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PR 200

LOCAL COUNCIL SUSTAINABLE BUILDING BARRIERS AND INCENTIVES – AUCKLAND CITY CASE STUDY

-FINAL REPORT

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AUCKLAND CITY COUNCIL SUSTAINABLE BUILDING BARRIERS AND INCENTIVES –FINAL REPORT

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ABSTRACT

A review of the potential barriers to sustainable building within Auckland City Council's planning and regulatory framework, and the incentives offered by the Council has been undertaken as a case study of the local Council environment. The consenting process for a number of examples of actual sustainable buildings was also examined. From the analysis, ways in which the barriers to sustainable building can be overcome and their potential effectiveness are provided.

REFERENCE

Easton L., Mead D., Trenouth C., Fullbrook D., and Arnold P. 2006. *Local Council Sustainable Building Barriers and Incentives – Auckland City Case Study*

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EXECUTIVE SUMMARY

INTRODUCTION

This work has been carried out to identify the barriers and incentives to sustainable building design and development within a local Council environment. Auckland City Council has been used as a case study to examine the effect of local government policy and regulation on the uptake of sustainable building within New Zealand. The work has been jointly funded with Auckland City Council and this report is a companion report to one which has been prepared for Auckland City Council.

Specific goals of the project are:

1. Look at the Auckland City Council regulatory framework and application of this as a case study for the local government framework within which the residential built environment is developed across New Zealand.
2. Identify ways in which the Beacon Pathway Limited research programme can assist Auckland City and other local councils in New Zealand to promote and support sustainable development of the residential built environment.
3. Provide specific focus on the areas of greatest control by local government – in particular, water supply, wastewater and stormwater services.

Auckland City is the largest local authority territorial area in New Zealand, containing approximately 140,000 households. Over the next 20 years approximately 50,000 dwellings will be developed to house the increasing population, as well as substantial renovation to the existing housing stock.

As a local council, Auckland City administers development controls under the Building Act and the Resource Management Act. Because many sustainable building methodologies are innovative, or require significant fore-thought the regulatory process has significant potential to help or hinder sustainable building outcomes.

In addition to its regulatory role, Auckland City Council also manages a significant amount of infrastructure and services which impact on the sustainability of the built environment.

REVIEW OF POLICIES, PLANS AND PRACTICES

Development within New Zealand is subject to a wide range of legislation, policies and plans. An analysis of the national and regional and Auckland City specific framework was undertaken, to determine what, if any, barriers or incentives to sustainable building were in place, with the following key findings:

Building Act, Building Code and its Administration

Currently many sustainable approaches to building are not included with the Acceptable Solution framework provided by the New Zealand Building Code. This makes the approval of such approaches generally more difficult for both the applicant and the Council staff. In addition, their current “alternative” nature means that Council staff are often not familiar with such measures, leading to increased time required by staff to ensure that they are being used appropriately.

As a result, time pressures can often lead to some sustainable building measures being discouraged or for additional information requests from Council staff to ensure proof that such measures will work. This is in essence the greatest regulatory barrier

to many sustainable building approaches within Auckland City and is likely to be a significant factor in other councils, particularly where high growth.

In addition, due to the work pressures created by the “hot” Auckland construction market, aspects of the Building Code are given priority over others for ensuring compliance. For example, measures around external moisture are given high priority, whereas proof of compliance with energy efficiency or natural light standards is given a much lower priority. In addition, anecdotally, a fewer number of inspections are given by building staff in Auckland City and the Auckland region than other parts of the country where there is much less development going on. In cities such as Auckland with a large number of developers and builders of varying quality, fewer inspections could lead to a greater number of non-compliance issues.

Health Act

The Health Act does not specifically contain provisions that are a barrier to sustainable building, but the guidance it provides around ensuring wholesome water appears to be creating an implementation barrier to rainwater and greywater re-use within the household, even for use within toilets.

Resource Management Act

Measures recently introduced into the Resource Management Act, but not yet considered within Auckland City’s district plans (or any others in the country), will allow a regulatory approach to be developed around energy efficiency and the benefits to be derived from the use and development of renewable energy. This has the potential to be used as a significant incentive to encourage, for example, new development, or redevelopment beyond a threshold, to be required to meet high levels of energy efficiency, or include solutions such as solar hot water systems.

Auckland Regional Policy Statement and Regional Plans

Few barriers or incentives are identified for the development of sustainable buildings within the regional framework and policy documents. Overall the role of these documents is to sustainably manage natural and physical resources, with a focus on macro-urban patterns, and policies that local authorities need to give effect to in the preparation of district-level rules.

Largely the regional council plays an advocacy and education role in encouraging the incorporation of sustainability features.

Auckland City policies, plans and practices

District plans

Overall the Auckland City district plans generally provide few barriers or incentives to the development of sustainable buildings. In most cases sustainability features can be incorporated into buildings as a matter of course, provided that normal development standards are met. Where there is explicit recognition of sustainability outcomes then these are in relation to residential environments and traditional concerns about daylight and sunlight access. There are a small number of provisions within the various plans which provide a minor barrier to some sustainable building approaches. The most significant of these are as follows:

- Solar orientation is often constrained by yard and height in relation to boundary rules which push buildings into the middle of lots.
- Carparking and access standards generally set minimum standards which significantly influence the layout of intensive developments.

- There is a significant conflict between providing natural ventilation and noise standards adjacent to major roads in high density (apartment) residential zones.

The Auckland City district plans are fairly “typical” documents of their type and regulate in a fashion similar to many other councils in New Zealand. These findings therefore are likely to be applicable to many other councils, particularly those in urban situations.

Council codes of subdivision and development standards

Generally these codes are considered to favour and direct development towards the implementation of conventional, rather than sustainable building outcomes and are seen as a significant barrier to sustainable building, particularly in relation to water.

CASE STUDIES

Two residential case studies were considered as part of the study as follows:

- Talbot Park residential development, Glen Innes
- Courtney – Heale residence, Point Chevalier

The findings of the case study analysis generally support those of the analysis of the policies, plans and practices.

CONCLUSION

The analysis indicates that the barriers to sustainable building within Auckland City and a local government context are generally more at the generic (eg lack of information) level than as a result of specific policies, plans or practices of the individual council.

The key exceptions to this are around the Building Act administration and interpretation of the New Zealand Building Code, and in the infrastructure standards, particularly for water, of the Council. This has been the experience for other councils such as Waitakere (Tony Miguel pers. comm.) where it was found that a negative staff attitude and inflexible conventional infrastructure standards were the major barriers to sustainable building.

1. INTRODUCTION

This work has been undertaken to identify the barriers and incentives to sustainable building design and development within a local council environment. Auckland City Council has been used as a case study to examine the effect of local government policy and regulation on the uptake of sustainable building within New Zealand.

Beacon Pathway Limited and Auckland City Council have been joint funders of this work, which has had a range of purposes. Because the legislative framework that local government works within is the same across the country, many of the barriers and incentives identified through the Auckland City case study will be applicable nationally. The next stage of this project is therefore to develop a tool kit for local government around the barriers to achieving more sustainable residential built structures and ways to address them. In addition, the work is seen as a first stage in developing a comprehensive approach to sustainable building within Auckland City Council, with recommendations from this work, and a companion report to this one which has been prepared for Auckland City Council, leading to detailed investigation of a package of measures to promote sustainable building within Auckland City.

Specific purposes for each agency involved in the project are as follows:

Beacon Pathway Limited

1. Look at the Auckland City Council regulatory framework and application of this as a case study for the framework in which the residential built environment is developed across New Zealand.
2. Identify ways in which the Beacon Pathway Limited research programme can assist Auckland City and other local councils in New Zealand to promote and support sustainable development of the residential built environment.
3. Provide specific focus on the areas of greatest control by local government – in particular water supply, wastewater and stormwater services.
4. Utilise the information gained through the Auckland City Council case study to develop a tool kit for local government on barriers and ways to overcome them.

Auckland City Council:

5. Identify incentives and barriers within Auckland City Council policies and plans which assist with, or prevent, the promotion and implementation of sustainable building principles into development.
6. Identify ways in which barriers can be overcome – with particular regard to those barriers which result from Council policy and/or strategies, rather than legislation.

2. BACKGROUND

2.1 Auckland City

Auckland City is the largest local authority territorial area in New Zealand, containing over 420,000 people (approximately 140,000 households). Over the next 20 years approximately 50,000 dwellings will be developed to house the increasing population, as well as substantial renovation to the existing housing stock. The Auckland City housing stock is therefore of significant importance when moving towards achieving Beacon's goal of 90% of homes having a high standard of sustainability by 2012 as well as achieving Auckland City Council's goals of becoming a more sustainable city.

2.2 Role of local councils in relation to sustainable building

All but minor building developments are subject to approval under the Building Act, and, in many instances, the Resource Management Act. This regulation is administered by the Territorial Local Authorities (TLAs). Because many sustainable building methodologies are innovative (eg composting toilets), or require significant fore-thought (eg passive solar design), the regulatory process has significant potential to help or hinder sustainable building outcomes.

In addition to their regulatory function, local councils have a significant role in the management of infrastructure (eg provision of water supply, stormwater and wastewater infrastructure) and services (eg household waste collection) which impact on the sustainability of the built environment. Many councils now offer incentives to promote aspects of sustainable building (eg subsidies for rainwater tanks, energy efficiency retrofit projects, reductions in development levies) and information and guidelines on aspects of sustainable building (eg ways to conserve water).

2.3 Value Case for sustainable building

A report titled 'The Value Case for Sustainability' was commissioned by the Ministry for the Environment. Completed in late 2005, this report used several case studies to outline the issues facing sustainable building in New Zealand; compare the performance (in terms of financial, environmental and social) of sustainable buildings with their conventional counterparts; and suggested guidelines and gave tips to those looking to build sustainably in the future. While largely targeted at the commercial and public sector, the value case provides a useful overview of the benefits of sustainable building and the New Zealand experience.

2.3.1 Summary of findings

Some of the key findings from the 'Value Case' report were:

- For owner occupiers (of commercial buildings), a 20-year whole-of-life cost view indicates the marginal cost increase of sustainable building is likely to be repaid between five or six times by operating cost savings alone.
- For tenants (of commercial buildings), the probable 20-year rental premium for sustainable buildings is likely to be repaid by a factor of approximately three from operating cost savings only.
- For owner occupiers, developers and investment funders, a residual land value analysis shows a sustainable office building may have a land value of 40% more than that of a conventional building. Its true worth is nearly 40% more than a conventional building.
- The case studies show that to achieve the above investment returns, the difference in the initial capital cost of sustainable buildings compared to

conventional good quality buildings varies from 15% less to 11.5% more, with sustainable features initially costing an average of 2–6% more.

