction, resulting in compaction and significantly reducing the advantageous properties of the soil (drainage, growing potential, etc.).

Limits and Relationship to Population / HCC:

The key driver of loss of productive soils is urban and peri-urban expansion, which is partly a function of population growth. In the Kāpiti Coast District, population growth is partly driving the loss of productive soils, demonstrated by a recent survey showing that about half of lifestyle blocks are occupied by people who previously lived in other districts (Isnard 2009). However, the other half were shifts within the District, and therefore do not reflect a change in population.

The only clear hard limit on the availability of productive soils is zero. The community must make a decision as to how much of each type of food production it wants to retain potential for into the future. In the meantime we recommend that this indicator be used to gauge relative sustainability.

3.6.2 Implementation

In this section we discuss potential approaches that could be implemented both through the District Plan, and via non-District Plan methods. It is noted that the non-District Plan methods could also be advocated for through the District Plan itself as a non-rule approach. As summarised in Table 2, District Plan options can be divided into the general headings of 'Mandated Rules' and 'Incentives'.

District Plan Options:

There are a number of possible ways Council could deliver improved sustainable outcomes through the District Plan.

- Rural subdivision rules could be reviewed so that a less crude, blanket approach of applying set minimum lot size subdivision rules across wide areas of land, is replaced by subdivision rules that may allow greater subdivision potential in certain locations, but lesser subdivision potential in locations recognised as having valuable versatile soils.

- TDRs could be considered with regard to landowners possessing land in the areas of versatile soils, with receiving sites located in areas without versatile soils.

Non-District Plan Options:

The following options could potentially be implemented either as part of the District Plan (as a non-rule method) or independent of the District Plan.

- Council could provide education on the way in which soil health could be better maintained through certain practices.
- Council could encourage local food production and agriculture, either on private land, or on Council owned land.

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32 of the RMA.

- **Data:** Council has access to data on productive soils and Land Use Capability via the Land Resource Inventory database, and can overlay this information at any time with the building and land parcel maps to determine fragmentation and build-over of important soils. However, more work could be done to identify the more important soils in the district as defined by production goals, as opposed to simply using LUC class. In addition, compaction during building construction is not monitored.
- **Incentives:** To what extent the use of TDRs may compensate landowners who become subject to stronger subdivision and development controls in areas with versatile soils. In addition, the extent to which the transfer of such rights to rural areas with poorer soils may generate environmental effects in those receiving areas.

Key Section 32 considerations include:

- Potential environmental costs of allowing more rural subdivision in areas not possessing versatile soils
- Economic impacts of tighter subdivision controls in areas with versatile soils, and the degree to which the utilisation of TDRs may compensate

3.7 Water supply

3.7.1 Indicator Details

Aspirational goal:

Water abstracted from the environment competes among important uses such as drinking water and sanitation, agriculture, and sustaining the natural environment. With a limited quantity of rainfall in the District each year, these competing uses, along with growth in population, intensification of agriculture, and changing lifestyle demands, require water supply to be carefully managed. The Council needs to balance these complex and competing demands on water supply in the District. Appropriate goals need to be developed with these considerations in mind.

- Indicators:**
- Total surface water abstraction (Ml/yr)
 - Total ground water abstraction (Ml/yr)
 - Water use for reticulated potable supply to urban areas (Ml/yr)
 - Water use for irrigation of agriculture and horticulture (Ml/yr)
 - Leakage in the reticulation system (Ml/yr)
 - Flow in rivers and major streams (m³/s)
 - Reticulated water use per person (l/person/yr)

All of the indicators suggested above are potentially measurable, particularly with urban and agricultural metering. With meters, monitoring data are available at a high level of spatial disaggregation.

Discussion:

As the population increases demand for reticulated water supply to residential areas increases. At the same time, the growth of lifestyle blocks puts further demands on the water supply system, and Council has been addressing this by requiring rain tanks to be installed on new rural-residential properties. With its intention to install water meters on connections to the reticulated supply, Council hopes to significantly reduce leakage and wasteful usage.

Because the costs of introducing new water supply capacity increase each time new capacity is required, efficiency gains and reduction in new demand are key measures to prevent runaway infrastructure costs. However, cost is not the only reason to try to dampen growth in demand for water, with the environment and other sectors having requirements for certain levels of water as well. The regional council sets limits on minimum flows in the District's rivers for environmental reasons, but minimum flows are not set for smaller streams. Once new freshwater quality rules (National Environmental Standards) come into place, these will indirectly set limits on minimum flows in streams.

Balancing these competing demands is a difficult challenge for Council, particularly with the range of values that are present in all communities: some value the environment highly, other agricultural production, others home gardens. To increase the District's sustainability the Council must continue to work with the community so that this range of values is understood and competing demands are all adequately met while maintaining certain demands, such as environmental flows, within limits.

Limits and Relationship to Population / HCC:

As discussed in detail in the stage 2 report, while a hard limit is imposed on water supply by the District's climate and Regional Council abstraction regulations, in practice lower limits are generally established according to infrastructure developments, which involve community choices. The general trend for consumption to increase as population increases is set against efforts to encourage and enforce reduced per capita consumption and waste.

From the demand side, a hard limit is imposed by the requirements for clean drinking water for each resident. However, lifestyles demand higher levels for use in, for example, gardens, and present infrastructure generally requires additional (rather than re-used, 'grey') water for washing and toilet flushing.

