

# **BARRIERS AND INCENTIVES TO SUSTAINABLE RESIDENTIAL DEVELOPMENT**

CHLOE TRENOUTH AND DAVID MEAD

*Hill Young Cooper Limited, Auckland, New Zealand*

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## **ABSTRACT**

Sustainable building is gaining increasing importance within New Zealand, with energy, water efficiency, on-site management of stormwater and similar issues becoming increasingly significant for local government, particularly their contribution towards managing climate change.

This paper discusses the findings of case studies undertaken by Hill Young Cooper for Beacon Pathway Limited on the common barriers created by district plan provisions to implementing sustainable residential buildings and ways to overcome them. Case studies review the residential provisions of four territorial authorities (Auckland City, Hamilton City, Christchurch City, and Kapiti-Coast District).

This work has identified a range of barriers, which are likely to be applicable to most district plans. Often these barriers are an unintended consequence of the way that district plans have been drafted. As sustainable development becomes a more important outcome at a local and national-level, district plans will need to be modified so that they take a more positive approach to the promotion of sustainable development practices. A workshop was held with council officers from the case studies to provide an opportunity to identify ways that district plans can be more proactive in achieving sustainable residential development.

## **KEYWORDS:**

Residential Buildings; Sustainability; Case Studies; District Plans

## **INTRODUCTION**

Sustainable building is gaining increasing importance within New Zealand, with energy, water efficiency, on-site management of stormwater and similar issues becoming increasingly significant for local government, particularly their contribution towards managing climate change.

Beacon Pathway Ltd is a FRST funded research consortium, which is focused on bringing sustainability to New Zealand's residential built environment. Established in 2004, with a initial focus on new technology for new homes, it became quickly apparent the principal opportunity for Beacon to impact lies not with the 25,000 new homes we build each year, but in transforming our existing home and neighbourhoods, and our existing 1.5 million homes, a large proportion of which are poorly insulated, damp, and relatively high consumers of energy and water (Storey, et al., 2004).

This paper outlines the work that has been undertaken by Hill Young Cooper Limited to identify potential barriers and incentives to sustainable building design and development within district plans. The district plans and codes of practice of four territorial authorities have been used as case studies to examine the effect of district plan policy and regulation on the uptake of sustainable building design within New Zealand.

## **METHODOLOGY**

Beacon was initially commissioned by Auckland City Council to identify existing barriers in the council's regulatory framework under the Building Act, Health Act, Resource Management Act, and included specific case studies of the development process. As part of this work Beacon sought to develop a tool kit for local government around the barriers identified and ways to overcome them. District plans and codes of practice significantly influence residential development and as these vary throughout the country it was recognised that to provide a practical tool kit for local authority's, further case studies would identify different methods of addressing sustainable buildings as well as common barriers.

Kapiti Coast District Council, Hamilton City Council and Christchurch City Council were identified as relevant case studies because they are each confronted with development pressures – both greenfield and redevelopment of existing areas – while also expressing a desire to promote more sustainable development. The three case studies also offered a range of city scales, complementing the metropolitan focus of the initial Auckland City case study.

The following methodology was used to identify common barriers and ways to overcome them:

1. A review of each of the district plans and codes of practice was undertaken against a list of sustainable building features (see Appendix 1) to reflect key elements and arrange analysis.
2. Council officers at each council were contacted by telephone to discuss the findings and identify other relevant information.
3. Identification of common barriers and incentives
4. A workshop at Waitakere City Council to discuss initial findings and possible solutions to feed into the tool kit. Council officers from Waitakere City Council and North Shore City Council also attended in response to their involvement in other Beacon work around residential buildings and sustainability.
5. Previous experience identified examples of other relevant work around subdivision and district plan provisions (i.e. Newcastle City Plan).
6. A paper was prepared and sent to the territorial authorities for comment.

## **DISTRICT PLAN ROLE IN RELATION TO SUSTAINABILITY**

District plans are local councils' major statutory plans, prepared under the Resource Management Act 1991 (RMA). They address mainly issues relating to land use and subdivision as well as activities that the council considers is likely to have an adverse impact on the environment. They typically include "zones" for activities and manage the bulk, location and type of development taking place.

Because of the RMA framework and the process of preparation of district plans (public submissions and appeals to the Environment Court), many district plans across the country address similar issues and manage them in a similar manner. This is particularly the case for urban councils. While there are always issues that are unique to a local area, aspects relating to residential buildings and their location within the urban residential built environment are often similar.

### **Impact of District Plans**

The issue of sustainable buildings is one that district plans are only just beginning to grapple with. To date, the focus of district planning has been on the spatial issues associated with city development, and within this context, the relationships and effects between different activities. This is based on the "avoid, remedy, mitigate" type approach that many plans adopt (that is, managing adverse effects of activities on adjacent land uses and the environment). The quality and sustainability of the "internal environment" involved in different activities and buildings is generally something that district plans have not directly addressed.

When considering the extent that district plans may impose a barrier to the up take of sustainable building technologies or features, it is important to place district plan rules in this context. Sometimes there will be conflicts between particular rules and sustainability outcomes at a site-by-site level. More often, plans are silent about sustainability features. The emphasis of district plans on zoning patterns and land use relationships is important to wider sustainability outcomes. As such, great gains will come about from rearranging the way that cities are laid out.

