PR201/3

District Plan Barriers and Incentives to Sustainable Residential Building – Case Studies

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About This Report

Title

District Plan Barriers and Incentives to Sustainable Residential Building – Case Studies

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Abstract

A case study review of three territorial authorities (Christchurch City Council, Kapiti Coast District Council and Hamilton City Council) identifying potential barriers to implementing sustainable residential development created by residential and subdivision requirements within district plans and codes of practice. Analysis and comparison of the case study findings providing a summary of common barriers, and identifying provisions that encourage more sustainable development.

Reference

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1 Executive Summary

Beacon Pathway Limited (Beacon) is preparing a toolkit for local councils that will identify and develop best practice approaches to sustainable residential developments. An important aspect of the toolkit will be best practice in terms of district plans and related regulatory tools under the Resource Management Act 1991 (RMA).

To help develop the toolkit, a review of selected district plans has been undertaken. This review has highlighted that the issue of sustainable residential buildings is one that district plans are only just beginning to grapple with.

A recent report by Beacon "PR 200: Local Council Sustainable Building Barriers and Incentives – Auckland City Case Study" identified a number of barriers to sustainable building in relation to Auckland City Council's district plans and its code of practice. As part of the development of the toolkit, this report has looked at a wider range of district plans.

The analysis has identified the following common barriers:

- Traditional development controls (height, yard, height-in-relation-to-boundary, building coverage, etc) where there is no exemption or allowance for features such as rain water tanks, solar panels or small-scale energy generation.
- Solar orientation is often constrained by yard and height-in-relation-to-boundary rules which push buildings into the middle of lots so as to protect sunlight to adjoining properties. There is no requirement to orientate buildings on lots for sunlight.
- Low impact approaches to stormwater management are restricted to areas of particular environmental sensitivity, or where there are infrastructure constraints.
- Process issues were highlighted as a major barrier to the incorporation of sustainability features, with the costs, uncertainty and delays of getting consent for discretionary and non-complying activity consents (including the need for written approvals) generally deterring people from incorporating sustainable features.
- Codes of practice were similarly identified as a barrier, although Kapiti has illustrated a positive way of addressing alternative solutions.

Key methods identified for addressing potential barriers and encouraging sustainable features include:

- Objectives, policies and assessment criteria that recognise and provide for sustainability and enable the wider positive benefits to be taken into consideration through resource consent processes.
- Allowance within standards for features like rain tanks, but also providing exemptions where sustainable features are included.
- Non-regulatory methods such as guidelines or information that assists in designing development appropriately to reflect sustainability matters.
- Development controls that require sustainability features, such as requiring appropriate building orientation for solar gain and natural ventilation.

2 Introduction

2.1 Purpose of the Report

This report looks at the district plans and codes of practice for three local authorities (Christchurch City, Kapiti Coast District and Hamilton City) and identifies common barriers to the incorporation of sustainable building features into residential developments. The analysis also highlights current provisions that encourage the implementation of sustainable features, and discusses how such incentives could be further developed.

This report builds on an earlier report by Beacon that looked at the Auckland City District Plan, with the intention that the outcomes of the two reports will assist with the development of a toolkit for resource management planners, setting out ways in which district plans could take a pro-active role in supporting sustainable building practices.

It is important to recognise that this review is focused on district plan barriers and incentives, and that district plans are only one input into the total building process. Obviously the Building Act, and in particular the Building Code, are very relevant.

Specific goals of this work are to:

- Look at local authority's RMA-based regulatory frameworks through a case study approach; and
- Identify ways in which the Beacon research programme can assist local authorities in New Zealand to promote and support sustainable development of the residential built environment.

The report on the Auckland City District Plan established a list of sustainable building features (which are identified in Appendix One), and each of the district plans in this case study has been reviewed against these features.

The review of plans for this project has involved the following steps:

1) All zoning, development standards and subdivision provisions relating to residential development were reviewed.
2) In addition, where the local authority had a code of practice for subdivision, then this was also reviewed in recognition of the direct linkage with subdivision activities and that the detailed requirements for water, waste and stormwater are generally contained in these external documents.
3) To provide greater clarity on particular issues, discussions with relevant council officers was also undertaken.
4) A one day workshop was held with council representatives from the three local authorities of the case study areas along with officers from Auckland City, North Shore City, and Waitakere City.

2.2 Context

Beacon has a focus on retrofitting existing houses. While influencing the development of new subdivisions and housing areas is important, the emphasis is on understanding barriers and incentives in relation to the redevelopment of existing houses.

Generally, at the level of an individual household, options to promote greater sustainability through retrofitting will involve small-scale actions. Typically, houses are incrementally upgraded and improved, with the addition of rooms, decks and outdoor facilities, and the remodelling of areas like kitchens and bathrooms. Substantial renovations are more infrequent. Budgets are often limited, and advice is mostly sought from a builder or draughtsperson in the first instance. Unfamiliarity with district plans and the processes involved (as well as plenty of bad press relating to the RMA) mean that many people stick to "working within the rules".

More significant opportunities to influence building design do arise at the time of comprehensive redevelopment of urban sites, for example through the removal of an existing dwelling and its replacement with a group of new townhouses or apartments. This process is more of a developer-driven process, involving professional designers, and there is often the willingness to consider more complex planning processes provided there is some certainty around timelines and outcomes. However, it is a process that is confined to only parts of urban areas, and is more common in metro areas experiencing rapid intensification, compared to slower growing provincial centres where there may be more of an emphasis of peripheral expansion.

In considering the nature of district plan barriers (and the tools to overcome these) it is useful to consider the scale of possible retrofitting activities, and their implications for resource management. In particular, it is useful to distinguish between changes to a dwelling that are internal to the site, changes that may affect neighbours, and those changes that may affect a wider community (such as through the operation of network infrastructure). Table 1 sets out examples of retrofitting activities that have different scale effects.

Table 1: Implications of Retrofitting

Internal to Site	Neighbours	Community
Additional insulation	Change in building footprint / height to provide improved solar access Addition of rain tank, solar panels	Impact on the operation of network infrastructure (positive and negative) from on-site stormwater, wastewater, power generation etc Carparking

Generally, district plans focus on the neighbourhood and community-level effects.