Again, limits must be established by the community, and indeed this already occurs in the planning process.

3.7.2 Implementation

In this section we discuss potential approaches that could be implemented both through the District Plan, and via non-District Plan methods. It is noted that the non-District Plan methods could also be advocated for through the District Plan itself as a non-rule approach. As summarised in Table 2, District Plan options can be divided into the general headings of 'Mandated Rules' and 'Incentives'.

District Plan Options:

There are a number of possible ways Council could deliver improved sustainable outcomes through the District Plan.

- The Kāpiti District Plan currently imposes a requirement that new or relocated residential dwellings are required to provide rain water tanks. It is considered that this provision should continue to apply to address water supply issues. Consideration could be given to widening the scope of District Plan water requirements to the commercial sector.
- District Plan assessment criteria could include water use and efficiency as a key matter for consideration in resource consent assessments.
- Incentives offered to encourage high sustainability ratings in new buildings and developments could help to encourage buildings that re-use water.
- The District Plan could include a rule that allows higher densities in certain zones where dwellings meet certain minimum green building requirements, such as a minimum **Homestar** rating (a residential green building rating tool recently released by the New Zealand Green Building Council).

Non-District Plan Options:

The following options could potentially be implemented either as part of the District Plan (as a non-rule method) or independent of the District Plan.

- Council should continue to focus heavily on community education around water use, across all sectors.
- Council could provide rebates for low water use appliances
- Council could incentivise grey water reuse, or other forms of water saving.
- Council could change the tariff structure to incentivise people to use less water (once universal metering has been completed)
- Council could modify the tariff regime to better reflect the cost of providing water services and to incentivise/reward water saving.
- Council could work towards improved pressure management and leak detection

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32 of the RMA.

- **Community Opposition:** With significant competing demands for water supply within the District the main potential barrier to implementation of this goal is entrenchment of contrary views within the community. Council must continue to work with the community to manage these disparate demands.
- **Incentives:** The degree to which development incentives will realise more efficient use of water will need to be considered. Furthermore, the magnitude of incentive that needs to be offered for developers to take up the opportunity, and what impact the additional development rights may have on the local environment will also need to be investigated, particularly with regard to amenity values.
- **Rules:** The extent to which the non-residential sectors may react to mandated water-use requirements will need to be considered.
- **Resource Consent Assessment Criteria:** The extent to which assessment criteria will be strong enough to achieve meaningful results should be considered carefully.
- The financial feasibility of rebates and other alternative financial mechanisms will need to be considered.

3.8 Surface water quality

3.8.1 Indicator Details

Aspirational goal

Point-source and non-point-source pollution of freshwater bodies, particularly with nitrogen and phosphorus, can compromise a wide range of values associated with water. In addition, increases in urban contaminants (copper, zinc, etc.) and volumes of runoff from impervious surfaces can lead to pollution of receiving environments and erosion and flooding of downstream areas. Council must continue to work in collaboration with Wellington Regional Council to balance these values while preventing key environmental limits from being breached. Environmental limits are currently being established by Wellington Regional Council, and as such it is suggested Council work towards establishing appropriate goals.

- Indicators:**
- Surface water nitrogen content (mg/l)
 - Surface water phosphorus content (mg/l)
 - Surface water E. coli (colony-forming units/100ml)
 - Surface water dissolved oxygen (ppm, mg/l or % saturation)
 - Surface water macroinvertebrates (Macrophyte Community Index or MCI)

It is noted that all of the above potential indicators are deemed to be measurable, with data likely to be collected either by Kāpiti Coast District Council or Wellington Regional Council.

Discussion:

Surface water quality is affected by point-source discharges (e.g., town sewage treatment, manufacturing) and non-point-source emissions (agricultural production). Each source of water pollution requires a different set of tools to leverage improvements, and these disparate tools must all aim to meet water quality targets, requiring a complex management process. Certainly the planned introduction of new, RMA-compatible water quality limits by Greater Wellington Regional Council will assist Council in introducing new measures to reduce water pollution.

Surface water quality is also strongly linked to water abstraction, watercourse modifications (e.g., riverbank engineering, gravel extraction), and the particular year's weather. Along with control of pollution into waterways, these other factors must also be managed to ensure water quality levels are maintained.

Council's efforts to derive energy from its treated sewage potentially reduces nitrogen and phosphorus emissions to waterways. Similarly, the Clean Streams Accord⁴, if implemented, could have a substantial effect on the quality of freshwater in streams and rivers in the District via the fencing off and planting of waterways to prevent stock access.

Limits and Relationship to Population / HCC:

As discussed in detail in the stage 2 report, the relationship between local population and local water quality is very weak. Limits are generally determined by other regulatory bodies including central and regional governments. Because of the weak relationship with population we recommend that water quality indicators be assessed in terms of relative sustainability.

3.8.2 Implementation

In this section we discuss potential approaches that could be implemented both through the District Plan, and via non-District Plan methods. It is noted that the non-District Plan methods could also be advocated for through the District Plan itself as a non-rule approach. As summarised in Table 2, District Plan options can be divided into the general headings of 'Mandated Rules' and 'Incentives'.