Sustainable buildings are intrinsically more economic to run over their whole lifetime. They reduce waste and are much more efficient in their use of key resources such as land, energy, water and materials. They can also be healthier and more comfortable, and support greater productivity, with improved levels of natural light, cleaner air and a higher degree of personal control. They are also adaptable and durable enough to meet the requirements for flexibility and needs of future generations of building occupiers.

Significant rises in energy costs and, to a lesser extent, water costs continue to make sustainable buildings increasingly attractive. Furthermore, public sector clients have incentives known as Crown Loans¹ to offset any capital cost premiums associated with adopting sustainable building strategies. Part funding is also available from the Energy Efficiency and Conservation Authority (EECA) for design audits and modelling which test the cost/benefits of sustainable building as well as loans assistance with solar hot water systems.

2.3.2 Implementing sustainability

The 'Value Case' report stated that implementing sustainability within a building is no more complicated than the conventional building process, however, it does require more in-depth analysis, design and buy-in from all stakeholders. In many ways the resulting building is more considered, balanced and valued by users and the environment it 'borrows'.

There were several areas identified in the report which were key to the production of a successful sustainable building project:

- The design and construction teams should be familiar with, and committed to, sustainability and should work to develop a clearly stated brief at the start of the design process. Once the goals have been established, the main design features that respond to these goals can be identified, visualised and incorporated into the project model.
- The greatest gains in sustainable building are achieved through good integrated and cooperative design early in a projects development. This teamwork needs to continue from the initial briefing through to completion, as well as a commitment from all team members to all aspects of sustainable building principles and outcomes.
- Sustainability must be considered as early as possible in a building project and must continue to be considered at every step of the design and construction. While this may require more time and higher fees this should be viewed as a sound investment as these costs are far outweighed by the life cycle costs of the building.
- In terms of budgeting it is important to realise that sustainable building is an integrated brief requirement rather than an added extra. Because of the differences between one project and another, simply adding a premium to the budget for sustainability is not enough. It is also important to ensure quantity surveyors are providing realistic estimates for sustainable features.
- Measurement tools are especially useful, both when constructing the brief and for grading just how sustainable a building is compared to benchmarks.

¹ The Crown Loans scheme is administered by EECA and enables government agencies to fund energy efficiency measures through a loan which is repaid from energy savings over the payback period for the measure.

- Using thermal, daylight and energy modelling, and three-dimensional massing model tools to refine, test and benchmark sustainable design strategies is also important. Energy modelling in particular is useful in quantifying the relative cost benefits and sensitivities of differing sustainable strategies.
- The sustainability of a building needs to be recognised as an ongoing process: metering should be installed to ensure that initial energy and/or water use targets are being met, the outline specification and brief can be adapted for use by owners/occupiers as an building users guide and Post Occupancy Evaluation is a useful tool in discovering what works and what goes wrong.

3. REVIEW OF POLICIES, PLANS AND GENERAL PRACTICES

This section outlines the findings of the review of the major regulatory influencers for local government and looks at their implementation within Auckland City.

Development within New Zealand is subject to a wide range of legislation, policies and plans. This mosaic of regulation creates the context – supportive or otherwise, for sustainable building. In essence there are three layers of regulation – central, regional and local, some of which are administered by Auckland City Council as a local council, and others by other statutory authorities.

From a legislative perspective, the Resource Management Act, Building Act and Health Act are the primary pieces of legislation which impact on the built environment. With regard to regional regulation, the Auckland Regional Policy Statement and the Auckland Region Air, Land and Water Plan are the principal influencing factors. With regard to local regulation district plans, bylaws and the codes of subdivision and development are the principle influencing documents.

In addition to the matters spelt out in the pieces of legislation and regulation, a key influence on the development of sustainable buildings is the implementation of regulation by local councils – most notably the Building Code. As all building work of any significance is required to be code compliant, how councils interpret and administer the code is a critical issue.

3.1 Central government regulation

3.1.1 Building Act and Building Code

3.1.1.1 Current Building Code status

The New Zealand Building Code is the first schedule to the Building Regulations 1992. All building work must comply with the building code.

The Building Code does not contain prescriptive requirements. It states how a building is to perform (given in qualitative or quantitative terms), but does not prescribe detailed requirements for design and construction. Such details are found in the non-mandatory compliance documents, which the Department of Building and Housing produces to help people meet the requirements of the building code.

The Building Code consists of two preliminary clauses and 35 technical clauses. Each technical clause contains an objective, functional requirement, and performance criteria. The objectives correspond to the purposes of the Building Act.

The objectives of the Building Code correspond to the purposes of the 1991 Building Act - which has been replaced by the Building Act 2004. The Building Code is currently being reviewed to align it with the 2004 Act.

A number of new regulations have been made under the Building Act 2004. More are scheduled.

The Building Regulations 1992, and subsequent amendments, were made under the 1991 Building Act - but are now treated as if they are regulations made under the Building Act 2004. However, the majority of the 1992 Regulations were revoked as from 31 March 2005, by the Building (Forms) Regulations 2004.

3.1.1.2 Current Building Code requirements and sustainability measures

The Building Code only requires minimum standards to avoid 'bad building' rather than 'best practice' or 'building excellence' which sustainable building seeks to encourage. Sustainable building therefore goes beyond minimum standards and seeks to provide

- Radically reduced energy consumption
- Radically improved water conservation
- Less impact on the environment and local infrastructure
- Improved use of resources
- Improved internal environmental quality
- Use of environmentally friendly materials
- Enhanced quality, marketability and asset value.

Whilst all the compliance requirements of the Building Code are generally related either directly or indirectly to sustainability the specific compliance aspects which are most closely related include:

- Durability B2
- Surface water E1
- External moisture E2
- Internal moisture E3
- Hazardous building materials F1
- Hazardous substances and processes F2
- Personal hygiene G1
- Ventilation G4
- Airborne and Impact Sound G6
- Natural light G7
- Water supply G12
- Foul water G13
- Industrial Liquid Waste G14
- Solid Waste G15
- Energy efficiency H1

Clearly each of the above compliance aspects could also be identified with the attributes of a sustainable building identified above. The change in emphasis from Building Code minimum standards to best practice sustainable building could for instance be reflected by the difference between 'hazardous building materials' and 'environmentally friendly building materials'. Similar comparisons could be made for each aspect, for example the provisions of solid waste could be extended to include provisions for recycling and improved use of resources.

Building Code aspects such as surface water, foul water, water supply, hazardous building materials, hazardous substances and processes, personal hygiene, ventilation, natural light, airborne and impact sound and internal environment are primarily concerned with health and safety and amenity for building users. They do not consider other upstream and downstream environmental effects such as water

conservation, water discharge quantity and quality, air emissions and energy efficiency. Some of these aspects, particularly surface water and foul water infrastructure discharges and air emissions, are however controlled to some extent by the planning and resource consent process.

Some measures are also only applicable to certain building types e.g. natural light to 'habitable spaces for domestic living'.

Some aspects such as energy efficiency (Clause H 1) are of an ambiguous and outdated standard. For instance the energy efficiency standards for small buildings as described in the acceptable solution NZS4218:1996 are of a reasonable standard, however set no minimum requirements for the thermal performance of windows. This oversight was corrected in a revision of the same standard in 2004 however this has yet to be officially adopted as an acceptable solution. The associated NZS4244 whilst not part of the acceptable solution also identifies better and best practice standards for small buildings. NZS 4243:1996 for large buildings by contrast is a relatively poor and outdated standard and is largely irrelevant in the Auckland (Climate Zone 1) region.

3.1.1.3 Sustainable building technologies which may conflict with building code requirements or require additional documentation

There are a limited number of sustainable building technologies which are outside the current range of acceptable solutions of the Building Code. Alternative solutions can be developed by industry for these technologies and the methodologies described by the Department of Building and Housing can be applied. Alternatively Acceptable Solutions could be developed in the future to cover these technologies and to give industry more certainty in consent processing. Examples include composting toilets and atrium-assisted natural ventilation with attendant fire issues for multi level apartments.

Composting toilets are recognised in the Building Code Clause G1 personal hygiene and by AS/NZS 1547, although their use is qualified by attendant issues of health and nuisance which need to be addressed. Composting toilets are generally accepted by Auckland City Council in rural/island communities such as Great Barrier and Rakino Island, but there is less acceptance/experience of composting toilets in urban environments, although they have been allowed in some instances.

A New Zealand study by Salmon, Millar and Crochet, which looked at the use of composting toilets in urban apartments, concluded that local authorities in New Zealand will generally not approve composting toilets in sewered areas, and that, in some cases, local authority by-laws explicitly prohibit the use of on-site sewage treatment in sewered areas. The New Zealand Building Code Clause G13 also specifies that, where a connection to a sewer is available, wastewater disposal is to be by connection to the sewer (Clause G13.3.3).

Atrium-assisted natural ventilation is a commonly used sustainable technology overseas but less so in New Zealand. Its viability relies on overcoming the fire issues of an atrium which can reduce inter-floor fire compartmentation within the building. This can be overcome by the provision of effective smoke control although it becomes more complex as the number of floors open to the atrium increases. For example, in the Auckland University Population Health Complex Building where the 3 levels were connected by two connecting atria, a complex fire issue arose and was not consented, under the old regime, until the building was nearing completion. The completely natural smoke ventilation system required extensive peer review and the application of complex time/egress modelling software to prove that the building met the performance requirements of the Building Code. Given the new regime on the processing of consents including the Fire Service Design Review Unit (DRU) and the

limitation on any conditions of consent this fast-track project would have been severely derailed in terms of processing and approval time. This situation will probably discourage building owners from adopting this type of technology in the future.

Other sustainable technologies such as solar water heaters are covered under the Building Code Water Supplies Clause G12. They may require a specific producer statement covering both water supply and structural support aspects. The Solar Industries Association and its members supply specific documentation in this respect. Another minor aspect facing solar water heating arises around the extra attention currently being paid to Clause E2 of the Building Code. Some extra detailing may be required for any penetrations of the roof by water pipes to or from the solar unit.

3.1.1.4 Incentives and disincentives of the building consent process

As the Building Code only deals with minimum standards of building, there are no incentives in adopting any higher standards of sustainable building although it should, in principle, make achieving compliance easier.

Some of the more 'alternative' technologies as described above could make compliance more difficult and time consuming to acquire and so may act as a disincentive to owners and particularly developers. This situation could be reduced as the demand for these technologies increases and there is greater familiarity and recognition of them within the Building Code and by the council compliance officers.