To date, requirements to incorporate sustainable building features (where these appear in district plan provisions) are usually linked to the mitigation of particular environmental effects, such as the effect of stormwater runoff on streams and coastal water. More often than not, sustainable building features are not directly mentioned in district plans, and the issue for sustainable building practices is whether plan provisions create an unintended barrier to their uptake. More recently, there has been the incorporation of some references to sustainable building techniques in provisions relating to comprehensive redevelopment of residential sites.

3 Background To Case Studies

The three local authorities covered by this report were identified as case studies because each of them are confronted with development pressures - both greenfields and redevelopment of existing areas - while also expressing the desire to promote more sustainable development. The three case studies also offered a range of city scales, complementing the metropolitan focus of the previous Auckland City case study.

Kapiti Coast District Council

In the first half of the twentieth century the district evolved from farming-related activities to more of a holiday and retirement area with little local urban-based employment. In the latter part of the century, the focus has shifted towards Kapiti Coast District Council (Kapiti) becoming a more permanent settlement area, to the extent that currently the area is one of the fastest growth centres in New Zealand.

Statistics New Zealand (Quarterly Review June 2005) population estimates showed that Kapiti had the eighth highest growth rate in population over the previous 12 months, equal with Tasman District. The current population of Kapiti is 46,200 people as of the 2006 Census, being an 8.8% growth since 2001.

The Kapiti Coast District Plan was made operative in 1999.

Hamilton City Council

Hamilton City is the seventh largest city in New Zealand, with a population of 129,249 at the 2006 Census.

The city is rapidly evolving from a town into a much more complex urban area, and while there has been to date an emphasis on peripheral expansion, redevelopment of the inner areas is likely to become a feature over the next 20 years.

The Hamilton City District Plan was proposed in October 1999. A number of appeals need to be resolved before the plan can be made operative.

Christchurch City Council

Christchurch City is the second largest city in New Zealand; it covers inner city as well as suburban residential development types. The Christchurch City Council estimated a population of 360,500 in 2006. In addition, it is expected that there will be a continuing reduction in the number of people per household and smaller households, thereby increasing housing demands.

Infill development is common, but with regional plans to limit the outward spread of the city, redevelopment is likely to become much more common.

The Christchurch City District Plan was made operative in 2005.

4 Review of District Plans

The following section of the report provides a discussion of the approaches of the case study district plans relating to the main sustainable building features.

4.1 Energy Efficiency

In terms of energy efficiency the key district planning issues relate to building orientation for solar access and the ability to generate power on-site.

*Solar a**c**cess*

All three case studies have some form of provision around the siting of residential developments so that access to sunlight is achieved. However, these are generally policy focused (Christchurch and Hamilton), with the emphasis on the subdivision, rather than development, stage. While none of the case studies provided for methods to require lot orientation for solar gain, two methods have been identified within other sources. Firstly, the "Subdivision for People and the Environment Handbook" provides a best practice for Energy Smart Lots based on Energy Victoria's guidelines, which provides a lot rating system for solar access which directly relates to the solar potential.[1] Another example is the minimum lot widths and depths identified by Waitakere City Council in the Developers Design Guide for Medium Density Housing depending on whether a site is north/west entry, or south/east entry.

The case studies did not identify any specific provisions whereby residential buildings are required to be oriented on a lot for solar access. Generally the district plans focus on protecting access to sunlight on adjoining sites through height-in-relation-to-boundary / recession plane provisions. Infringements of recession plane controls evoke consent procedures that tend to focus on the adverse effect of the infringement on neighbouring properties.

For example, Christchurch City has a policy that seeks to minimise energy use through improved building design. Factors that contribute to this include density, building location and position within a site, layout of subdivision and orientation of individual allotments and buildings, and energy efficient design of houses. This policy is generally achieved through building height controls and recession planes which allow for a certain degree of solar gain into adjacent sites, but is not specifically addressed through control of the orientation of a building on a lot. An assessment criterion relating to recession plane infringements seeks to protect the access of sunlight to neighbouring properties, particularly admission to internal living spaces in winter so as to reduce energy utilisation.

Generally district plans contain requirements for outdoor living spaces to be orientated to the north, which in some cases would result in the main living areas fronting onto these spaces also being appropriately orientated. It is also common for plans to contain an allowance for eaves within standards for yard setbacks and outdoor living space requirements, which enables

1 "Subdivision for People and the Environment Handbook" Standards NZ, page 141

buildings to be designed to offer shade in summer months without creating an infringement to development controls.

A further issue with relation to energy efficiency is thermal mass, and in particular slab on ground construction. By allowing for earthworks within a building platform to be a permitted activity (i.e. no need to obtain resource consent), there is no barrier to the construction of concrete slab-on-ground as a means of providing thermal mass. Generally plans permit earthworks within an approved building platform, unless there are specific concerns around sensitive environments, such as earthworks adjacent to streams, sediment runoff or the earthworks resulting in landscape modification that is not sustainable.

4.1.1 Power generation

Generating electricity on-site is not something that district plans address, particularly in the urban environment, because of the expectation that all development will connect to network utilities. It is anticipated that as residential development becomes more sustainable the inclusion of solar panels and wind turbines either to provide for all electricity generation on-site, or at least to supplement supply (i.e. solar hot water) will become more frequent.

The biggest barrier to providing wind turbines on-site is identified to be development controls relating to maximum height and height-in-relation-to-boundary. Non-compliance with these controls generally requires consent as a discretionary activity and would require neighbours' written approval if the application was not to be notified. In the case of Christchurch, if the critical standard for height is exceeded consent is required as a non-complying activity.

Discussions with council officers indicate that provided written approval is obtained, an application for a small wind turbine on top of a residential building could address the issues around perception of noise and visual effects. However, the activity status and process are likely to be discouraging for most property owners.

It is interesting to note that Kapiti identified public perception as a potential barrier to the installation of solar panels, whereby water tanks above rooflines were seen as being acceptable but solar panels were perceived to create adverse effects. This appears to relate to traditional acceptance of water tanks for water supply, and the perception that solar panels have a visual impact on amenity, for example glare.