District Plan Options:

There are a number of possible ways Council could deliver improved sustainable outcomes through the District Plan. It should be noted however that key regulatory responsibility for surface water quality lies with the Wellington Regional Council. However Kāpiti Coast District Council also have a role in considering the ways in which land use can be regulated to maintain or enhance water quality.

- Consideration could be given to allowing rural landowners the opportunity for bonus subdivision rights in certain situations where riparian planting to improve surface water quality is undertaken. Such a provision would need to be accompanied by rigorous criteria requiring an ecologist to provide a report outlining an appropriate planting response that can achieve tangible water quality improvements. Minimum standards would need to be developed specifying a minimum width and length of riparian planting required to provide for bonus subdivision rights.
- Limitations on impermeable surfaces could be imposed, with incentives for maximised permeable surface retention on sites.
- More stringent on-site stormwater quality and quantity controls could also be contemplated. This could be by way of mandatory low-impact stormwater design standards (e.g., rain gardens and swales), and / or aspirational goals strongly encouraged by assessment criteria for resource consent applications. Both approaches have been utilised, for example, in the Long Bay Structure Plan, which forms part of the North Shore City District Plan.

Non-District Plan Options:

As discussed above, these options could potentially be implemented either as part of the District Plan (as a non-rule method) or independent of the District Plan.

- Council should focus on community education around land management and land use.

⁴ The Clean Streams Accord is an agreement signed in 2003 between Fonterra, Ministry for the Environment, Ministry of Agriculture and Forestry and regional councils. The purpose of the accord is to provide "a statement of intent and framework for actions to promote sustainable dairy farming in New Zealand".

- Council could subsidise more sustainable land management approaches. This could be by way of direct subsidies, or through rates relief.
- Development contribution policies could allow remissions with regard to stormwater charges where optimised stormwater management measures are incorporated into developments.
- Council should work closely with the Regional Council on these and other approaches.

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32 of the RMA.

- **Standards:** The current lack of enforceable water quality standards is a clear barrier to improving water quality, but despite this the RMA and Local Government Act (LGA) still allow Council to enact measures to prevent pollution.
- **Community buy-in:** As with many sustainability indicators, water quality is easier to address with community buy-in, and Council should continue to promote pride in the District's waterways including community volunteer riparian planting efforts.
- **Developer Opposition:** More stringent stormwater requirements will add cost to development projects, which is likely to attract opposition from some developers. There was a strong degree of resistance to such approaches in Long Bay (North Shore City – see above), with the Structure Plan resolved through the Environment Court process.
- **Incentives:** The degree to which additional rural subdivision rights will realise meaningful outcomes in terms of improving water quality resulting from riparian planting. Furthermore, how much incentive needs to be offered for developers to take up the opportunity, and what impact the additional development rights may have on the local environment, particularly with regard to amenity values.
- **Resource Consent Assessment Criteria:** The extent to which assessment criteria will be strong enough to achieve meaningful results should be considered carefully.
- The financial feasibility of subsidies and other alternative financial mechanisms should be considered.

3.9 Urban Land Use Supply and Demand

3.9.1 Indicator Details

Aspirational goal:

People need space in which to live, work, recreate and carry out their daily activities. However, given limited land area in the district, increasing the area devoted to residential, industrial, commercial, retail and recreational activities will by default reduce land available for other uses, particularly agricultural production and natural ecosystems. The Council, working with the community, needs to deliberate and decide on the total area to make available for urban land uses including residential uses versus other land uses.

Indicators:	Area of Land in Major Land Use Types (ha)
	Total Potential Land for Major Land Use Categories (ha)
	Rates of Land Use Change among Major Land Use Types (ha/yr)

It is noted that all of the above potential indicators are deemed to be measurable, with data collected nationally (e.g., Land Cover Database, Land Use Database), regionally, and locally.

Discussion:

The Council is mandated via the RMA and LGA to sustainably manage the natural resources of the district for the benefit of current and future generations. A fundamental aspect of that responsibility is deciding on the supply of land to make available for different uses. As discussed in preceding sections, this choice is complex because it depends on many factors, including the population of the district and the associated values and lifestyle choices of the community.

Continued urban expansion will by definition reduce the land available for other uses. For example, assuming that land set aside for biodiversity protection does not decrease, land available for agricultural production would therefore decrease. To maintain a desired aggregate level of agricultural production at the district level would therefore require compensatory production increases on remaining agricultural land and/or increased or new production on predominantly urban land (this latter possibly being contrary to a goal of higher urban dwelling density). Compensatory production on remaining agricultural land may be feasible given continued improvements in productivity, improved land-use management practices, and/or increased inputs, although note that many farm inputs come from outside of the district, so increasing inputs affects resilience. Also production can often increase in urban areas via activities such as gardening, but that requires a commitment by individuals to pursue such activities.

Unless urban growth is eventually limited, the amount of land available for other uses will reduce to those areas set aside for other purposes, e.g., agricultural, conservation, recreation, etc. By definition the areas of land available to future generations decreases, limiting their possible range of choices. Reversing urbanisation is technically possible but not without high cost and possibly substantial time to remove infrastructure and restoring suitable biophysical conditions to suit the desired use (i.e. production, conservation, etc.).