3.1.1.5 Future Building Code requirements and sustainability measures

The Building Code is being reviewed to ensure that it reflects the new purposes and principles of the 2004 Act. These are wider than those in the Building Act 1991, particularly as buildings need to be designed, constructed, and able to be used in ways that promote sustainable development. This means that the code review will address energy and water efficiency, the use of renewable sources of energy, the efficient, safe and sustainable use of materials, and construction waste.

Sustainability measures in the revised Building Act (2004)

- Ensure harmful building designs, methods or products are prevented or minimised
- Ensure the building is durable for its intended use
- Consider the costs of a building – including its maintenance – over the whole of its life
- Use renewable energy sources in the building to facilitate efficient energy use and conservation
- Facilitate the efficient use of water in the building
- Reduce waste during the construction process

Changes to the Building Code are likely, with a review of the code scheduled for completion by November 2007. From the discussion document recently released by Department of Building and Housing, it is expected to include regulations to enforce the sustainability measures in the Act.

3.1.1.6 Conclusions

The current Building Code represents minimum standards and is primarily concerned with health and safety of users. Sustainable building represents a higher standard which considers all the environmental effects of the building; direct, upstream and downstream from the project.

In principle sustainable building should make the Building Consent process easier. However, in practice, since alternative technologies will require greater input and review as part of the Consent process, this situation may deter some building owners/developers particularly on fast-track projects, from adopting these technologies. In addition the weathertightness issue has led consenting authorities to become increasingly risk averse as regards alternative technologies and this, as for example occurred in the Heale – Courtney Residence, can make the process more difficult.

The Building Act has recently been replaced and the Building Code is being reviewed for completion in November 2007. The new Building Act and Code are likely to be used in ways to promote more sustainable development particularly in terms of renewable energy sources, efficient use of water and waste during the construction process.

3.1.2 Health Act

The Health Act has been initially reviewed to determine whether there exist any relevant provisions relating to health that would impact on the provision of sustainable features. Overall, no significant barriers were identified within the Health Act as few provisions were directly relevant to the development of sustainable features.

The following provisions of the Health Act that may affect the design of buildings are:

- Section 39 of the Health Act requires provision of water supply in accordance with Building Code. The Health Act requires adequate and convenient supply of wholesome water, and this is a constraint on the use of roof water in urban areas as a source of potable water. This is despite Australian research indicating that if the water passes through a hot water cylinder that urban roof water can be an acceptable source of potable water.
- Section 120c of the Health Act enables regulations to be developed under the Health Act for construction of houses; drainage, sanitation and ventilation; supply of water; protection from damp, excessive noise and heat loss; and dimensions of rooms. Such regulations could all be relevant to the provision of sustainable building features, should they be developed.

Interviews with staff of the Auckland Regional Public Health Service (ARPHS) both in the areas of the 'Healthy Homes Programme' and resource management, determined that the organisation is primarily responsive to public health issues, while also being involved in advocacy of health issues. Other Regional Public Health Services act in a similar fashion.

Nothing within the Health Act specifically provides a mandate to Regional Health Services to respond to potential health issues associated with sustainable buildings. For example, no mandate exists to ensure that drinking water standards are met for all households.

In the case of the Auckland Region, the ARPHS tries to ensure that appropriate treatment of water is being achieved. From a public health point of view, it is ARPHS view that it is most appropriate to ensure all water and wastewater is reticulated, as quality standards are better controlled if managed in a centralised way, rather than on a site-by-site basis. This report does not investigate the views of other Regional Public Health Services but anecdotally different Regional Public Health Services have varying views on rainwater or greywater reuse for non-potable purposes with some having less concern than evinced by the ARPHS.

In terms of general rainwater reuse and dual reticulation for non potable purposes, Auckland City Council staff advise that difficulties have been encountered with

Auckland public health authorities, despite the minimal risk associated with such activities. This is an issue which has been dealt with by other councils in the Auckland Region (Waitakere, North Shore City, and Rodney District) with satisfactory sustainable building outcomes. In the case of the recent Waitakere Hospital development undertaken by the Waitemata District Health Board, rainwater tanks are an integral part of the water supply system, dual reticulated to provide rainwater for toilet flushing. This measure would not have been undertaken if the Board were not completely confident of the safety of using roof collected rainwater for non-potable purposes.

The Healthy Homes Programmes works to improve existing state housing, insulating all homes, improving passive insulation and modifying homes to address overcrowding. Part of this role is advocating for improved legislation, such as the Residential Tenancies Act. However, this advocacy role relates primarily to those areas of need rather than being across the board covering all forms of development.

Design factors identified as being particularly relevant to public health include ventilation, noise, insulation and overcrowding:

- The circulation of airflow and where the intake of air for ventilation systems is a concern as the location of the intake can result in contaminated air.
- Noise has an effect on public health, although generally this is addressed through district plan requirements.
- Insulation and inappropriate room sizes for the number of people is a significant concern as this is associated with overcrowding and transmission of disease.

3.1.3 Resource Management Act

The purpose of the Resource Management Act is the sustainable management of natural and physical resources, to provide for the social and economic wellbeing of future generations (Section 5). Generally, the purpose of the Act has been interpreted to mean that District Plans should focus on avoiding, remedying or mitigating the adverse effects of activities on the environment. Consideration of sustainable building outcomes has not figured in District Plans, with the focus on activities and land use patterns.

Recently the Act has been amended to include reference in Section 7 (matters to take into account) to:

(ba) The efficiency of the end use of energy

(j) The benefits to be derived from the use and development of renewable energy.

The extent to which these amendments to Section 7 will mean that district plans will address green building issues is unclear. It is likely that they will be used to support urban form outcomes and the establishment of renewable energy sources like wind farms.

Because of the recent nature of these amendments, no councils in New Zealand have yet incorporated a response within their district plans. Therefore these specific matters have not been addressed, and as new plan changes are developed it is likely that these matters will be addressed in some way.

3.2 Regional policy statements and plans

Section 30 of the RMA lists the functions of regional councils. In terms of sustainable building, the key responsibilities related to discharges to land, air and water, particularly stormwater. Other relevant provisions relate to discharges to air from waste processes, such as recycling and sewage treatment.

Key RMA documents are identified as:

- Regional Policy Statement;
- Regional Plans – eg in Auckland the Air, Land and Water Plan and the Sediment Control Plan.

3.2.1 Regional Policy Statements

Regional Policy Statements are required to be prepared in all regions of New Zealand and provide the regional context for RMA plans, identifying strategic objectives and policies for sustainable management of natural and physical resources. They are policy documents and if regional rules are considered to be required to implement regional policy, then this are done through Regional Plans.

3.2.1.1 Auckland Regional Policy Statement

The Auckland Regional Policy Statement (ARPS) provides the regional context for RMA plans, identifying strategic objectives and policies for sustainable management of natural and physical resources. Of particular relevance is the promotion of transport and energy efficiency through urban growth management. Other resources addressed are heritage, water quality, water conservation and allocation, air quality, and waste.

Managing water quality is dealt with through objectives and policies relating to transport, industrial and trade, sewage reticulation and disposal, and solid waste disposal. Therefore where sustainable building reduces the effects of these activities on water quality, they are consistent with the ARPS. A key policy relates to land use intensification in urban areas, where adequate provision is made for the control of sediment and stormwater discharges. This is a major role of the ARC, and is further dealt with through the Proposed Regional Plan: Air, Land and Water.

In terms of water conservation and allocation, the ARPS primarily address this in terms of rural activities where water is not reticulated.

In terms of waste, the ARPS seek to minimise the quantity of waste being generated and disposed of within the Auckland Region. Policies seek to reduce solid waste from domestic, commercial and industrial activities by 10% by 1998. The waste management hierarchy is also recognised by the ARPS; reduction, reuse, recycling, recovery and disposal establishing a strategic directive for the region. However, implementation of waste minimisation and cleaner production are effectively left up to territorial authorities.

New provisions proposed to be incorporated into the ARPS² are particularly relevant as they address the integration of land use and transportation. This plan change illustrates the current move within the regulatory environment to address issues of sustainability, particularly energy, water and use of materials:

² Auckland Regional Policy Statement: Proposed Plan Change 6 “Giving Effect to the Regional Growth Concept and Integrating Landuse and Transport” notified 31 March 2005, Auckland Regional Council.

- *Policies 2.6.8 Urban Design (1) design of new urban areas and management and promotion in existing urban areas:*
 - *(n) urban design acknowledges the importance of energy, water and materials efficiency and conservation to the sustainable management of natural and physical resources*
- *Methods 2.6.9 Urban design:*
 - *(13) The ARC will advocate for and support initiatives to improve:*
 - *The liveability and sustainability of building outcomes*
 - *Energy, water and materials efficiency and conservation*

Overall, the ARPS promote the sustainable management of air, land and water through managing the adverse effects of activities. The ARPS advocates for the development of policies and methods to promote and encourage sustainability, but these are generally actions that lie outside its sphere of influence.

3.2.2 Regional Plans

The type and number of regional plans put in place by regional councils across New Zealand varies, depending on the extent to which the regional council feels that regional rules are required to implement the policies within its Regional Policy Statement. In the case of the Auckland Region there are a number of regional plans currently in place: the Regional Coastal Plan; the Proposed Regional Air, Land and Water Plan; the Regional Sediment Control Plan; and the Regional Farm and Dairy Discharges Plan. Of these, the Proposed Regional Air Land and Water Plan and the Regional Sediment Control Plan are most relevant to a sustainable residential built environment in Auckland.

3.2.3 Air, Land and Water

The Proposed Regional Plan: Air, Land and Water (ALW Plan) controls any discharges from activities into these natural resources. The *precautionary approach* is a core theme acknowledging that the full extent of effects on these resources is not always known. This concept is particularly relevant to sustainable buildings, which seek to reduce loads on the key resources of air, land and water. Key provisions in the ALW Plan that may affect sustainable buildings are identified as follows:

- Controls on air discharges from solid fuelled domestic fires and on-site waste disposal including sewage, but primarily large scale facilities.
- Controls for stormwater diversion and discharges encourages use of low impact design as a method for addressing increases in stormwater runoff from sites.
- Sewage (conveyance and disposal) and recognises the potential public health issue of sewage solids, although it is also recognised that there are potential reuse benefits.
- Discharge of other contaminants from trade and industrial processes, such as concrete and wash water is encouraged to be recycled through sustainable site management practices. Activities may be permitted if wastewater produced on-site is collected either for recycling or disposal to a system or facility.
- Conservation of water is addressed through water allocation provisions, encouraging conservation and efficient use of water and use of alternative sources such as wastewater re-use and rainfall capture.