Generally it is unclear how on-site electricity generation as an activity would be assessed under the various district plans, as this activity is for the most part not anticipated. Current provisions mostly provide for network utility operators to establish and maintain structures for the distribution of energy. On-site generation may not be able to be assessed under these provisions.

Hamilton has a provision that allows non-network utility operators to provide network utilities (such as electricity), as a permitted activity, subject to threshold standards. Structures for the generation, storage, and transmission of utilities are permitted provided they comply with the following standards:

- Generation of electricity not exceeding 500 MW
- Transmission or conveyance of electricity at a voltage not exceeding 33kV
- Storage or treatment of water or sewage not exceeding 50m^3 per day

- Maximum of 15m high pole or mast
- Maximum size of 6.5m³ for structures located above ground
- Maximum size of 40m³ for structures below ground.

While such provisions provide flexibility for on-site power generation, other district plans may not apply any activity controls apart from standard development controls and therefore may potentially have even greater flexibility. On the other hand, if by definition small on-site generators are not network utility operators, then they may automatically become a discretionary or non-complying activity.

4.2 Indoor Environment Quality

District plans do not traditionally address indoor environmental quality, as this is covered by the Building Code. However, as urban settlements are intensifying and residential development is locating in closer proximity to noisy activities such as arterial roads and transport facilities like rail corridors; and in mixed use environments, councils have started addressing internal noise effects in district plans. A particular issue that arises in these situations is how to provide for a quiet internal environment, while also allowing for natural ventilation of residential units.

At the same time, the design of some intensive residential developments (such as developments involving single loaded units where the unit has only one exterior face and therefore internal bedroom and living rooms with no external windows) is raising issues associated with the limited extent of natural ventilation, and the reliance on mechanical ventilation (and with this, energy use). Natural ventilation is an issue that is being addressed more in the design of residential apartments rather than stand-alone residential dwellings, which are presumed to offer natural through-ventilation by the nature of their design. This issue was not specifically identified in the current case studies, but was addressed more in the Auckland City case study.

With regard to internal noise standards (which are usually required to avoid reverse sensitivity effects – that is, to limit the potential that inhabitants of the residential units will complain about noisy adjacent activities), the issue is whether the internal noise standards are to be achieved with the windows open or closed. Where such standards are to be achieved with the windows closed, this generally results in the need to provide for mechanical ventilation. For example, Hamilton requires residential development near arterials to meet internal noise standards for all habitable rooms at all times with the windows open, but where the internal noise standard cannot be achieved (i.e. windows have to be closed), then alternative forms of ventilation have to be provided.

Many councils require internal noise standards to be met with windows closed, based on the premise that if individuals do not want the noise they can close the window, but if they want to open windows for fresh air, and are happy to be subject to a higher noise environment, then this is their choice. This approach may work where louder noise is infrequent, but for areas of continuous higher noise, this trade-off is not easy.

This is illustrated by Kapiti for sites near arterials and the airport (Paraparaumu), with standards for habitable rooms applying with the windows closed. However, Kapiti's recently notified

Proposed Plan Change 62 for medium density housing requires acoustic insulation for development near arterials or a railway corridor and for internal noise standards to be achieved with the windows open. This Proposed Plan Change indicates that Kapiti may be changing its direction on this issue, and officers indicate that noise issues are currently being explored further.

An alternative method for addressing noise issues, as illustrated by Christchurch, is the application of building setbacks and standards to be achieved relating to outside areas, or indoor areas with the windows and doors closed. The building setback requirements can be reduced in relation to arterial roads, provided barriers are erected and landscaped (such as walls and mounds), and the relevant noise standard can be achieved. The approach uses both a relevant noise standard in combination with mitigation measures, therefore as further mitigation is provided buildings can be located closer to the noise source. Christchurch council officers indicate that this approach is reasonably successful. In terms of aircraft noise exposure, the Christchurch Plan applies a noise contour and different standards apply to different rooms depending on the primary activity (i.e. sleeping). This recognises that not all rooms have to achieve the same levels of quiet.

4.3 Stormwater

To date, stormwater runoff is a matter that has generally only been managed in district plans by either a control relating to maximum impervious areas or minimum levels of permeable areas on a site. For example, Kapiti requires a permeable area of not less than 30%, partly to provide for some infiltration of stormwater, but the main aim of the control is to ensure that residential development retains a green, vegetated character to it.

The issue of stormwater is one that is becoming more significant with increasing urban redevelopment and additional runoff as a result. A number of district plans are now requiring stormwater to be minimised as part of intensification, such as Kapiti through Proposed Plan Change 62 while others are requiring on-site management such as in specific areas of Christchurch.

At the time of subdivision Christchurch has introduced provisions requiring greater consideration of stormwater matters. The Christchurch Plan requires that all sites provide for the disposal of collected stormwater from all impervious surfaces within the site. As no method for undertaking this is outlined, this approach does not preclude alternative methods being implemented as part of the controlled activity consent for subdivision. However the lack of explicit support for alternative, on-site methods for stormwater mitigation can create unintended barriers at the consent stage. To a certain extent Christchurch avoids this issue: consideration of stormwater disposal methods includes the effectiveness and environmental impacts of measures proposed. Provisions requiring swales, retention ponds and soakage apply in specific areas. In addition, assessment criteria provide for wider roads if they are required to accommodate swales.

Another common technique often used by district plans is a policy framework, such as in Kapiti where a policy requires consideration as to whether adequate measures are proposed to handle increased stormwater runoff from subdivision and development. This applies to applications that are at a higher density than that provided for as a controlled activity, but provides no specific guidance on what would be an adequate measure to mitigate stormwater.

In terms of more specific requirements, Christchurch applies these in particular areas where surface water runoff is a significant issue. For example, rules restrict hard surfacing for driveways, paths, parking or other outdoor areas, limiting materials to gobi blocks or similar (or loosely compacted uniformly graded gravel), to allow infiltration to occur. This approach applies in the Living 1 zone within the South Brighton Coastal Management Area 1. Other specific provisions apply in the Living HA Deferred zone requiring ponding basins at subdivision stage; or in Areas B & C (Awatea Block) of the Special Purpose (Wigram) Zone where collection and disposal shall be by swales, retention ponds and soakage.