Limits and Relationship to Population / HCC:

Urban land use is a clear function of population, although there are obvious interacting factors such as infill housing. With so many interacting factors, limits are not clear and must be determined by balancing other issues in consultation with the community. As such, we recommend that this indicator be monitored from a relative sustainability perspective until limits have been established.

3.9.2 Implementation

In this section we discuss potential approaches that could be implemented both through the District Plan, and via non-District Plan methods. It is noted that the non-District Plan methods could also be advocated for through the District Plan itself as a non-rule approach. As summarised in Table 2, District Plan options can be divided into the general headings of 'Mandated Rules' and 'Incentives'.

District Plan Options:

There are a number of possible ways Council could deliver improved sustainable outcomes through the District Plan.

- In order to minimise urban expansion into rural areas, intensification should generally be promoted over greenfield development.
- Council should carefully consider the extent to which it zones rural land for rural residential purposes, given the difficulty in reversing land out of residential use.
- Greater use of flexible, mixed-use zoning would allow for greater ability to change land use activities.

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32 of the RMA.

- **Data:** Unlike many other indicators, basic information on land use can be obtained via a range of sources including most prominently the valuation database, the Land Cover Database, and topographic information from LINZ. In addition Council can use its own databases on infrastructure and consents to help monitor trends in land use over time.
- **Community buy-in:** The extent to which the community accepts intensification.
- **Developer Opposition:** The extent to which developers embrace the possibilities offered by intensification, and the potential economic and community obstacles to realising such development should be considered.
- The extent to which more mixed-use zoning may lead to excessive residential development versus commercial development in commercial areas should be assessed, and the degree to which residential development can be changed to other uses. This may be resolved through ensuring any development in mixed use areas is "future proofed" to allow for relative ease of change of use.

3.10 Biodiversity

3.10.1 Indicator Details

Aspirational goal:

Indigenous biodiversity is maintained to safeguard its life-supporting capacity and sustain its potential to meet the reasonably foreseeable needs of future generations (RMA Sections 5 and 31). To achieve this Council should undertake a number of activities including 1) identifying and protecting areas of significant indigenous vegetation and significant habitats of indigenous fauna (RMA Section 6(c)); 2) undertaking planning and activities that contribute to the goals of the New Zealand Biodiversity Strategy; and 3) ensuring policies and plans are consistent with the proposed National Policy Statement on Indigenous Biodiversity (if implemented).

Indicators: Condition of Threatened Environments (% Indigenous Cover Remaining and/or Level of Legal Protection by LENZ Level IV Environment)

Condition of Naturally Uncommon Ecosystems (Identified and Protected)

Condition of River Ecosystems (Qualitative Assessment)

Population Status of Threatened Species in the District (Presence/Absence, Population Trend Estimates, or Annual Census in increasing order of preference)

It is noted that all of the above potential indicators are deemed to be measurable, however further work would be required to determine an appropriate source of data for the District. Potential sources are listed in Appendix A.

Discussion:

Biodiversity in the Kāpiti Coast District, like most areas throughout New Zealand, has declined as a result of loss through the clearance and fragmentation of native habitat for both agricultural production and urban development, especially in coastal and lowland environments and pressure from introduced pests and weeds. Currently there are several national frameworks for assisting councils with biodiversity prioritisation and protection

- 1) Land Environments of New Zealand (LENZ) – identifies areas with similar terrestrial environmental conditions
- 2) Naturally Uncommon Ecosystems Classification – helps identify and assess condition and trends of uncommon and spatially limited natural ecosystems
- 3) River Environment Classification (REC) – an ecosystem-based spatial framework for river management purposes and provides a context for inventories of river resources, and a spatial framework for effects assessment, policy development, developing monitoring programmes and interpretation of monitoring data and state-of-environment reporting.
- 4) Threatened Species Classification – identifies species most vulnerable to extinction and the known or likely causes for their predicament.

These datasets provide Council with what are known as coarse filters to help evaluate the local, regional and national significance of different areas. These databases, along with more detailed surveys such as those conducted through the Protected Natural Areas Programme (Bellingham, 2001), provide Council with baseline information needed to guide policy, planning, and resource management.

Using such resources at its disposal, Council should at a minimum:

- Actively seek to protect remaining native habitat (land cover) located in Priority One Land Environments (Figure 2)
- Seek to identify, inventory and protect uncommon natural ecosystems in the district
- foster improvement in condition in degraded REC river and stream segments and maintain conditions in high-quality REC segments
- Protect and conserve any critical habitat of threatened species.
- To achieve these goals Council will need to work with a number of public and private partners including DOC, Wellington Regional Council, QEII National Trust, research institutions, industry and local community groups.

- In addition to protection and conservation of intact native ecosystems and habitats, Council can also encourage the integration of native biodiversity into agricultural and urban areas through planting of more natives species (e.g., kowhai for tui) on farms and around houses. Proper selection of native trees may also yield non-biodiversity benefit such as reduce leaf loss of evergreen species leading to a reduction in blocked drains and shelter for livestock. This could also include encouraging control of pest species on private land. Individual pest control efforts will yield at best marginal benefits but collectively coordinated pest control across landscapes can have broad and profound effects, as evidenced by increased biodiversity benefits as recorded in several areas across New Zealand.