- Non-regulatory methods for energy are emphasised, with partnerships with other organisations including Energy Efficiency Conservation Authority (EECA) noted, and promoting and advocating for alternative methods of sustainable domestic heating, such as active solar heating, and insulation and passive solar heating.

The ALW Plan promotes low impact approaches to stormwater management through regulatory processes, and encourages conservation of water. However, the ALW Plan relies on non-regulatory methods of advocacy and policy development to encourage other aspects of sustainable development, such as energy efficiency.

3.2.3 Auckland Regional Plan: Sediment Control

The Sediment Control Plan manages significant areas of site works, generally greater than 0.25 hectares. The primary technique of managing effects from earthworks is to require the implementation of appropriate sediment and erosion controls techniques to ensure adverse effects are avoided, remedied or mitigated. In this way the Sediment Control Plan does not seek to minimise the areas of earthworks. Small site areas of earthworks are effectively dealt with at the district plan level.

3.3 Territorial local council policies and plans

Like regional councils, territorial local councils have a number of mandatory policies and plans which they have to produce. In the case of the RMA, the district plan is the local council's major statutory plan. In Auckland City's case, because it covers a disparate range of local areas, several district plans, covering different areas, have been produced.

In addition to RMA plans, local councils can produce bylaws which influence the built environment and activities undertaken within their territorial area. Auckland City has produced relevant bylaws on stormwater management, refuse, water supply and wastewater.

Local councils are also required to produce a number of policies as part of their ten year Long Term Council Community Plan (LTCCP) process. The most significant of these policies, in terms of the opportunities to create barriers or incentives for a sustainable residential built environment, are the Development Contributions Policy; the Water and Sanitary Services Assessment and the Rates Remission Policy.

3.3.1 District plans

District plans are local councils' major statutory plan, prepared under the RMA. They address mainly issues relating to land use and subdivisions as well as activities which the council considers are likely to have an adverse impact on the environment. They 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 which are unique to a local area, aspects relating to residential buildings and their location within the urban residential built environment are often similar.

3.3.1.1 Role 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). The quality and sustainability of the “internal environment” involved in different activities and buildings is generally something that district plans have not directly addressed.

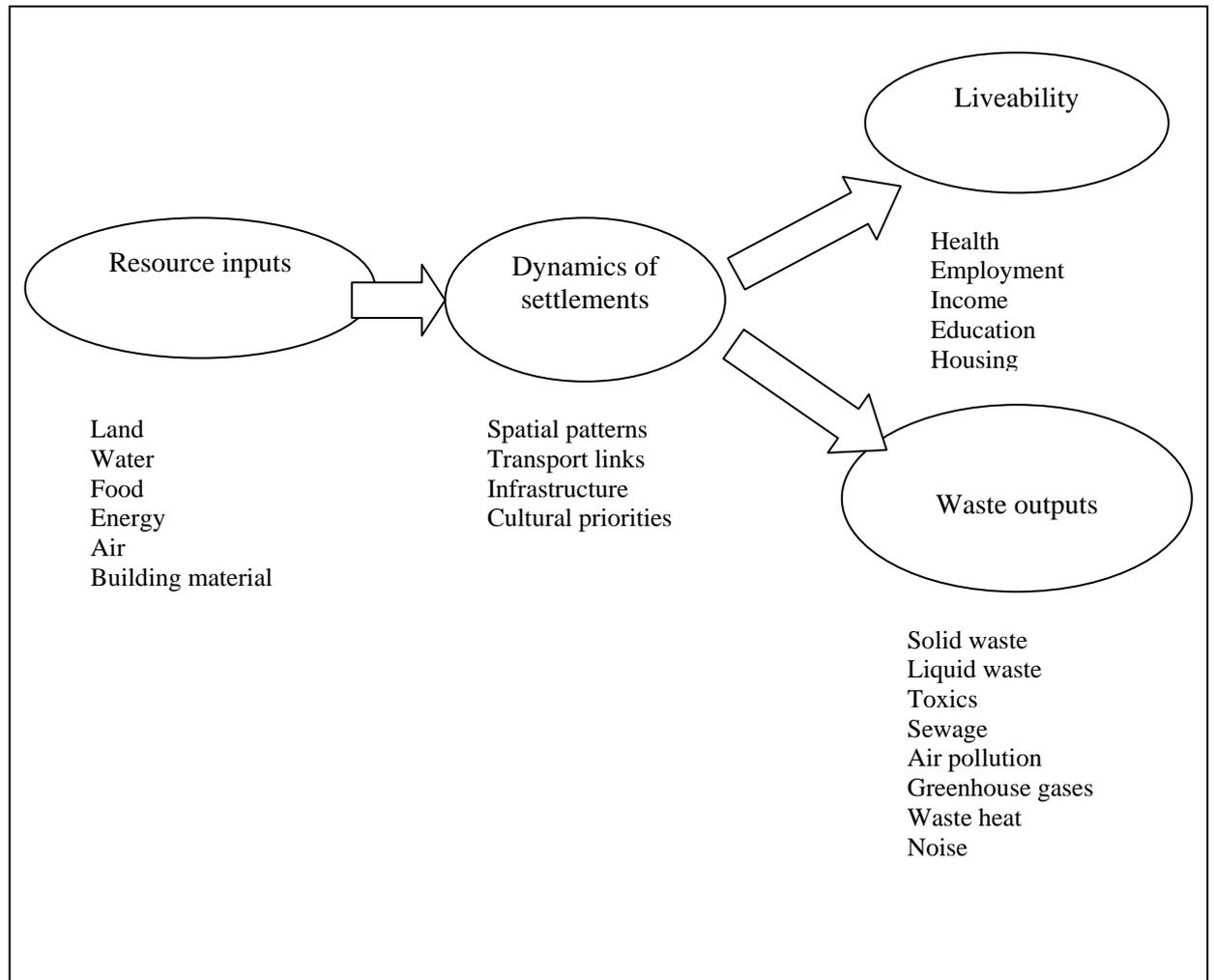
When considering the extent to which district plans may impose a barrier to the uptake of sustainable building technologies, it is important to place district plan rules in this context. Sometimes there will be conflicts between particular rules and sustainability outcomes, at a site-by-site level. More 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. Great gains to sustainability outcomes will come about from rearranging the way that cities are laid out.

P. Newman (former New South Wales Sustainability Commissioner) and J. Kenworthy³ suggest the following model as a way to understand sustainability and cities (refer Figure 1 over). In short, sustainability for cities means improving the liveability and economic prosperity of urban areas, while reducing resource inputs and reducing waste outputs. Crucial to these outcomes is the dynamics of cities – in particular their spatial, infrastructure and transport systems. These systems greatly determine per capita resource use⁴. They have presented the following framework that conceptualises these relationships:

³ Newman P. (2004) Keynote Address Sydney Futures Forum

⁴ See for example: Professor Peter Newman keynote address - Sydney Futures Forum Wednesday, 19 May 2004

Figure 1: Sustainability and cities relationships framework



Using this approach to review the sustainability of Australian cities, Newman and Kenworthy noted the following key points:

- The larger the city, the more sustainable they are in terms of per capita use of resources (land, energy, water) and production of wastes (solid, liquid, gaseous), and in terms of liveability indicators (income, education, housing, accessibility);
- Larger cities are, however, more likely to reach capacity limits in terms of air sheds, water sheds etc. For large cities to continue to grow, they must be even more innovative if they are to be sustainable;
- The extent and availability of passenger transport was an important factor in energy consumption and the extent of pollutants that affect air and water quality;
- In geographic cross-sections of Australian cities, there is an increase in metabolic flows and declines in liveability indicators from core to inner to

middle to outer fringe suburbs. This pattern is related to different urban development periods and densities and most recently related to reurbanization of more central areas, providing a better mix of residents and workers in these areas.

Urban Form in Auckland City

Within the context outlined above, Auckland City is heading in the right direction in terms of sustainability and city planning. The city is encouraging more intensive development in the CBD and in and around selected suburban centres, with an emphasis on rail nodes. It is also promoting mixed uses. At the same time it is seeking to increase the level of protection afforded to key resources that are of value to the community, such as heritage areas and ecological areas. These tasks could be said to be the prime focus of district plans.

Where conflicts do arise with site-based development proposals that may be promoted as being more sustainable and wider zoning strategies, then it is important to keep in mind that a balance needs to be struck between encouraging more sustainable city forms, as well as more sustainable buildings.

The task currently facing Auckland City (as well as other planning authorities) is how to overlay on the traditional spatial focus of plans a new layer related to the quality and sustainability of individual buildings and activities. Getting the two layers to work together is a challenge.

3.3.1.2 Overview of Auckland City district plans

Auckland City Council has three operative district plans, which apply to three distinct areas of the city:

- Central Area Plan
- Isthmus Plan
- Gulf Islands Plan.

Each of these district plans are in a different format, reflecting their different character and key resource management issues. Development within Auckland City must comply with the planning provisions of the relevant district plan.

- Central Area Plan - divided into different precincts or quarters and various overlay-based rules. The Plan was prepared in the mid 1990s and takes a fairly hands-off approach to building design. Key outcomes are generally related to the protection of important public resources like sunlight access to public spaces, and the quality of pedestrian-orientated streets. Recent changes to the Central Area Plan have introduced design criteria more focused on building design, including the incorporation of sustainability features.
- Isthmus Plan - more conventional, divided into traditional zones. Key zones applicable to the consideration of sustainable building features are Residential and Business zones, with some relevant provisions relating to city-wide rules such as Transportation, Network Utility Services, Subdivision, and Earthworks. The most explicit sections relating to the sustainability of developments are those responding to recent growth management initiatives, especially the Residential 8 zone (which provides for intensification around selected town centres).
- Gulf Islands Plan - reflects the varying environment of the different islands within the gulf, from Great Barrier and Waiheke, to other smaller less inhabited islands. This Plan uses policy areas and land units to determine

specific planning provisions relevant to the very different areas. A review of the Gulf Islands Plan is currently underway.

Overall, it could be said that at the level of their policies and rules, the plans generally neither explicitly help nor hinder the development of sustainable buildings. In most cases sustainability features can be incorporated into buildings as a matter of course, provided that normal development standards are met. Where there is explicit recognition of sustainability outcomes then these are in relation to residential environments and traditional concerns about daylight and sunlight access.

Within this overall approach, the issues for site-based sustainable development proposals are:

- When infringements of development standards are proposed so as to incorporate sustainability features, the extent to which the positive environmental effects of these features may be used as an argument to outweigh negative adverse effects on other activities is unclear.
- The extent to which the plans positively encourage the incorporation of sustainability features into developments (that is, make them a condition of design), although there may be jurisdictional arguments that this type of approach is outside of the intention of the RMA to manage adverse effects.