As identified by the Auckland City case study, the installation of rain tanks particularly on smaller urban sites will often conflict with traditional develop controls such as yard setbacks, building coverage, and recession planes. Christchurch was the only council identified as having any allowances associated with rain tanks, whereby roof tanks could infringe the recessions planes (every 20m length of internal boundary, with a maximum dimension of 3m).

One factor that contributes to stormwater runoff is minimum parking requirements, as discussed in the Auckland City case study. Generally plans require parking areas to be adequately sealed and drained.

The Hamilton Plan includes performance standards and assessment criteria that recognise the impact of surface materials on surface flooding. Although minimum parking standards still apply to residential developments, there is provision for the minimum width of access ways to be reduced (provided visibility is unrestricted), for stacked parking, and parking areas are not required to be formed, drained or maintained with permanent sealed or paved all weather, dust-free surfaces. This helps to minimise the amount of impervious surfaces associated with parking, potentially reducing the extent of runoff. Sufficient manoeuvring space is still required, and resource consents to provide less on-site parking would be assessed against effects on traffic function of the road and on the function and safety of the surrounding road network. Therefore, where it is appropriate, parking could be provided on the road, but the consent process is likely to deter most people from applying for less on-site parking.

4.4 Water Supply

In terms of the case studies, no specific barriers were identified any of the district plans in relation to the provision of water-saving devices. Water supply is generally not addressed by district plans, unless there is a particular constraint for the district. Plans may have a policy framework, such as Christchurch, where policies seek to achieve sustainability of the city's water supply by encouraging water conservation and re-use and recycling of water; and assess land use proposals to determine likely impacts on water quality and quantity. Otherwise

generally water supply is addressed through engineering standards provided by codes of practice.

In terms of engineering standards, all sites are usually required to connect to a potable water supply unless they are in a rural or unserviced area. Although this generally does not preclude the implementation of water conservation devices and/or recycling of water on-site, there is often no encouragement or process for assessing alternative solutions to supplement potable water supply.

In areas with water supply constraints, there is a basis to consider RMA-based techniques. A number of positive provisions were identified in the case study review and in discussions with Kapiti council officers around encouraging sustainable water supply, such as:

- the installation of water-savings devices for intensive residential development as part of Kapiti's recently notified Proposed Plan Change 62 for medium density housing
- subdivision as a controlled activity enables the council to require water-saving devices when land is rezoned from rural to residential and is encouraged by Kapiti's Sustainable Development Guide
- flow limits on water (such as 1000 litres per day per household) may be included as conditions of consent on subdivisions which have the requirement to provide 'water-saving devices' (mostly land rezoned since 2000); and
- in restricted water supply areas (eg Peka Peka & Waterstone) water tanks based on house size are calculated at building consent stage; alternatively a 22m³ tank is recommended if developers want to install a tank at subdivision stage for sites in residential locations.

4.5 Waste

As recognised in the Auckland City case study the primary matters addressed by district plans is the requirement for a suitable area for waste storage, collection and recycling in intensive residential developments, and that this is suitably screened. Therefore district plans are not identified as providing any particular barriers for sustainable waste management.

Christchurch has policies to encourage waste minimisation through the application of the waste management hierarchy (reduce, reuse, recycle, recover, dispose), promoting waste reduction at source, and further use of recycling by providing facilities to encourage this. Although these policies demonstrate a desired direction they do not provide any methods or incentives for implementation. An assessment criterion was identified that enables a reduction of on-site parking requirements to be considered where this is required to provide for public recycling facilities within the carparking area. Although this could be viewed as an incentive, it is likely to be mostly applicable to business activities given it has to be a public facility.

4.6 Wastewater

In terms of wastewater, the district plans reviewed have a clear preference for sites to connect to reticulated systems for health reasons, unless in a rural area. Therefore where a site is unable to connect, or chooses not too, an application for discretionary consent would generally be required.

In Christchurch, resource consent would be required as a discretionary activity to propose an alternative wastewater system. Discussion with council officers indicates that restricting the use of on-site systems is partly related to consolidation of urban form and avoidance of urban sprawl through proliferation of small rural commuter settlements that are expensive to service. It also avoids proliferation of septic tanks which is important in Christchurch because there is generally a high water table and large areas of uncapped aquifers that need to be protected. However, although responding to regional issues and constraints, this approach does enable the recognition of the technical advances of alternative technology such as composting toilets, which may have very little impact on water quality.

Kapiti provides for alternative systems to be proposed for sites not serviced by a community wastewater system, provided the systems are in compliance with NZS 1547:2000 'on-site domestic wastewater management'. Discussion with council officers indicates that this can apply in both urban and rural sites, provided alternatives are certified by an engineer as suitable (i.e. composting toilet). This is primarily addressed through the Council's Sustainable Subdivision and Development Guide, which encourages alternative wastewater systems that minimise environmental concerns and/or maintenance expenditure. Connection to an existing wastewater system is sought, unless an alternative is approved. The principles to be addressed for alternative systems include compatibility of treatment and disposal system; reuse of wastewater; and on-site wastewater systems.

An important comment was made by Hamilton City Council officers around the issue of asset investment and efficient design, and the need for council to fund these elements through development contributions. There is often an expectation that new development will help to fund already committed asset upgrades, and so proposals for on-site systems raise the prospect of funding shortfalls for some forms of infrastructure.

4.7 General Development Standards

The general development standards within a district plan can affect the extent to which features such as rain tanks, slab on ground and solar panels are incorporated into a building.

Overall, development controls such as building coverage, yard setbacks, height, and recession planes can be a barrier to many sustainable features, as infringements of these rules usually involve resource consent processes. Generally district plans are silent on sustainable features themselves, and do not provide any allowances or exceptions to their incorporation.

This is a particular issue for small scale redevelopments and extensions, particularly of older housing stock. It is quite common for existing houses not to comply with recession plane

controls, and while redevelopment within current building envelopes is possible, adjustments to building footprints outside of the existing envelope can trigger consent processes. For newer houses, where section sizes are small, houses are often built to the envelope provided by the district plan, and additional coverage to incorporate a rain tank, or perhaps to better capture sunlight also triggers consent processes.