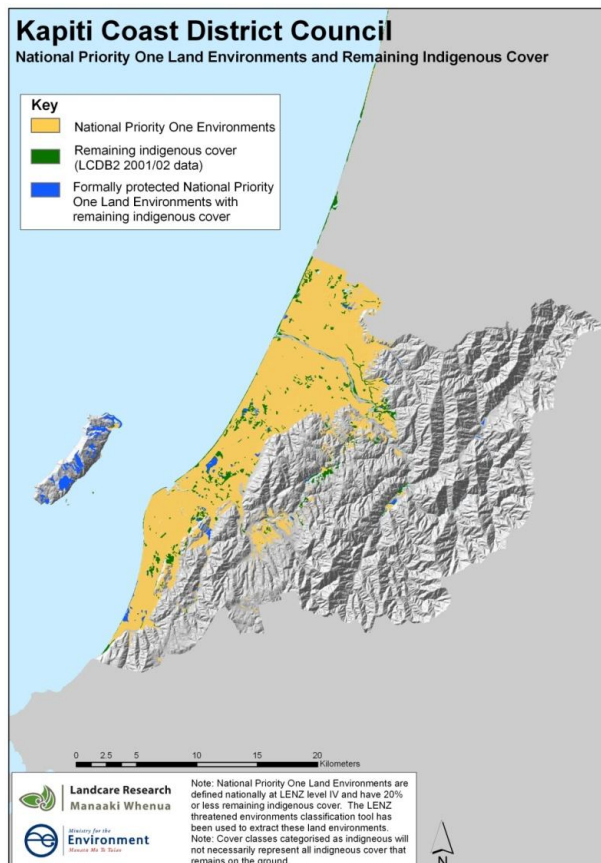


Figure 2 National priority one land environments and remaining indigenous cover in the Kāpiti Coast District

Limits and Relationship to Population / HCC:

The relationship between population and biodiversity is complex, owing partly to the uncertainty stemming from the lack of full knowledge about what aspects of indigenous biodiversity have been or might be affected by proposed activities, and hence it is difficult to determine human carrying capacity based on biodiversity. However, a number of key aspects of the relationship can be articulated:

- 1) Research shows a clear relationship between total area and quality of ecosystems and habitats and presence of indigenous biodiversity. As the area of indigenous ecosystems and habitats declines (e.g., via clearance), biodiversity declines. Biodiversity also declines as ecosystem and habitat quality declines (e.g., via fragmentation, introduction of competitors/predators/pests, disruption of interspecies relationships, etc.), although the potential effects are more difficult to gauge owing to the differential response among species.
- 2) Following from point 1), population affects biodiversity according to the degree to which human activities transform the environment via changes to habitat quantity and/or quality. As a result, human activities can decrease (e.g., via loss or degradation) or increase (e.g., via restoration or enhancement) indigenous biodiversity or, in some cases, lead to mixed results.

- 3) In addition, transforming a smaller portion of the total environment for use by society will result in less impact to biodiversity. Therefore increases in population will *not necessarily* adversely affect indigenous biodiversity relative to current conditions if the total area of remaining indigenous ecosystems or habitats does not further decrease and quality is maintained. Positive biodiversity benefits could also potentially accrue if future development results in the restoration or enhancement of previously degraded or cleared habitat.

Due to the complexity outlined above we cannot definitively ascertain the HCC of the district relative to indigenous biodiversity. As a result, we recommend a relative sustainability approach provided that certain criteria are met. For example:

- Future development must not further reduce or degrade any threatened ecosystems, habitats or species identified by the biodiversity planning and management frameworks discussed earlier (e.g., threatened environments, REC).
- Future development should also be directed as much as possible to existing urban areas to minimise the need to modify additional indigenous ecosystems or habitats.

Finally, Council could implement plan rules, voluntary measures, or undertake other means to help restore or enhance indigenous biodiversity through a range of mechanism such as native plantings, pest control, or implementation of low-impact urban design that recreates some elements of former ecosystems in existing or new urban areas.

3.10.2 Implementation

In this section we discuss potential approaches that could be implemented both through the District Plan, and via non-District Plan methods. It is noted that the non-District Plan methods could also be advocated for through the District Plan itself as a non-rule approach. As summarised in Table 2, District Plan options can be divided into the general headings of 'Mandated Rules' and 'Incentives'.

District Plan Options:

There are a number of possible ways Council could deliver improved sustainable outcomes through the District Plan.

- The Resource Management Amendment Act (RMAA) 2009 requires councils to remove rules from their plans that provide for the blanket protection of trees in urban areas by 2012. The RMAA 2009 allows for blanket protection rules for trees to remain in areas not within the definition of "urban" and in reserves and parks. Council is still able to schedule individual trees, and groups of trees, however its current approach of blanket general tree protection of native species will not be legal. The Environment Court has issued a Declaration to the Auckland Council (ENV-2010-AKL-000241) providing some clarification on the protection of groups of trees.
- District Plan development incentives could be considered for residential / commercial / industrial development that provides a certain area (e.g., over 500m²) of native planting on a site. An ecologist would need to advise what minimum area (as well as density of planting and species selection) of native planting would be required to provide biodiversity benefit, either when viewed individually or as part of a wider network of possible planted areas.
- TDRs could be considered with regard to landowners improving biodiversity through native planting, with receiving sites located in areas without high biodiversity values. Again guidance would be required from an ecologist in order to develop robust and effective standards.
- Council will be able to retain its District Plan protection of trees in rural areas. Greater subdivision rights could be considered in areas where the land does not offer productive soils, where substantial tree planting is proposed.
- Policy 4 of the Proposed National Policy Statement on Biodiversity states:

District plans and any relevant regional plans shall identify, using (where practical) maps and/or schedules, areas of significant indigenous vegetation and significant habitats of indigenous fauna. In identifying these areas, decision-makers must include in their plans the criteria of the relevant regional policy statement and, within five years of this national policy statement taking effect, the criteria of Policy 2a–d (to the extent that

these may be broader in scope than those of the relevant regional policy statement) and 2e (to the extent that existing information enabling the application of this criteria is available).