A lack of explicit recognition of sustainable building features in policies and rules means that, in the first circumstance, the incorporation of sustainability features can be an uncertain task, should resource consent processes be required. This uncertainty is likely to mean that desirable but non-essential sustainability features may be dropped from the development due to the transaction costs involved in resource consents. In the second circumstance, there can be a lost opportunity to incorporate sustainable outcomes where plans promote redevelopment by providing additional development rights, over and above what currently exist.

To assist with understanding the role of Auckland City's District Plans in addressing these issues, the following section breaks down the plans' approaches into those provisions that positively promote sustainability outcomes and those that may be a barrier, depending upon the particular design of the development.

3.3.1.3 Auckland City Council District Plans' recognition of sustainability features

There are a number of requirements that seek to incorporate sustainability features, most prominently in relation to residential development in Residential 8 (Isthmus) and the Central Area. Important provisions that encourage sustainable features include:

- The Isthmus Plan contains a Residential Design Guide which currently only applies to intensive development in the Residential 8 zone, but under proposed Plan Change 153 will also apply to multi-unit development of over 4 units in the Residential 6 and 7 zones⁵. Eleven elements of design are identified as assessment criteria, to assess new buildings as a controlled activity in Residential 8 and a discretionary activity in Residential 6 and 7. The Guide incorporates a number of sustainable building measures to encourage good design, for example, energy efficiency. Although the Guide does not address all possible features, it is the most comprehensive example of the Council's policy on sustainability to date.

⁵ Proposed Plan Change 153: Incorporation of Urban Design provisions for development of 4 or more residential units in the Residential 6 and 7 zones. Notified 26 September 2004, currently under appeal by Housing New Zealand.

- Stormwater-related provisions within the Isthmus Plan provide for on-site mitigation, including the promotion of alternative solutions, particularly for residential development. This recognises that intensification of development is likely to increase impermeable surfaces, related run-off and the effects on infrastructure and waterways. The Council's On-site Stormwater Management Guide (OSM) provides a range of alternative solutions, which may be deemed to comply with the district plan rule where resource consent is required for exceeding impermeable area limits.
- Proposed Plan Changes 1 and 2 to the Central Area Plan expand provisions for urban design and residential amenity and introduce general criteria relating to sustainable design. The Plan Changes comprise five key components, of which four are relevant to sustainable building features:
 - High quality and durable building design
 - Adaptable building form encouraging re-use and conversion of building spaces over time
 - Sustainable building and site design which takes a long term view of energy and stormwater efficiency
 - Adequate internal and external amenity, includes sunlight access

Generally development is required to take a variety of urban design principles into consideration, which can overlap with some sustainability features such as orientation, solar gain, ventilation and noise. Separation (outlook areas) between residential activities and adjacent development is proposed. However there are tensions between the two sets of outcomes (urban design versus sustainability).

Key provisions are:

- The erection of any new building or external alteration or addition to existing buildings within the Victoria Quarter and throughout most of the Central Area is a restricted discretionary activity. The consent process could be considered an opportunity to further encourage sustainable features. However, generally planning provisions are more focused on urban design features with a strong directive for energy efficiency, rather than wider sustainability features.
- Provision is made for the conversion of floor space within existing buildings to accommodation uses as a restricted controlled activity. Consideration of sustainability criteria relating to low maintenance materials, solar access and natural ventilation, and incorporation of mechanical and electrical systems that optimise energy efficiency is required.

These two plan changes are early in the statutory process, with submissions not yet having been heard, and, as such, they are therefore subject to change and amendment. However, they illustrate how the Council is seeking to address sustainability issues alongside urban design issues in the Central Area.

- The amount of car parking is controlled in the Central Area and Residential 8 Zone of the Isthmus Plan (for the purposes of Traffic Demand Management), seeking maximum car parking rather than the minimums traditionally used.
- Generally planning provisions, particularly for intensified residential development, require provision of adequate space for waste disposal including recyclables in both the Central Area and Isthmus Plans. This often

results in a centralised area for storing waste receptacles for individual residents. These storage areas are generally required to be in a location that is visible and easily accessible. This has led to conflicts between the need to "hide" recycling and rubbish bin holding areas and the need to make them visible and accessible.

- The Gulf Islands Plan provides greater opportunity for sustainability features, largely because the environment is less urban and much of the development does not have reticulated stormwater or wastewater, and in some instances power. This enables a greater acceptance and recognition of the need to provide alternative solutions for land use activities, particularly within the outer islands.

While all of these provisions are positive, outside of the rules relating to car parking in the Central Area and Residential 8 Zone, the guidelines and assessment criteria related to sustainability features outlined are matters of discretion. They are weighed up in each individual case, and their uptake is very dependent upon the intentions of the building developer as to whether they will be pursued

3.3.1.4 Auckland City District Plans' barriers to sustainable buildings

Development controls generally establish whether a development complies or requires resource consent. Generally these rules relate to height, building coverage, impermeable coverage, car parking, height in relation to boundary, and yards. These standards are not tied to any particular design feature or approach.

Development controls in residential zones vary depending on character of site, such as the Residential 1 and 2 zones in the Isthmus Plan which have significant heritage character, compared to the more permissive intensive Residential 6 and 7 zones. Development controls in business zones tend to focus on interface opportunities and are much more liberal in terms of building bulk and location.

There exists a potential for all of these development controls to conflict with the provision of sustainable building features. For example, where a rain tank contravenes the building coverage requirements, it may require consent as a discretionary activity. The uncertainty of notification, delays in processing, and costs of obtaining resource consent can be significant, and as such may act as a barrier to installing a rain tank.

Although the Residential Design Guide and Plan Changes 1 and 2 in the Central Area have started to provide an impetus for assessing the sustainability of buildings, the criteria are quite general and do not refer to any technical standards or solutions that would assist developers with implementation.

Some of the more obvious tensions or conflicts of development controls are as follows:

Energy / Solar Access:

- Passive solar orientation is usually constrained by lot layout, small lot sizes and rules providing for daylight / sunlight access to adjacent properties. Yard / height in relation to boundary rules tend to "push" buildings into the middle of the lots. Infringements to provide for better solar gain to buildings are unlikely to be granted if neighbours don't agree. Policies and assessment criteria focus on effects on neighbouring properties, rather than the benefit of improved solar access.
- Vegetation blocking sunlight access. Generally there is a push to keep vegetation, and to have more trees along streets and around buildings (especially buildings of low aesthetic quality). When seeking consents to

remove a tree that has a shading effect, there is limited recognition of solar access issues, or alternatively, the role of vegetation moderating cooler southerly winds.

- Slab-on-ground (the easiest and most common way to create thermal mass for residential buildings). The earthworks associated with this type of approach may, on steeper sites and where retaining walls are required, require resource consent, with the emphasis of analysis on the adverse affects of the earthworks, not the benefits of the slab-on-ground.
- In the areas subject to intensification (such as the Residential 8 zones), the urban design guideline places an emphasis on the promotion of an active interface between buildings and the street. This may mean that active rooms like living rooms get orientated so that they overlook the street, rather than for solar orientation. It may also mean it is hard to cluster the kitchen with bathroom and laundry facilities
- Maximum height provisions to some extent may encourage the construction of buildings with flat roofs to avoid infringement, and can impact on the ability to install solar panels.
- Energy production (eg wind turbines, small micro generation plants) is not generally recognised as a separate activity. Rather energy production is dealt with through the network utility provisions. Activities not otherwise provided for in the Network Utility provisions in either the Central Area Plan or the Isthmus Plan are identified as Discretionary Activities. Private, small scale energy production units do not clearly fall under these general utility provisions, and so there is a question mark about the status of such activities.

Carparking and access requirements

- In most instances the district plans set minimum standards for carparking, rather than maximums. Often the car parking provisions are interpreted with little or no flexibility, requiring provision of parking on-site where there is ample on the street or the development is located close to activity centres and public transport routes where alternatives are available.
- Car parking, access and manoeuvring areas can contribute significantly to the extent of impermeable surfaces on a site, and in many instances fitting these areas on to a site impacts on building form and site layout. This is particularly relevant for small sites, or those developed for intensive uses, although developments in the Residential 8 Zone do have to comply with a maximum number of carparks.
- The extent of impermeable surfaces associated with car parking and access requirements has a significant impact on stormwater runoff. However it is possible to build in mitigation features which deal with stormwater impacts from impermeable surfaces. Surface material can be an issue, where an applicant may desire to use gravel to provide greater permeability but must instead use concrete to ensure all weather use, and avoid effects on adjacent footpaths and roads.
- In terms of size of carparking spaces, minimum standards tend to provide for larger vehicles. There is a growing trend overseas to provide two standards, one of which is for smaller (generally more fuel efficient) vehicles with a proportion of each type provided as part of a development.

Two big issues for apartment developments are natural ventilation and resource use.

Natural ventilation

- To achieve required internal noise conditions, windows may be required to be closed, and forced ventilation of units provided. Without air conditioning, occupiers may face a choice between a quiet, but hot room in summer, and a cool, but noisy room. Apartment rules do not require cross ventilation of units, that is, single-sided apartments are acceptable. For example for the HNZ Talbot Park project, mechanical ventilation has been provided in the bedroom and lounge areas to address the noise provisions in the Residential 8 zone although this has, to some extent, been overcome for some buildings by adopting an 'atrium' configuration.
- There is also increasing concern at the regional-level about air pollution along busy road corridors (and where more dense development may be permitted) and the need for air conditioning to be installed in order to remove pollutants. This obviously impacts upon energy efficiency and the use of natural ventilation.
- In order to provide reasonable levels of natural light and ventilation in apartments developers typically try to maximise the glazing area on external walls. It is not uncommon for some apartments in a building to have only one external wall which may be essentially fully glazed. This then causes issues with the energy efficiency requirements of the Building Code. Any dwelling with over 30% window to wall ratio (WWR) would not comply with the requirements of Clause H1 of the Building Code using the simple 'tick the boxes' Schedule Method (for Commercial buildings the WWR limit is 50%). In the 2004 version of NZS4218 any housing development with a WWR of greater than 50% must prove compliance using computer simulation. In practice however Clause H1 is rarely enforced and is, in general, poorly understood.