At the workshop council officers agreed that there are a lack of exemptions provided within district plans on the basis of sustainability features, and that general development controls are significant barriers in terms of process. Process issues around consent fees, certainty, time delays and public notification reduce the value of including sustainability features, such as solar hot water heating or rain tanks.

Discussion around the issue of compliance with development controls determined that compliance did not necessarily result in the best outcome, but that this generally affords an easier route through the consenting process (particular where non-compliance is discretionary or non-complying).

Some plans require compliance with privacy standards, such as Hamilton, whereby a separation distance of 5 metres is required between windows or balconies at upper floor levels where dwellings are on the same site. Such standards could potentially reduce the ability of a building to be designed to achieve solar gain. Consent is required as a discretionary activity to infringe privacy standards, which although appropriate in terms of protecting privacy is likely to result in redesign rather than application for consent.

As an incentive, flexibility could be built into development controls. This is illustrated by Kapiti, whereby the side yard requirements for front sites are 3m on one side (to provide for vehicular access) and 1.5m on the other, enabling some greater flexibility for building orientation.

Excluding rain tanks from the definition of building coverage was discussed at the workshop, identifying that any such approach would need to address whether there would be times when exclusion is not appropriate, such as locating large rain tanks in the front yard. However, excluding specific features, or providing allowances within the development controls was identified as a useful tool.

Providing for cycle parking and applying a maximum parking standard rather than a minimum are also recognised as being positive ways of encouraging sustainability. Kapiti is introducing parking maximums as part of Proposed Plan Change 62 (no more than 2 parking spaces per unit); and Hamilton requires cycle parking within parking lots.

4.8 Subdivision

Subdivision provisions generally relate to minimum lot sizes, road dimensions and alignments, and requirements to connect to water supply, wastewater and stormwater reticulation. These are also implemented in accordance with Codes of Practice providing environmental standards for infrastructure requirements.

District plan provisions generally anticipate traditional forms of urban development, often with limited consideration for existing landforms and drainage patterns, instead focusing on infrastructure networks such as roading and wastewater reticulation. Few district plans recognise alternative forms of subdivision, and even less provide incentives to implementing these. The case studies confirmed that the key area that subdivisions address within district plans is infrastructure, ensuring that sites are adequately serviced.

Generally, district plans require subdivision to be considered as a controlled activity, ensuring water, wastewater and stormwater systems are available to service the subdivision. In most cases, if such services are not available the proposal becomes a discretionary activity. For example, the Christchurch Plan requires all new lots to be provided with the means of connection to a reticulated sanitary system where available. Council will consider alternative methods of disposal where reticulation is not available as a discretionary activity. The discretionary activity status is considered by the Council to be appropriate as it prevents groundwater pollution that could occur if there weren't any controls on how developers dispose of sewerage. Requiring alternatives to be considered as a discretionary activity creates a potential barrier to applicants in terms of certainty, delay and costs; having to provide significant levels of information and potentially obtain neighbours' consent or face public notification.

Provisions for subdivision and development of land often include specific provisions requiring a shape factor circle and unit site area, as illustrated by both Hamilton and Christchurch. These provisions seek to ensure an allotment is created that can be developed without infringing other controls, such as front yard setbacks and outdoor living area. In Christchurch, council officers indicate that generally sites are larger than the minimum size (13m x 16m) required, and as such provide flexibility to orientate a dwelling appropriately. However, the district plan provisions pertaining to site area and shape factor could be utilised better to explicitly require appropriate building orientation.

In Kapiti, a requirement for Comprehensive Development Plans to be developed for growth areas is being introduced through the plan change process. This provides for the design of an area to be considered prior to subdivision and provides opportunity for better design of lot sizes, and energy efficiency in terms of transport and location.

It is important to recognise that district plans often provide for sustainability on a macro level through policies and land use zoning designed to contain urban sprawl and to achieve a consolidated urban form. This is the case in Christchurch, and this filters down through to the subdivision process, where the road network is required to link well with existing suburbs and provide good pedestrian linkages and access to public transport. This is achieved through

Outline Development Plans and the assessment criteria in the subdivision chapter. However, it does not filter down to on-site implementation.

4.9 Codes of Practice

Councils generally require development to comply with traditional engineering standards, which are more often that not provided for within a code of practice applied at the time of subdivision. Although all three case studies had a code of practice, only the code's of Kapiti and Hamilton were relevant to the design of on-site facilities. Christchurch's code only addressed public infrastructure matters.

Hamilton provides guidance on traditional subdivision and development, with little emphasis on sustainable/alternative methods. Typically the use of alternatives is expected to occur more in the rural settings, with connections required to networks in urban areas. However, there are provisions relating to the incorporation of natural environment-based systems within new works, including features such as ground recharge, overland flow systems, open drainage systems, storm peak mitigation systems, lake and wetland systems with an objective to minimise the amount of stormwater entering the network. This provides a basis for considering the provision of sustainable stormwater features, and there is encouragement of ground soakage within the property with particular guidance on how this should be achieved.

One of the difficulties faced by territorial authorities is the need to approve developments, and to provide certainty and consistency in assessing developments. When considering sustainable design solutions this is more complicated as there is no one-size fits all solution, as designs have to be responsive to the specific environment within which they are to be located. The provision of guidelines to provide for the assessment of alternatives is something that Kapiti has recognised and provided for through their "Sustainable Subdivision and Development Guide".

Kapiti's Development Guide is a design guide that supports both the traditional and alternative routes for the provision of infrastructure, encouraging applicants to use alternative design approaches while also recognising that traditional methods may be more appropriate in some cases. Kapiti has adopted the New Zealand Standard NZS 4404:2004 as the base document to meet its minimum engineering requirements, and provides schedules where the council requirements differ to the standard as well as options for alternative and innovative designs that may be proposed.

Proposals for alternative solutions are required to provide significant detail to demonstrate achievement of engineering standards, and in some cases council staff are identified as having a general lack of understanding of the alternative technologies proposed. This significantly reduces the degree of certainty provided to applicants wanting to propose alternatives, not knowing whether they will be accepted by the council. On-going maintenance, up-keep and liability issues are also identified as key barriers to sustainable features.