### Role of district plans

Generally, at the level of an individual household, options to promote 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 on 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<br><br>Addition of rain tank, solar panels | Impact on the operation of network infrastructure (positive and negative) from on-site stormwater, wastewater, power generation etc<br><br>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.

## KEY FINDINGS OF CASE STUDIES

The case studies involved a review of both the district plans and codes of practice of four territorial authorities, as well as a one day workshop to discuss the findings, to assist with the development of a toolkit for local councils identifying best practice approaches to sustainable residential development.

A number of potential barriers were identified through this process, as well as identification of current provisions that encourage the implementation of sustainable features that could be developed further.

Table 2 below provides a summary of potential barriers identified through the case study reviews.

**Table 2: Potential District Plan Barriers**

| Feature                    | District Plan Provision   |
|----------------------------|---|
| Energy efficiency          | <ul style="list-style-type: none"> <li>• Height controls in relation to wind turbines</li> <li>• Network utilities have different rules than those applying to individuals</li> <li>• Building orientation for solar access</li> </ul>  |
| Indoor Environment Quality | <ul style="list-style-type: none"> <li>• 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</li> </ul>   |
| Development controls       | <ul style="list-style-type: none"> <li>• In relation to features such as rain tanks, solar panels, on-site stormwater management - bulk and location requirements (yards, etc)</li> <li>• Privacy requirements affecting building orientation</li> <li>• Minimum parking standards increasing impervious surfaces</li> <li>• Low impact approaches to stormwater management are restricted to areas of particular environmental sensitivity, or where there are infrastructure constraints</li> </ul> |
| Subdivision / Codes        | <ul style="list-style-type: none"> <li>• Connection of sites to urban services / public infrastructure focus</li> <li>• Minimum lot size / dimensions not taking into consideration orientation for solar access</li> <li>• Traditional engineering practice not recognising sustainable alternatives</li> </ul>  |
| Process issues             | <ul style="list-style-type: none"> <li>• Costs, uncertainty and delays in getting consent for distraction and non-complying activity consents (including the need for written approvals)</li> </ul>   |

In addition to the potential barriers existing within district plans, a number of positive provisions were also identified that help to encourage sustainability. These are summarised in Table 3 below, and are identified as being relevant to other districts either in their current form or as a basis for further development.

**Table 3: District Plan Incentives**

| Sustainability Feature | District Plan Provision |
|------------------------|-------------------------|
|------------------------|-------------------------|

|                            |   |
|----------------------------|---|
| Energy Efficiency          | <ul style="list-style-type: none"> <li>• Permitted earthworks within the building platform encouraging slab-on-ground (thermal mass)</li> <li>• Orientation of living courts to north</li> <li>• Policy framework recognising energy efficiency</li> <li>• Recognition of non network utility operators providing services</li> <li>• Eaves allowance within bulk and location controls assisting with solar gain</li> </ul>  |
| Indoor Environment Quality | <ul style="list-style-type: none"> <li>• Acoustic insulation requirements associated with medium density housing</li> <li>• 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</li> </ul>   |
| Stormwater                 | <ul style="list-style-type: none"> <li>• Requiring on-site management</li> <li>• Allowing stacked parking / reduced access widths resulting in reduced impervious surfaces</li> <li>• Policy framework recognising impacts of stormwater</li> <li>• Specific requirements for swales, on-site soakage in areas of particular constraints</li> <li>• Allowances for roof rain water tanks to infringe development controls such as height, height-in-relation-to-boundary</li> </ul> |
| Water Supply               | <ul style="list-style-type: none"> <li>• Requiring water-saving devices to be installed for medium density housing</li> <li>• Policy framework seeking water recycling (grey water)</li> </ul>  |
| General                    | <ul style="list-style-type: none"> <li>• Requirements for cycle parking as part of large parking lots</li> <li>• Maximum parking standards in response to location near public transport</li> </ul>   |
| Subdivision / Codes        | <ul style="list-style-type: none"> <li>• Provision to assess alternatives</li> </ul>  |

Further work with council officers and planning practitioners will assist in addressing barriers and the development of a practical tool kit for local councils has been prepared by Beacon to encourage the implementation of sustainable features and reduce potential barriers. The tool kit will use the case studies findings to identify triggers and provide guidance on how to achieve more sustainable building outcomes.

### **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 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 could be through a partnership programme with other local authorities that helps with the costs and analysis required to amend their district plans.

### **Information**

It is noted that Eco Advisors are currently in place at a number of local authorities throughout the country, including Kapiti Coast District Council, Hamilton City Council and Waitakere City Council. 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 has been found by Kapiti to increase demand for the incorporation of sustainability features. It was suggested attendees at the workshop 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.

### **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.

As an example, 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.

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.

### **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 is 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 necessarily 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.

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.

## **CONCLUSION**

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 that 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 although a number of impediments are identified. There is an opportunity to provide greater flexibility into the process to recognise and encourage sustainable building features. The workshop discussions highlighted a number of ways that barriers could be addressed, both through district plans and through other mechanisms.

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