Resource and material use

- Mixed uses in suburban business areas. Where the zoning allows, there is a trend for commercial and business activities to be replaced by residential development. Often this is beneficial in bringing workplaces and residences closer together, but if all local workplaces are removed (which is possible in some zones), this will be an adverse outcome in terms of sustainability. The adaptability of the new building stock can be reduced through not requiring a building design that encourages multiple uses of ground floor areas (eg minimum stud heights, access direct to street).
- Efficient use of materials and resources increases as building height increase and the intensity of development grows. Many of the sustainability constraints that exist for stand alone development (inadequate thermal mass, extensive ground coverage, stormwater run off, damp interior conditions), can be overcome through well located and designed apartment-type development. The Council is moving to promote more intensive development, which is positive in this regard, although opportunities are restricted.
- Waste minimisation and recycling during the operation of development is facilitated through design which enables adequately sized and easily accessible locations for recyclables storage. In most business and commercial zones, the focus on the outdoor waste storage areas is on screening these from neighbours which can conflict with the need to make these visible and accessible.

3.3.1.5 Resource Consents

In terms of resource consent processing, the district plans are not identified as being a significant barrier to implementing sustainable features. A review of the decision reports for the case studies in section 4 of this report, illustrate that the sustainable features of these developments were barely mentioned in the assessment. This is largely because the assessment of sustainability is not mandatory.

Although Plan Changes 1 and 2 to the Central Area Plan have incorporated assessment criteria relating to sustainable buildings, the implementation of such measures are at the developer's discretion. Essentially the provisions within the district plans which identify sustainable features result in the voluntary implementation of sustainable features in buildings and do not particularly provide any incentives to encourage development.

In interviews with Council officers, it was indicated that issues related to sustainable features are generally raised outside the resource consent process, through the building consent or engineering approval processes which deal with the Building Code. Where alternative solutions are provided by a proposal, these are generally acceptable in terms of planning so long as they comply with the Building Code – and this assessment is undertaken by the development engineers rather than the planners.

The Resource Management Act does enable positive effects to be taken into consideration in an assessment of environmental effects, which may assist in determining the overall effects of applications for developments that incorporate sustainable features, but involve minor infringements of rules. For example, it may be appropriate to consider the positive, mitigating effects of the sustainable features but these need to be linked back to the adverse effects created by the infringement of a rule or performance standard. Discussions with Council officers indicate that giving particular weight to the positive effects of sustainable features is generally not included in an assessment unless this is presented as a mitigating factor by the applicant.

An issue identified by Council officers is the need to assess resource consent proposals which involve sustainable solutions in conjunction with the building and development engineers. This is because the good intentions and determination to incorporate sustainable features at the resource consent stage can quickly unravel at the building consent stage because of costs and delays in providing adequate justification for alternative solutions. It was recognised that building officers are reluctant to take risks with alternative solutions, particularly since their experiences associated with leaky buildings, and require a high level of documented justification.

3.3.1.6 Subdivision in Auckland City

Subdivision in the Isthmus Plan is addressed primarily via compliance with the Code of Urban Subdivision and Development. District Plan provisions for subdivision largely relate to hazard management (i.e. flooding), and requirements for adequate disposal of stormwater and sewage. These requirements are not considered a particular disincentive to enabling the incorporation of sustainability features.

The Code of Urban Subdivision and Development is discussed further in this report, however in summary there are particular issues around road design and layout and lot layout that have a major influence on sustainability outcomes of subsequent development. It is noted that other subdivision codes are available, such as the SNZ 44:2001 Subdivision for People and the Environment. Equally, regional policy is placing a greater emphasis on sound subdivision design to protect key ecological resources and to promote on-site stormwater features (low impact design).

3.3.2 Relevant Auckland City Council bylaws

In addition to district plans, the Auckland City Council has a number of bylaws prepared under the Local Government Act to assist in the management and regulation of activities. Relevant bylaws, which may affect sustainability measures, are identified as follows:

- Part 18: Stormwater Management
- Part 22: Refuse
- Part 26: Water Supply
- Part 29: Waiheke Wastewater

Overall, the review of bylaws has not determined any particular barriers or incentives to incorporate sustainability measures. The following is a summary of how the relevant bylaws apply to sustainability measures.

3.3.2.1 Stormwater Bylaw

The purpose of the stormwater bylaw is to regulate natural runoff to minimise the adverse effects of stormwater on people, property and the environment. As such it responds primarily to issues of flooding and keeping flow paths clear. There is no specific response to the use of alternative stormwater management measures, or indication that these would not be appropriate. Essentially, the stormwater bylaw enables the provision of retention tanks or other constructions associated with the management of stormwater where required to the approval of Council, and subject to building consent, as a way of addressing increased flows.

3.3.2.2 Refuse Bylaw

The refuse bylaw seeks to ensure an effective and efficient collection of household and trade refuse by setting out administration and collection procedures. The bylaw therefore addresses disposal of waste, requiring disposal in approved receptacles – e.g. up to three receptacles are provided for recycling. The aim of the bylaw is to protect the general public from refuse creating a nuisance or annoyance or becoming a danger to health and also provides for the protection of refuse collectors and the public by prohibiting hazardous materials being placed out for collection. The bylaw does not discourage other waste management techniques such as composting kitchen waste. Although the Council provides garden receptacles it does not provide a composting service. The bylaw is currently being reviewed and a draft (2006) bylaw has been publicly notified for submissions. One of the changes relates to the responsibility of owners of residential buildings, and providing for the sharing of receptacles, which primarily relates to reducing the cluttering effects of increasing numbers of receptacles.

3.3.2.3 Water Supply Bylaw

The water supply bylaw seeks to monitor the operations of the water supply system and develop preventive maintenance procedures to ensure the system is adequately protected from damage and contamination. In addition, the bylaw does also seek to provide for water conservation measures such as the following:

- Requires all new toilets to be dual flush.
- Dual supply of water can be interconnected with approval
- Automatic flushing urinals installed with approved water conservation devices
- Where water used for cooling purposes shall install water conservation equipment, reducing flow from public supply.

Nothing within the water bylaw itself is identified as a barrier to implementing these sustainability measures. However, as discussed further in the report, there are issues with the way these are dealt with by Metrowater, specifically in relation to rainwater and greywater re-use for non-potable purposes.

3.3.2.4 Waiheke Wastewater Bylaw

The Waiheke Wastewater Bylaw seeks to ensure that septic tanks and foul water disposal systems in use on Waiheke Island are installed and maintained in a manner to prevent the failure of the system to operate effectively. This is the only wastewater bylaw for the Auckland City, presumably because generally all development is reticulated.

3.3.3 Auckland City development contributions policy

Auckland City Council has prepared a Development Contributions Policy in accordance with the provisions of the Local Government Act 2002, which enables territorial authorities to take development contributions from developers to help fund the cost of growth (infrastructure). The operative policy is currently under review, and a draft policy has been prepared as part of the Draft Long Term Plan 2006-2016. Essentially the draft policy is the same as the operative policy, but some charges have increased and provisions have been incorporated in relation to transport.

The policy is based on the concept that the causer pays. It would be reasonable therefore to assume that there should be opportunities to reduce development contributions if suitable alternative solutions are provided to reduce the effects of development on infrastructure.

Of particular relevance to sustainable building is the part of the policy relating to development contributions for stormwater. These are charged for both residential and non-residential development in the Isthmus and Central Areas, on the basis of a Household Unit Equivalent where non-residential activities are undertaken, based on the amount of impervious area which is added to the site. Development contributions are not required in the Gulf Islands Area.

Under the current policy, stormwater contributions require charges of \$1340 per Household Unit Equivalent, and effectively apply to any developments that result in a household unit (therefore not minor alterations or additions). It is proposed to increase these charges potentially to as much as \$3720, reflecting the increased costs of upgrading the stormwater network. The final charge will depend on decisions on the draft Long Term Plan.

To reflect the new stormwater charges, and the wider aims of the drainage strategic review, a partial remission of the stormwater charges may be proposed for sites that incorporate appropriate on-site stormwater management⁶. It is noted that Auckland City Council recently sent out a press release indicating that a \$1000 reduction in development contributions would occur where new development included a rainwater tank, which is understood to be part of this policy. However, this is not clear in the policy nor is there any detail on what 'appropriate' on-site stormwater management means. It is likely that this remission policy would be tightly controlled, as generally the works to be provided by the contribution are still likely to be needed, given the uptake of on-site alternatives is only likely to be partial across a catchment.

The policy also indicates that developments with exceptional features may be reassessed at the discretion of an approved officer, which could potentially consider developments with sustainable features. However, there is no detail provided on this

⁶ Draft Development Contributions Policy "Auckland City's Draft Long Term Plan 2006-2016) page 150

process and the costs involved. It is most likely that this clause will only apply where developments provide significant infrastructure within the site, but it provides an opportunity to seek consideration of sustainable features within future drafts of the policy.

3.4 Interpretation and administration of the Building Code

3.4.1 Auckland City Council compliance with minimum Building Code requirements

One aspect which has been reviewed in this study is whether the minimum standards of the Building Code which affect sustainability are being complied with in Auckland City.

Industry's and the Council's understanding of the shortcomings with regard to compliance with external moisture Clause E2 is in sharp focus due to acute issues in terms of durability, asset value and health. However, compliance with other less prominent, low risk issues within the Building Code such as energy efficiency and natural light which are highly significant to sustainable building could do with tightening up. Anecdotally, proof of compliance with the energy efficiency Clause H1 is not routinely demonstrated by industry or required by the Council. Similarly the requirements for natural light Clause G5, particularly for multi-unit residential apartments are not being routinely demonstrated by industry or required by the Council although this may change with the current Council stance on the quality of inner city apartments.

It is interesting to note that this anecdotal feeling within the industry is in stark contrast to the opinion of the Auckland City Council Principal Building Officer interviewed for this study, who felt that Clause H1 was "appropriately enforced at consent time". This statement could be interpreted to mean that either; enforcement of Clause H1 reflects its priority to the Council, which according to the anecdotal evidence is quite low; or that Clause H1 is being adequately enforced and the anecdotal evidence is unreliable. It is true however that Clauses relating to building performance such as G7 and H1 are 'soft' clauses compared to B1 or E2 which are seen as by the Council as high risk, particularly in the current building climate.

3.5 Auckland City Council codes of subdivision and development standards

Three Auckland City Council codes of development standards have a direct influence on the sustainability of buildings within the city – the Code of Urban Subdivision and Development, the Metrowater Development and Connection Standards for Water, Wastewater and Stormwater and the On-site Stormwater Management Manual.

3.5.1 Auckland City Code of Urban Subdivision and Development and Metrowater Development and Connection Standards for Water, Wastewater and Stormwater

In general, these documents provide for, and steer, the applicant towards the use of conventional infrastructure. More sustainable options are not specifically provided for within the standards, requiring additional design and approval processes. This compares with, for example, the Waitakere City Council Code of Practice for Subdivision and Development which has a comprehensive section on the range of more sustainable water options, and directs applicants to consider the appropriateness of these for their development.