Kapiti has established a design and review team to assess alternative solutions at the time of application and also prior to lodgement at the early design concept stage. The design team has

been established to recognise where compromises may need to be made to achieve an overall benefit rather than the traditional application of regulations.

The “Subdivision for People and the Environment Handbook” provides a best practice guideline for alternative designs and technologies developed by Standards NZ. It is a handbook available to guide land development and subdivision so as to enable and encourage the implementation of sustainable practices. The handbook identifies three overall criteria which form the design framework to be adopted:

- Environmental responsiveness – such a design will use natural features and resources for infrastructure such as stormwater management, roading, water supply and building sites in a manner that ensures that the effects of those activities now and in the future are acceptable.
- Resource efficiency – efficient use of resources in terms of land, construction materials, water, energy and circulation patterns requires their incorporation into an integrated design process.
- A sense of community – opportunities need to be provided for future transport choices, recreational and leisure facilities, future community land uses such as planning projects and social gatherings need to be provided for, as does ability to obtain privacy.

4.10 Summary of Case Studies

The following tables provide a summary of the findings of the district plan reviews.

Table 2: Summary of Potential Barriers Created by District Plan Provisions

Potential Barriers	
Feature	District Plan Provision
Energy efficiency	■ Height controls in relation to wind turbines ■ Network utilities have different rules than those applying to individuals ■ Building orientation for solar access
Indoor Environment Quality	■ Maximum internal noise standards for habitable buildings and the need to provide for mechanical ventilation, conflicting with energy efficiency aims and the promotion of natural ventilation
Development controls	■ In relation to features such as rain tanks, solar panels, on-site stormwater management - bulk and location requirements (yards, etc) ■ Privacy requirements affecting building orientation ■ Minimum parking standards increasing impervious surfaces ■ Activity status of discretionary / non-complying activities having process implications
Subdivision / Codes	■ Connection of sites to urban services / public infrastructure focus ■ Minimum lot size / dimensions not taking into consideration orientation for solar access ■ Traditional engineering practice not recognising sustainable alternatives

Table 3: Summary of Positive District Plan Provisions

Positive Encouragement	
Sustainability Feature	District Plan Provision
Energy Efficiency	■ Permitted earthworks within the building platform encouraging slab-on-ground (thermal mass) ■ Orientation of living courts to north ■ Policy framework recognising energy efficiency ■ Recognition of non network utility operators providing services ■ Eaves allowance within bulk and location controls assisting with solar gain
Indoor Environment Quality	■ Acoustic insulation requirements associated with medium density housing ■ Alternative methods for managing noise from arterial roads and airports, such as building setbacks and implementation of acoustic barriers, as well as varying standards according to room
Stormwater	■ Requiring on-site management ■ Allowing stacked parking / reduced access widths resulting in reduced impervious surfaces ■ Policy framework recognising impacts of stormwater ■ Specific requirements for swales, on-site soakage in areas of particular constraints ■ Allowances for roof rain water tanks to infringe development controls such as height, height-in-relation-to-boundary
Water Supply	■ Requiring water-saving devices to be installed for medium density housing ■ Policy framework seeking water recycling (grey water)
General	■ Requirements for cycle parking as part of large parking lots ■ Maximum parking standards in response to location near public transport
Subdivision / Codes	■ Provision to assess alternatives

5 Options to overcome barriers and to improve incentives

The review of planning documents, as well as the workshop held with relevant council officers has highlighted a number of steps that could be taken to remove barriers to the incorporation of sustainable building features.

Actions are likely to involve:

- Providing better information to people
- Recognising sustainability benefits in the policies, rules and assessment criteria of District Plans
- Providing better assessment tools, and training and up-skilling staff.

It was identified at the workshop that the greatest barrier is likely to be the human resources involved in changing and resolving district plan provisions and then implementing them. The RMA imposes a stringent process by which plan provisions have to be prepared and agreed with stakeholders, with the likelihood that contentious provisions will be settled by an independent body – the Environment Court. Consequently changing district plans is often a long and expensive process, increasingly dependent upon very detailed analysis of the costs and benefits of alternative approaches. Therefore one of the main means of assisting local authorities may be through a partnership programme that helps them with the costs and analysis required to amend their plans.

5.1.1 Information

It is noted that Eco Advisors are currently in place at a number of local authorities throughout the country, including Kapiti and Hamilton. These positions are funded by BRANZ to provide residential home builders with information on sustainable building practices. This approach is proving to be particularly useful in Kapiti, with people taking the opportunity to discuss alternative building designs in conjunction with the council's Sustainable Development Guide.

Providing information to people on sustainable building is obviously going to increase demand for the incorporation of sustainability features. It was suggested that the provision of information that identifies the things that can be done within a residential building that doesn't require any consent would be beneficial, particularly in the area of retrofitting homes. Some work in this area is currently occurring through the Healthy Homes Programme in association with the Regional Public Health Services throughout the country, addressing insulation and passive ventilation.

5.1.2 District plan provisions

In relation to incorporating sustainable building features into district plans, it was the view of the workshop participants that the approach of providing policy support and appropriate

assessment criteria relating to sustainable building features is one that is more practical than imposing rules requiring incorporation of sustainable development features. Such criteria can guide the use of durable low maintenance materials, maximising solar access and natural ventilation, energy efficiency and on-site stormwater conservation in the design process. Kapiti considers that the use of guidelines (similar to assessment criteria) is a way of achieving good outcomes, rather than using rules. There is also scope to relax the application of development standards for certain features, such as rain tanks and solar panels.

However, there may be opportunities for rule-based provisions relating to mandatory incorporation of some aspects of sustainability, although each council will need to consider which aspects should be given statutory force. This exercise will be particularly related to the nature of the district, and what resources are particularly adversely affected by urban development.

The City of Newcastle in Australia has a draft Local Environmental Plan that controls residential development. Within the plan it is identified that all development requires consent, but then provides a schedule of exempt development within specific development standards. Examples of exempt development are:

- Solar and wind energy generating works
- Water tanks
- Dwellings providing such things as solar access and stormwater.

Appendix Three of this report sets out the standards used in the Plan. They are an example of how relevant standards and allowances could be incorporated into district plans.