Based on this, the Council could undertake a review of its identification, and management, of areas of significant indigenous vegetation and significant habitats of indigenous fauna, and consider mapping and protecting new areas of land via its District Plan if required.

- A focus on intensification over urban expansion will ensure that less pressure is placed on peri-urban areas with significant ecological areas.

Non-District Plan Options:

As discussed above, these options could potentially be implemented either as part of the District Plan (as a non-rule method) or independent of the District Plan.

- Council should focus on community education around land management, land use and biodiversity.
- Council should work closely with the Regional Council and central government agencies such as the Department of Conservation on approaches.
- Council could consider planting more native trees in street berms and reserves. Council could also encourage voluntary community tree planting exercises.
- Collectively coordinated pest control endeavours could be strengthened.

Considerations for Implementation:

There are a number of potential considerations and barriers to implementation, which will depend on the implementation approach chosen. These may also apply to analysis required under Section 32 of the RMA.

- **Data and Monitoring:** Measurement and monitoring of biodiversity is typically challenging, time-consuming and resource-intensive. As discussed above, Council will need to coordinate their efforts with a range of other organisations to track trends in biodiversity effectively. The coarse filter approaches outlined above benefit from being more amenable to broad-scale analysis using remote-sensed data (e.g., land cover), spatial databases, and expert knowledge. More fine-scaled knowledge, particularly that involving threatened species, demands direct survey and observation.
- Another emerging approach is the use of internet-based community observation networks to increase coverage, both extent and frequency, of biodiversity monitoring. Examples include the New Zealand Biodiversity Recording Network and the New Zealand Garden Bird Survey.
- **Funding:** the financial feasibility of significantly augmenting council planting initiatives should be considered.
- **Incentives:** the extent to which development incentives are effective in encouraging protection and augmentation of indigenous vegetative cover should be considered, as well as the potential impact of extra development rights on amenity values. Careful consideration would need to be given to requiring consent notices on Certificates of Title that mandate the perpetual maintenance of planted areas utilised to obtain additional development rights .
- **Community buy-in:** The extent to which the community accepts intensification should be evaluated.

3.11 Summary

In order to summarise the suite of indicators and their relevant application options, we present Table 2 below. For each of the potential indicators, we have detailed which possible options for implementation may apply, from rule or incentive-based options through the District Plan, to non-District Plan options. We note that the report does not cover in detail examples relating to each potential option, instead indicates solely (in the opinion of the author) if such an approach may be possible.

Also, it is useful to draw out the key District Plan approaches discussed, which could cover a variety of (multiple) indicator groups. Some examples are given in Table 1 below:

Table 1 Key District Plan Methods

District Plan Method	Indicators Addressed
Incentivise Green Building (e.g., High Homestar ratings)	Electricity, waste, water
Urban Intensification	Productive soils, biodiversity, transport, infill housing, urban land use supply and demand
Planting requirements	Biodiversity, water quality, air quality

Table 2 Summary of Indicators and District Plan Approaches

Indicator	Potential District Plan Approaches		Potential Non District Plan Approaches		
	Rules	Incentives	Education	Financial Incentives (Subsidies/Penalties/Rates Relief/Dev Contributions Relief)	Council Initiative (eg planting/urban renewal)
1. Electricity Supply and Demand					
Elec Consumption by Sector*	√	√	√	√	√
Electricity Generation in the District*	√	√	√	√	√
% of energy Supplied by Renewables*	√	√	√	√	√
2. Transport Fuel: Supply and Demand					
% of renewable fuels sold in the district	√		√	√	√
3. Infill Housing and Apartments					
% of new dwellings on existing urban land	√			√	√
4. Waste to Cleanfill and Landfill					
Construction waste to landfill	√	√	√	√	√
Domestic Solid waste to landfill			√	√	√
Construction Waste to cleanfill	√	√	√	√	√
% of population with access to recycling			√		
% of packaging waste recycled			√	√	√
% of recycling by material			√	√	√
Total waste recycled			√	√	√
5. Air Pollution					
Particulate matter in sample air (PM10)*	√	√	√		√
Heavy vehicles passing through residential areas			√		√
Mature trees in urban areas	√	√	√	√	√
6. Availability of Productive Soils for Agriculture					
Areas of land remaining by agricultural type	√	√		√	
7. Water Supply					
Total surface water abstraction*		√	√	√	
Total ground water abstraction*		√	√	√	
Water use for potable urban supply*		√	√	√	
Water use for irrigation (ag and hort)*		√	√	√	
Leakage in reticulation system			√		√
Flow in rivers and major streams*		√	√	√	
Reticulated water use per person		√	√	√	
8. Surface Water Quality (and Quantity?)					
N content*	√	√	√	√	√
P content*	√	√	√	√	√
Macro Invertebrate Index*	√	√	√	√	√
E Coli*	√	√	√	√	√
DO*	√	√	√	√	√
9. Urban land Use Supply and Demand					
Area of land in major land use types	√				
Supply of land for major land use categories	√				
Rates of land use change among major land use types	√				
10. Biodiversity					
Condition of threatened environments	√	√	√	√	√
Condition of naturally uncommon ecosystems	√	√	√	√	√
Condition of river ecosystems	√	√	√	√	√
Population status of threatened species	√	√	√	√	√