In the case of specific sustainable water measures such as rainwater use for non-potable purposes and greywater re-use, the Metrowater document clearly does not anticipate that such measures are necessary or desirable. Extra levels of assurance, design detail and checking are identified as requirements for the use of more sustainable technologies and this will be a barrier to all but the most committed of applicants.

3.5.2 Auckland City On-site Stormwater Manual

This manual provides a suite of on-site stormwater management (OSM) options from which developers can select the one best suited to their development. The manual applies to all development, with a focus on intensive residential development that exceeds impervious area limits (i.e. 60% of site area in Residential 1-7 zones). It is only under the 'Residential Design Guide' for Residential 8 where OSM devices are required to be provided. The manual is a guideline with a range of ways to minimise the effect of this high imperviousness and is the best of the Auckland City Council infrastructure documents assessed, providing for a wide range of innovative and sustainable solutions. This document could be viewed as a model for an approach which could be undertaken for water and wastewater services also, and the applicability of the document could also be applied to development more widely.

The manual is applied through both the resource and building consent processes. The OSM devices are generally permitted under the district plans Greater reference to the manual and to the requirement for OSM devices within the district plans could improve the sustainability of buildings.

3.6 Other Auckland City Council practices and documents

3.6.1 Water and Sanitary Services Assessment

The Auckland City Council Water and Sanitary Services Assessment is required to be produced as part of the Council's Long Term Council Community Plan (LTCCP). This assessment outlines the policy approach taken by the Council to the management of water, wastewater and stormwater.

As a generalisation, these policies could be summarised as being largely supportive of a conventional rather than sustainable three waters network.

For example, urban stormwater management is focused on quantity and removal of combined sewer overflows, and in particular the minimisation of flooding. While these are all important issues, the methods largely used by the Council focus very much on increasing the size, capacity and extent of piped networks rather than on reductions of the causes of such issues and promoting these issues within the community.

Similarly urban water supply management is focused on ensuring continuity of supply and adherence with water quality standards, with only a minor focus on demand reduction and development of sustainable on site water sources such as rainwater harvesting. The assumption here appears to be largely that as the water is supplied by Watercare via their systems, and that the Waikato Pipeline will provide sufficient capacity to 2028, water conservation is not a priority for water management.

Wastewater services within the urban area are largely focussed on the management of the pipe network and reducing wastewater overflows through infrastructure upgrading. The benefits of water conservation on reducing the volumes of wastewater do not appear to be considered as part of this framework.

3.6.2 Metrowater Statement of Corporate Intent

As a Council Controlled Organisation, the Statement of Corporate Intent for Metrowater is a key document which determines the approach that Metrowater takes towards sustainable water management as it directs how the Board manages the company. This document includes a commitment to sustainability from Metrowater and identifies a range of measures to achieve its aim of:

“sustainable profitability by balancing the needs of today's customers with the likely requirements of future generations”.

This is an unusual definition of sustainability, which places commercial profitability at the heart of the sustainability definition.

Two key strategic themes identified in the Statement of Corporate Intent include Urban Sustainability and Customer Satisfaction and these both have links to a sustainable three waters provision.

In terms of key initiatives identified, the most directly linked to sustainable building are:

- Provide a conservation service to our customers to assist them with measures that can lead to reduced costs.
- Promote water conservation and highlight the user-pays philosophy, to ensure all customers are aware of the savings that can be gained from conservation.

Both of these initiatives are identified under the Customer Service banner, and there are no initiatives identified in relation to water efficiency under the urban sustainability programme.

With regard to Key Performance Indicators for Metrowater, the following indicator has relevance for sustainable building:

“Percentage annual domestic water: Achieve volume growth less than the percentage population growth of Auckland City”

In summary, it is considered that the Statement of Corporate Intent does not provide a framework, whereby Metrowater would see that it has a key role to promote sustainable water technologies or practices within buildings. In order to promote a sustainable building framework for water, significant changes to the Statement of Corporate Intent, its key initiatives and key performance indicators is required.

3.6.3 Metrowater charges for water and wastewater

Essentially Metrowater’s charges act as both an incentive and a barrier to sustainable building. On the incentive side, the very fact that water and wastewater is charged for creates a very strong incentive for water savings as a method to reduce costs for the consumer. In addition, because wastewater charges are based on water used, measures such as rainwater tanks have an additional financial benefit for users.

However the charging rates used by Metrowater do not create a positive differential charging regime for low water users. This compares with power suppliers, for example, where low user plans exist.

3.6.4 Rates remission policy

This policy, required as part of the LTCCP, outlines the circumstances in which the council will reduce rates requirements. In the case of Auckland City, this policy allows for remission or deferral of rates for social reasons around ability of the ratepayer to pay; part remission for carparks which are under separate title; uninhabitable Rural 3 zoned properties on islands; or when the unit’s rates are disproportional when compared with other equivalent properties. No remissions are provided for in relation to sustainability aspects.

3.7 Auckland City Council non regulatory practices and programmes

In addition to its regulatory role, Auckland City Council provides a range of non-regulatory programmes; practices and incentives which promote sustainable building development and these are discussed briefly below:

3.7.1 Energy wise programmes

Auckland City Council is a partner in the EECA co-ordinated EnergyWise Councils Partnership. A number of programmes have been developed by the Council under that umbrella which act both as a demonstration and incentive to energy efficient building practices. The Auckland City Council joined the EnergyWise Councils partnership as part of its celebrations of world environment day on June 4th 1999.

3.7.1.1 Internal energy efficiency programme

Since 1999 Auckland City has undertaken one-off energy audits throughout the main administration buildings, the library and art gallery. These initiatives have been backed up by education campaigns which have concentrated on encouraging staff to switch off computers, lights and unnecessary appliances when they leave for the evening. The Council has recently announced an expansion of this programme, which has the opportunity to have both a significant positive financial impact for the Council as well as creating leadership by example. Auckland City Council has over 900 buildings owned by the Council, undertaking energy audits and retrofitting basic energy efficiency measures (eg low energy lights, light sensors, energy efficient ventilation systems) would have a significant impact.

3.7.1.2 Snug Homes for Auckland programme

Auckland City Council has recently decided to participate in the EECA part funded Energy Wise homes programme – to be known in Auckland City as “Snug Homes for Auckland”. Funding for five hundred low income homes within Auckland City as a joint project with a range of agencies will be provided over the next three years to undertake basic retrofits of insulation, draught-stoppers and hot water cylinder wraps into low income households.

3.7.2 Zero waste programmes

In early 2005, Auckland City Council adopted a policy of being a zero waste Council, recognising that zero waste is a philosophy that will be progressively implemented, with a target of zero waste to landfill by 2015.

Free recycling services to households is provided across the Isthmus and this provides a significant incentive to recycling. Funding is also provided towards the regional HazMobile which aims to reduce the amount of hazardous waste going into general domestic refuse with four hazardous waste collections annually. The following waste minimisation programmes are undertaken by the Council:

- Create your own Eden campaign (this offers free composting courses and awards for smart gardening);
- Auckland Business Care Enviro-Mark (20 businesses within the city are participating);
- Waitemata Harbour Clean Up Trust;
- Wastewise Schools (a project working with two schools to reduce waste).

Unlike some other councils in the Auckland Region (North Shore, Rodney, Waitakere), Auckland City does not have user charges for domestic waste collection, but instead includes these costs within a Uniform Annual General Charge. Arguably,

the provision of a free wheelie bin disposal service is a barrier to the reduction of household refuse, as there is no incentive for households to decrease their waste volumes. There are range of other measures, eg trialling a kitchen waste collection service and development of a resource recovery centre to replace inorganic rubbish collections, proposed within the recently reviewed Isthmus Waste Management Plan which may result in a reduction of household refuse.

With regard to construction waste, a key issue for sustainable building, Auckland City Council are sponsors of the REBRI project, however beyond the passive provision of information on the website, it is unclear to what extent Auckland City Council promotes the use of REBRI guidelines and approaches through its interactions with the development industry. The Isthmus Waste Management Plan sets in place an action of promoting the reduction of demolition and construction waste through Council processes such as the Building Consent process, although it is not clear that this has yet been put into effect. In addition the Plan identifies that the Council will promote recovery of construction and demolition materials in its own projects and specify the purchase of recovered materials.

3.7.3 General sustainable building programmes

Auckland City Council, as part of its commitment to urban sustainability, has started including sustainable building as a key component of some of its own activities. For example, the recently completed Oranga and Wesley Community Centres both have sustainable stormwater management systems, including rain gardens and swales.

A Mayoral Taskforce on sustainable building is currently being set up, and the Council has also started including sustainable building principles in the briefing of major construction projects, for example the Auckland City Art Gallery extension. The Auckland Sustainable Cities Programme seeks a commitment from all Auckland Councils to developing all new buildings as sustainable buildings, although to date Auckland City Council has not signed up to this commitment.

3.7.4 Property Enterprise Board

Auckland has recently decided to set up a Property Enterprise Board (PEB) to undertake development on behalf of the Council. The Statement of Intent identifies the following key outcomes expected from the PEB:

Achieving high quality developments which:

- reflect the unique character of Auckland and the surrounding neighbourhood;
- demonstrates best practice in quality urban development;
- demonstrates best practice in quality urban design and sustainability;
- encourage a choice of transport and provides streets that are active, safe and attractive to pedestrians;
- enable a range of activities, housing types and intensity to support a diverse community within the greater neighbourhood;
- are environmentally, economically and socially sustainable in the short and long term; and
- enhance the long-term financial value of Auckland City

The focus of the PEB's role is to facilitate and encourage such aspects of the development, or the development quality, which are inadequately provided for by developers in comparison to the objectives in the statement of intent. This focus will

be on strategic projects including areas with little market interest where it can be a catalyst for a different type or quality of development, or where it can demonstrate more integrated and sustainable development types where there is currently ad hoc market development. The PEB will have a “watching brief” over Council’s existing property holdings with a view to identifying opportunities to use these holdings to deliver Development with Vision objectives.

The PEB will:

- Assume the role (which currently sits with the Finance and Corporate Business Committee (“FCBC”)) in providing governance over Auckland City’s existing non-core service property portfolio¹. Specifically the PEB will takeover FCBC’s delegations with respect to property.
- Have responsibilities for identification of opportunities for enhancements to Council’s property portfolio which help to achieve Council’s Development with Vision objectives. This could take the form of a “watching brief” over Council’s (core and non-core) property portfolio.
- Consider and prioritise ideas for possible Development with Vision projects. This will include:
 - identification of opportunities outside the existing property portfolio for achieving Council’s Development with Vision objectives.
 - requesting, assessing and overseeing the development of business cases for possible Development with Vision projects
 - providing governance over the negotiation with project partners including: property purchases and disposals; requests for proposals; and tender selections.
- Monitor the Development with Vision projects.