5.1.3 Applying the criteria

There is a need to develop better assessment tools to help understand the benefits (and effects) of sustainable building features. This is to help home renovators and developers, as well as council staff, in assessing the merits of proposals that step outside normal development standards.

For example, Kapiti indicates that they are currently developing shading angle diagrams for their website, to enable people to determine the extent of shading effects of developments that will infringe height and height-in-relation-to boundary controls without the need to engage expert advice. This process seeks to avoid the tradition of designing to comply, recognising that compliance will not necessary create the best outcome for the site, or adjoining properties. This kind of web based tool could be useful to applicants to enable them to test their proposals and to demonstrate that non-compliance is not necessarily going to lead to significant adverse effects.

Other examples from Australia include the NSW Residential Flat Design Code which addresses elements such a solar orientation, stormwater, acoustic privacy, daylight access, natural ventilation, energy efficiency and water conservation. It does this by providing best design practice to assist local government in the development of standards for development. For example, the best design practice for energy efficiency addresses the following matters, with detail of how this can be achieved:

- Incorporate passive solar design techniques to optimise heat storage in winter and heat transfer in summer
- Improve the control of mechanical space heating and cooling
- Provide or plan for further installation of photovoltaic panels
- Improve the efficiency of hot water systems
- Reduce reliance on artificial lighting
- Maximise the efficiency of household appliances.[2]

The recently prepared Good Solutions Apartment Guide by North Shore City Council has used the above code as a base, amended for the Auckland context. This is also a non-statutory document aiming to promote the good design of apartments and addresses the same elements, using Auckland examples.

[2] "Residential Flat Design Code" Planning NSW (p93)

6 Conclusions and recommendations

A range of barriers and incentives to the incorporation of sustainable building features were identified previously in the Auckland City Case Study, and through the additional case studies covered in this report, it has been illustrated that these are largely "generic" to other local authorities within New Zealand.

In comparison to the Auckland example, the other case study areas are not confronted with the same level of pressure for intensification, with little or no provisions around high density development. Therefore the case studies reflect more traditional subdivision and housing forms.

Common barriers exist in relation to:

- Traditional development controls (height, yard, recession plane, building coverage, etc) where there is no exemption or allowance for features such as rain water tanks, solar panels or small-scale energy generation.
- Solar orientation is often constrained by yard and recession plane rules which push buildings into the middle of lots so as to protect sunlight to adjoining properties. There is no requirement to orientate buildings on lots for sunlight.
- Low impact approaches to stormwater management are restricted to areas of particular environmental sensitivity, or where there are infrastructure constraints.
- Process issues were highlighted as a major barrier to the incorporation of sustainability features, with the costs, uncertainty, and delays of getting consent for discretionary and non-complying activity consents (including the need for written approvals) generally deterring people from incorporating sustainable features.
- Codes of practice were similarly identified as a barrier, although Kapiti has illustrated a positive way of addressing alternative solutions.

Sustainable development elements are beginning to be addressed with regard to intensive development. District plans are beginning to require site analysis at the beginning of the design process to ensure that development responds to the natural features, opportunities and constraints that exist within a site. Assessment criteria may refer to the extent to which sustainable building practices are followed. Generally, these types of provisions are being applied because comprehensive redevelopment of sites to a higher density enables sustainable development features to be considered in an integrated way.

District plans did not intentionally set out to discourage the incorporation of sustainable building features. The workshop discussions highlighted a number of ways that barriers could be addressed, both through district plans and through other mechanisms. This review and discussions with council officers has identified a number of recommendations for the development of a local authority toolkit:

- A need to consider regional differences in terms of natural environmental constraints and local awareness

- How to address risk management and asset management issues relating to how councils manage infrastructure, and in particular if a move towards more decentralised infrastructure systems will be acceptable.
- A need to consider the relationship between the Building Act and the Resource Management Act, and whether it is possible to require more stringent standards in district plans than what is required by the Building Act.
- The linkage between urban design and sustainability is strong and the push for better urban design should be utilised as a platform to help advance sustainability, but to do so there is a need to be careful that any possible conflicts are addressed.
- Any toolkit should address sustainability at three levels, the site (house); neighbours (solar access); and community (network utilities), and acknowledge the different issues involved.
- A set of standard principles could be developed that apply throughout New Zealand and which could be adopted by councils as a starting point.
- It may be useful to have standard planning controls, such as those providing for roof tank allowances, or the sizing of rain tanks in accordance with roof areas. However, in many situations it may be more appropriate for the toolkit to offer alternatives as to how the principles could be applied.

7 References

Easton, L. et al "Local Council Sustainable Building Barriers and Incentives – Auckland City Case Study" Report PR200/3 for Beacon Pathway Ltd. (July, 2006)

Christchurch City Council "Operative City Plan" (2005)

Hamilton City Council "Proposed District Plan" (2001)

Hamilton City Council "Subdivision Code of Practice"

Kapiti Coast District Council "Operative District Plan" (1999)

Kapiti Coast District Council "Sustainable Subdivision and Development" (2005)

Newcastle City "Centre Local Environmental Plan" (2006)

North Shore City Council "Good Solutions Guide for Apartments" (2007)

Standards New Zealand "New Zealand Handbook: Subdivision for People and the Environment" (2001)

Waitakere City Council "Developers Design Guide"

Key Interviewees

Emily Thompson	Kapiti Coast District Council
Ian Johnson	Hamilton City Council
Brendan Smyth	Christchurch City Council