* These indicators are not deemed to be directly attributable to an action/approach, and downstream measurements. For example, total water abstraction could be reduced by improving household water efficiency or greater use of rain tanks.

4.0 Conclusions and Recommendations

One approach to assessing sustainability of society is the concept of 'human carrying capacity'.

However due to the inherent complexity of the human carrying concept, the project has evolved to address and recommend potential sustainability indicators that could be useful in delivering improved sustainability outcomes for Kāpiti Coast District. This Stage 3 report has identified and analysed a suite of environmental indicators that we consider can be taken forward to inform District Plan policy development.

In addition, the report has outlined District Plan and non-District Plan approaches that could practically influence environmental outcomes in relation to each selected indicator. The possible approaches include both rule and non-rule methods. This recognises that comprehensive and multi-faceted approaches will be required to achieve progress with environmental outcomes, as measured through the indicators. Rarely will only one or two approaches achieve significant environmental outcomes.

The report has addressed key implementation considerations that will need to be weighed up in terms of potential approaches for each indicator. Further detailed Section 32 analysis will be required of potential District Plan methods outlined herein.

However, on a preliminary basis it is considered that a number of new District Plan approaches have potential to help more readily facilitate the kind of environmental outcomes that the Council and Kāpiti community seek, as expressed in key strategic documents such as the Long-Term Council Community Plan.

As a starting point, it is recommended that the three key District Plan methods as listed in Table 1 be prioritised for further consideration, as they address multiple indicators and sustainability areas at the same time.

Below we have listed some 'next steps' that we believe Council could undertake:

- Confirm suite of indicators and potential district plan approaches, in consultation with community and key stakeholders.
- Council to consider whether to broaden the indicator list to include social, cultural and economic indicators.
- Align outcomes from this study with work being undertaken in other areas – e.g., District Plan Housing Study.
- Further investigate successful international planning approaches for potential application, such as the 'Merton Rule' and Transferable Development Rights.
- Undertake Section 32 analysis following consultation.