8 Appendix One – Summary of Sustainable Features

Feature	Development Type feature is suitable for use in		Implications
	Residential	Multi-unit/ apartment residential	
Energy			
Passive solar design	Yes all	Yes all	■ allow for east-west orientation of building ■ allow for large north facing windows ■ allow for small south facing windows ■ adequate eave width to stop summer sun ■ provision of sun shades on multi-storey buildings
High thermal mass	Yes all	Yes all	■ thick concrete floor slab and/or thick concrete wall with sun exposure
High levels of insulation	Yes all	Yes all – although as not so many external walls glazing can be more important	■ generally double building code minimums
Solar hot water system	Yes all	Yes as shared pre-heat system	Either 1 system per building on north facing roof or option of pre-heating for multi-unit development on north facing roof
Multi pane windows (double glazing)	Yes all	Yes all	
Wind generation	Yes on off grid sites (eg Grt Barrier)	Yes on off grid sites	■ height of wind turbine
Day - lighting/ provision of atria or lightwells	N/A	Yes depending on depth of building & orientation	
Photovoltaic panels	Yes on off grid sites (eg Grt Barrier)	Unlikely	■ North facing roof
Water			
Rainwater tanks	Yes all	Yes all	■ Sufficient space for tank, consent required for plumbing. Assume non-potable uses (toilets, gardens, laundry)
Dual flush toilets and water efficient fittings (incl. no waste masters)	Yes all	Yes all	
Landscape treatment using plants which do not require	Yes all	Yes all	

Feature	Development Type feature is suitable for use in		Implications
	Residential	Multi-unit/ apartment residential	
watering			
Indoor Environment Quality			
Natural ventilation with minimum airflows	Yes all	Yes - issues where high noise	
Low VOC emitting materials	Yes all	Yes all	■ ventilation of bathroom, kitchen & laundry no unflued gas appliances
Low moisture	Yes all	Yes all – gen. requires mechanical ventilation	
Waste			
Provision for Recycling	Yes all	Yes all – needs to be on a building wide scale	
Minimise building waste	Yes all	Yes all	
Provision for composting kitchen waste	Yes all	Ideal but can be difficult	
Stormwater			
Green roofs-extensive and intensive		Yes - though depends on what else is required on roof	
Swales, rain gardens, infiltration pits	Yes	Yes	
Stormwater tanks	Sometimes	Sometimes	These are tanks which fill and slowly drain water out to mitigate peak flows.
Wastewater			
Composting toilet	Yes in non-reticulated areas	Sometimes – can be difficult in this building type	
Greywater re-use	Yes	Yes	
Materials			
Materials with low life cycle cost	Yes all	Yes all	
Allowance for innovative sustainable materials eg rammed earth, straw bales	Yes all	Yes all	
General			
Cycle storage	Yes	Yes	
Pedestrian focus to building (prominent entry)	Yes	Yes	
Building design life exceeds the Building Code	Yes	Yes	
Minimise earthworks	Yes	Yes	
Minimise impermeable surfaces	Yes	Yes	
Minimise impact on ecological values (eg bush,	Yes	Yes	

Feature	Development Type feature is suitable for use in		Implications
	Residential	Multi-unit/ apartment residential	
streams, large trees)			
Adaptability to future uses (design able to accommodate change in function and use) eg provision of home office, high stud ground floor in CBD etc	Yes	Yes	
Fit with local environment (eg minimise driveway length, retaining walls)	Yes	Yes	
Efficient design eg co-location of kitchen/bathroom for pipework efficiency	Yes	Yes	
Minimise carparking	Yes	Yes	

9 Appendix Two – Summary of District Plan Review

Development Control	Kapiti	Hamilton	Christchurch
General Density	450m² for sewered front lot, or 550m² rear sewered 300m² - 350m² high density 950m² for unsewered lot	400m² standard 600m² for MHU 300m² for CRD 350m² for high density area 150m² per unit for apartments	270 - 650m²
Site / Building Coverage	40%	35% - 50%	35% - 40%
Building Height	8m	10m	8m
Recession planes	2.1m + 45 degrees	3m + 28 / 45 degrees	2.3m + (varying degrees)
Yard setbacks	Front = 4.5m Rear = 3m Sides = 3m / 1.5m	Front = 3m – 5m Rear = 1.5m Side = 1.5m	Front = 4.5m – 8m Rear = 1.8m Side = 1.8m
Eaves allowance	600mm in yards	500mm in yards	600mm in yards and outdoor space
Outdoor living space	Orientated north and accessed from main living area	Direct access to living room	Multi-units require sunshine at midday on shortest day of year
Parking standards	2 per dwelling 1.5 per unit (multi-unit)	2 per unit 1 per apartment	2 per unit 1 per high density unit + 1 per 5 units (visitor)

10 Appendix Three - Newcastle City Centre Local Environmental Plan: Exempt Development - Schedule 2

Development	Development Standards and other requirements	
Solar and wind energy generating works Installation and use of generating works and water heaters used for the purpose of collecting solar or wind energy.	Siting	■ Not located between the front of a building and the street alignment ■ Does not direct glare into the windows of nearby buildings ■ Roof-mounted solar panels are aligned parallel to the roof plan
	Dimensions	■ Maximum height of 2.7 metres above existing ground level, except where mounted onto an existing building or structure
	Capacity	■ Maximum generating capacity of 5 kilowatts for a photovoltaic ■ Maximum generating capacity of 2 kilowatts for wind turbines
	Noise control	■ Noise emissions from wind turbine are not audible inside any adjoining dwelling between 10.00pm and 7.00am on weekdays, and between 10.00pm and 8.00am on Saturdays, Sundays and public holidays. At all other times, noise levels must not exceed 5dBA above ambient background noise level measured at the allotment boundary.
Water tanks Installation and use of above ground water tanks	Number	■ Maximum of one tank per dwelling
	Siting	■ Not located between the dwelling and the street alignment ■ Located wholly within the boundaries of the allotment ■ At least 0.6 metres from any property boundary ■ At least 1 metre from any sewer main ■ Does not encroach on any easement, pipeline or watercourse
	Dimensions	■ Maximum height of 2.4 metres above existing ground level ■ Maximum capacity of 5,000 litres
	Connection	■ Is not interconnected with a reticulated water supply provided by Hunder Water Corporation
	Drainage	■ Overflow is connected to a stormwater

Development	Development Standards and other requirements	
		drainage system
	Bush fire	■ The development is carried out on land that is not bush fire prone land.
Dwelling houses and associated out-buildings Erection (or carrying out) and use of: a. new dwelling houses, or b. alterations and additions to existing dwelling houses, or …	Solar access	■ The structure complies with guidelines for solar access of a development control plan approved by the Council
	Stormwater	■ The development does not restrict the flow of stormwater ■ The development complies with applicable requirements in Element 4.5 of *Newcastle Development Control Plan 2005*.