5.0 References

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Appendix A

Environmental Indicators List

Appendix A Environmental Indicators List

Group	Indicator	Source	Measurable?	Currently Measured? / By whom?	Strength of relationship to District population	Within influence of KCDC?	Potential for spatial differentiation?	Overall Relevance / suitability as an indicator?	Linkage to Section 13 of this Report	
Biodiversity	Number of threatened species	Stats NZ	Yes	No	low	Marginally	Not in this form	Not viable	N/A	
	Distribution of selected native species	Stats NZ	Yes	???	low	Yes	high		Biodiversity	
	Area of native land cover / Abundance of native plants / Extent of native vegetation (forest, wetland,coastal)	Stats NZ / CF Waikato / KCDC CP	Yes	KCDC / DOC / MAF	low	Yes	high		Biodiversity	
	Proportion of assessed fish below target levels	Stats NZ	Yes	Unknown	low	???	???	Not viable	N/A	
	Distribution of selected pest animal and weed species	Stats NZ	Yes	???	low	Yes	high, but high cost			
	Protected native vegetation areas / Covenanting of significant natural vegetation	CF Waikato / KCDC CP	Yes	DOC / QEII	low	Yes	high		Biodiversity	
	Identification of significant vegetation	KCDC CP	Yes	???	low	Yes	high		Biodiversity	
Air and Atmosphere	Net greenhouse gas emissions	Stats NZ / CF Waikato	Yes	No	high	Yes	medium		N/A	
	Greenhouse gas emissions by sector	Stats NZ	Yes	No	high	Yes	medium		N/A	
	Annual surface temperature	Stats NZ	Yes	NIWA	low	No	high	Not viable	N/A	
	Greenhouse gas intensity of the economy	Stats NZ	Yes	No	high	Yes	low		N/A	
	Stratospheric ozone levels	Stats NZ	Yes	NIWA	low	No	none	Not viable	N/A	
	Air pollution / Air quality (particulate matter, PM 10)	Stats NZ / CF Waikato	Yes	KCDC / GWRC / NIWA??	high	Yes	medium		Air pollution	
Water	Population with drinking water meeting standards	Stats NZ	Yes	KCDC	low	Yes	high	Relevant		
	Nitrogen in rivers and streams	Stats NZ / KCDC CP	Yes	GWRC / KCDC ??	low	Yes	medium			
	Biological health of rivers and streams	Stats NZ	Yes	GWRC / KCDC ??	low	Yes	medium			
	Lake water quality / Lakes water quality for ecological health	Stats NZ / CF Waikato	Yes	GWRC / KCDC ??	low	Yes	medium			
	Groundwater quality	Stats NZ	Yes	GWRC / KCDC ??	low	Yes	low			
	Bacterial pollution at coastal swimming spots, rivers, and lakes / River water quality for recreation	Stats NZ / CF Waikato	Yes	GWRC / KCDC ??	low	Yes	high			
	Water allocation compared with total water resource	Stats NZ	Yes	GWRC / KCDC ??	low	Yes	high			
	River water quality for ecological health	CF Waikato	Yes	GWRC / KCDC ??	low	Yes	medium			
	Groundwater availability and use	CF Waikato	Yes	GWRC / KCDC ??	low	Yes	low			
	Surface water availability and use	CF Waikato	Yes	GWRC / KCDC ??	high	Yes	high			
	Surface water P loading	KCDC CP	Yes	GWRC / KCDC ??	low	Yes	medium			
	Surface water E coli	KCDC CP	Yes	GWRC / KCDC ??	low	Yes	medium			
	Surface water dissolved oxygen	KCDC CP	Yes	GWRC / KCDC ??	low	Yes	medium			
	Macroinvertebrates	KCDC CP	Yes	GWRC / KCDC ??	low	Yes	medium			
	Groundwater N loading	KCDC CP	Yes	GWRC / KCDC ??	low	Yes	medium			
	Groundwater P loading	KCDC CP	Yes	GWRC / KCDC ??	low	Yes	medium			
	Wastewater treatment	KCDC CP	Yes	KCDC internal	low	Yes	high		N/A	
	Highest daily water use	KCDC CP	Yes	KCDC internal	high	Yes	high			
	Land Use	Area of land used for farming	Stats NZ	Yes	KCDC internal	low	Yes	high		Urban Land Use Supply and Demand
		Soil health	Stats NZ	Yes	No	low	Yes	medium		N/A
Nitrogen and phosphorus content in soil		Stats NZ	Yes	No	low	Yes	medium		N/A	
Contaminated soil sites		Stats NZ	Yes	KCDC internal	low	Yes	high		N/A	
Versatile soil extinction		Stats NZ	Yes	Landcare Research	high	Yes	high		Availability of Productive Soils for Agricultural Production	
Hill country erosion		Stats NZ	Yes	Landcare Research	low	Yes	high		N/A	
Protection of natural heritage and landscapes		CF Waikato	Yes	KCDC / DOC	low	Yes	high		N/A	
Rural subdivision		CF Waikato	Yes	KCDC internal	high	Yes	high		Infill housing and apartments	
Stock density		CF Waikato	Yes	AsureQuality / MAF	low	???	high		N/A	
Energy										

Group	Indicator	Source	Measurable?	Currently Measured? / By whom?	Strength of relationship to District population	Within influence of KCDC?	Potential for spatial differentiation?	Overall Relevance / suitability as an indicator?	Linkage to Section 13 of this Report
Transport	Total primary energy supply per person	Stats NZ	Yes	No	low	Yes	low	Not viable	N/A
	Energy intensity of the economy	Stats NZ	Yes	No	low	Yes	low		N/A
	Percentage of electricity generation from renewable resources	Stats NZ	Yes	MED	low	Yes	low		N/A
	Household expenditure on energy used in the home, by income group	Stats NZ	Yes	Census	low	Yes	To meshblock level		N/A
	Energy dependency	Stats NZ	Yes	???	???	???	???		N/A
	Energy-related greenhouse gas emissions	Stats NZ	Yes	No	high	Yes	low		N/A
	Total energy consumption	CF Waikato	Yes	No	high	Yes	low		N/A
	Energy efficiency (or Energy use relative to economic growth)	CF Waikato	Yes	No	low	Yes	low		N/A
	Electricity consumption	KCDC CP	Yes	Network company	high	Yes	medium		Electricity Supply and Demand
	Natural Gas Consumption	KCDC CP	Yes	Network company	high	Yes	medium		N/A
	Vehicle-kilometres travelled by road, by vehicle type	Stats NZ	Yes	No	high	Yes	low		N/A
	Road freight transport intensity of the economy	Stats NZ	Yes	No	low	Yes	low		N/A
	Total public transport boardings per person	Stats NZ	Yes	KCDC / GWRC	high	Yes	medium		N/A
	Number of international flights per week	Stats NZ	Yes	No	N/A	No	low		N/A
Waste	Proportion of population in employment walking or cycling to work	Stats NZ	Yes	Surveys	low	Yes	low	N/A	
	Petrol consumption	KCDC CP	Yes	No	high	Yes	low	Transport Fuel: Supply and Demand	
	Diesel consumption	KCDC CP	Yes	No	high	Yes	low	Transport Fuel: Supply and Demand	
	Solid waste disposed to landfill / Waste to landfills	Stats NZ / CF Waikato	Yes	Unsure	high	Yes	low	Waste to cleanfill and landfill	
	Proportion of population with access to kerbside recycling	Stats NZ	Yes	KCDC	high	Yes	high		
	Proportion of packaging waste recycled	Stats NZ	Yes	Packaging Accord	high	Yes	low		
	Real household consumption expenditure	Stats NZ	Yes	Stats NZ	low	Marginally	high		
Proportion of recycling	CF Waikato	Yes	KCDC / GWRC ?	high	Yes	low			