Because the PEB is not a building developer per se, its impact on the development of sustainable building in Auckland City will be constrained. However within the boundaries of the Statement of Intent, the PEB has the potential to be a significant advocate for sustainable building, and through partnerships with the private sector drive a sustainable building agenda. Its degree of influence has yet to be tested as it has just been established, but the framework set out in the Statement of Intent for the board is a positive one which may well achieve good sustainable building outcomes.

3.7.5 Urban Design Action Plan

Many of the aspects addressed by the Urban Design Action Plan are likely to result in improved sustainable building outcomes also. Many of the guidelines and actions developed to promote good urban design are likely also to have sustainable development benefits, as has occurred with the development of the guideline for the Residential 8 Zone and the On-Site Stormwater Treatment Manual. As discussed above, there are some tensions between sustainable building and good urban design in some instances – most significantly between solar orientation and development addressing the street.

The Urban Design Panel has been established to review resource consent applications on a voluntary basis. Although the process of a panel review is voluntary, the comments of the urban design panel are taken into consideration when determining resource consent applications.

Urban design reviews of all resource consent applications for new buildings in the Central Area are undertaken by the Council’s urban design team, prior to review by the Panel. This process provides the opportunity to comment on applications prior to

lodgement to identify possible concerns that the Panel may have. At this stage of the process it is common for staff to encourage greater consideration of sustainable building features. Since the notification of Proposed Plan Changes 1 and 2 to the Central Area Plan, there has been a greater mandate to respond to issues of sustainability. Specific comments are now provided within the urban design review process to reflect how sustainable building features, in addition to general urban design issues, have been addressed. However, at this early stage, the role relates more to encouraging developers to respond to the sustainability criteria rather than encouraging particular features or responses. The review process does enable sustainability features to be highlighted as a benefit of good design.

Issues highlighted through an interview with one of Council's urban designers include:

- lack of information available from the Council to those wishing to implement sustainable building features, such as the cost savings of certain features
- while sustainable buildings are provided voluntarily, their presence can assist with the processing of the application as the beneficial environmental effects of the sustainability features can be taken into consideration
- The Council's urban designers are not experts in sustainable design, and therefore can only encourage rather than facilitate incorporation of sustainable features. Detailed reports from specialists would be required to comprehensively address sustainability issues

Commercial buildings are more easily considered as they are one thermal environment, whereas apartments are individual and therefore more difficult to control in terms of energy efficiency outcomes.

4. ANALYSIS OF EXPERIENCE OF SUSTAINABLE BUILDING EXAMPLES WITHIN AUCKLAND CITY

A range of sustainable building examples within Auckland City have been looked at, with specific consideration of the barriers or promoters of sustainable building features through their development. This section summarises the information about the residential examples. The work for Auckland City Council also looked at non-residential examples, and the summary of information provided for these is included in Appendix 2.

The information in this section of the report is a result of interviews with the developer and/or their consultants, where possible interviews with the Council staff involved in the processing of the consent(s) in relation to the developments and detailed analysis of the planning and building consent files in relation to the developments.

Only a very small number of sustainable buildings have been developed within Auckland City and this has limited the range of examples for consideration. While there are other examples of buildings developed with other sustainable building features, such as composting toilets, rainwater tanks, solar hot water systems etc, the examples here cover a wide range of sustainability features and give a strong indication as to the main issues arising from the Council development process.

4.1 Talbot Park residential development



Image courtesy of Architectus

The developer of this site is Housing New Zealand. The site occupies most of a triangular block bordered by Pt England and Pilkington Roads and Apirana Ave, in Glenn Innes, Auckland. The planning consents were granted in October 2005. The development is subject to the Auckland Isthmus District Plan, with a zoning of Residential 8. Work started on the construction in November 2005 with completion expected by December 2006.

Client: Housing New Zealand
Architects: Architectus, Bailey Architects, Boffa Miskell, Pepper Dixon Architects.
ESD Consultant: Dave Fullbrook, e Cubed Building Workshop Limited
Contractor/Builders: Eco Maintenance, Fairway Homes, Federal Residential, GJ Gardener Homes.

4.1.1 Sustainable features of the buildings

The redevelopment of a whole urban block provided Housing New Zealand with the opportunity to address sustainability on a holistic level. The Talbot Park renewal project incorporated the refurbishment of nine existing 12 unit 'Star Flats' buildings and the construction of 97 new homes. Also included in the scheme is an extensive landscaping plan which converts a central reserve into two separate open areas and provides a new internal road layout.

The housing units vary from single bedroom pensioner flats to three level apartment buildings up to seven or eight bedroom detached houses. Sustainable features used across the development vary from building type to building type however they make use of the same general principles. It was important that the development be seen as a demonstration project of 'best practice' public housing at no, or little, extra cost to conventional developments of the same type.

Insulation levels much higher than Building Code requirements, though still available 'off the shelf', were used throughout the development along with sensible levels of thermal mass to moderate internal temperatures throughout the year. This meant the size of the heating installed in the houses was then able to be reduced. Furthermore the houses make use of high efficacy, low energy light sources. Use is also made of solar water heating to further reduce energy use.

Some new buildings use rainwater collection for recycling back into non-potable uses such as toilet cisterns and outdoor taps. Surface water in all areas is dealt with by using swales and rain gardens.

Extensive use was made of natural ventilation, with a variety of options available to tenants such as fully openable windows and trickle vents. In the apartment block wind generated ventilation serves the washroom cores. In some cases mechanical ventilation was supplied to kitchens using standard products.

Further sustainable features relating to the development or community as a whole included the use of narrow internal roads to encourage walking and pedestrian safe areas; good street lighting for a safer environment; and the site was selected on it's suitability in terms of proximity to shops/local centres. Overall the site is now (or is planned to be) used more efficiently and in a more productive way.

The sustainable features can be summarised as:

- Rainwater recycling and greywater systems;
- Exposed thermal mass for winter heat storage and mass cooling in summer;
- Higher than code levels of insulation;
- Solar Hot Water;
- Energy efficient lighting;
- Pedestrian oriented access and natural landscaping;
- Increasing the efficiency of land use;
- Re-use of buildings and building materials.

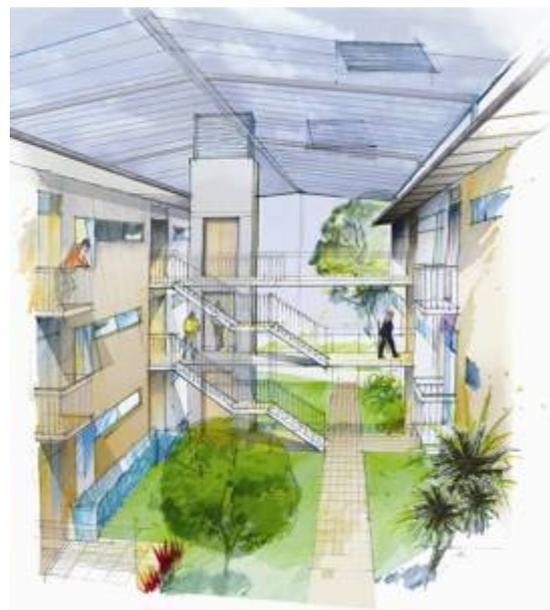


Image courtesy of Architectus

4.1.2 Planning and regulatory process

Because this is very much a community wide development, the Council also has a vested interest in its success. The applicants, in this case Housing New Zealand, worked closely with the Council on this particular project. Part of the site is Auckland City Council-owned reserve which is also being completely redeveloped, and there are several roads being taken out and new roads being constructed.

Unfortunately it was found that two different arms of the Council often contradicted each other in their attitudes of certain aspects. While the policy side of the Council was very supportive of the development and the philosophy behind it, the regulatory side often acted against some of the initiatives or innovation being used.

This application was the first processed under the new Residential Design Guidelines, which, although providing some criteria related to sustainable buildings, primarily addresses urban design issues. The application was processed by one of the Council's urban designers.

Key features dealt with through the planning process were orientation, site layout, daylight, ventilation, and stormwater. Each building was designed by a different architect, with the Atrium Building containing a number of sustainable building features. However, this appears to be an experimental directive by Housing New Zealand rather than a concept for the entire development.

The planning process, being focused on urban design issues, did not specifically address sustainable features. These were considered as a bonus of development, rather than a beneficial environmental effect. Therefore no assessment of these was undertaken, with the information provided being considered reasonable and acceptable on the whole.

Natural ventilation became an issue after resource consent had been granted, as it was realised that a condition to comply with the district plan's noise standards was not achievable. This highlights a conflict within the district plan, where on one side natural ventilation was desirable while on the other side minimum noise standards within a dwelling was required. In this situation it resulted in mechanical ventilation being installed instead of natural ventilation.

4.1.3 Enabling factors which helped the project through the planning process

As stated above, overall the Council lent support to the community development. Possibly the best example of this is with converting the existing reserve land into the two separate parks as planned by Housing New Zealand. The Council and HNZ set up a well worked consultation process and the Council was prepared to work within, and apply, HNZ framework to the aspects of the project which were technically under their control.

4.1.4 Barriers to the process or to inclusion of particular features

While the regulatory side of the Council probably did not object to the merits of the project, they seemed to be wary of any sustainable features which did not fit 'inside the box'. Fortunately, working solutions were found and none of the features originally planned had to be excluded from the final designs.

The main causes of difficulty related mainly with the stormwater and roading aspects of the development. The Council had concerns over the stormwater drainage plan, run off areas and flow paths; and width of the streets was deemed too narrow to allow emergency access around other service vehicles. There were also concerns

about the type of street lighting specified with HNZ wanting a whiter light for safety reasons which was more expensive than its sodium yellow counterpart. Rainwater tanks for water recycling also increased overall site coverage. While the process got better as the project went on, it still caused delays which a commercial developer would not be able to endure.

In terms of the actual buildings there was a contradiction in the apartment block between the requirements for ventilation and those for noise insulation in the units adjacent to the road. The Building Code Acceptable Solution of 5% of floor area being openable window did not meet the Residential 8 requirements for the control of traffic noise. The use of an atrium alleviated the problem somewhat however the natural ventilation strategy raised further concerns about smoke extraction in the event of fire. Noise intrusion is a constant problem with natural ventilation and in this case was only solved by incorporating mechanical venting.

4.1.5 Suggested changes and improvements to the planning processes

It was felt that the Council needed more expertise in the field of sustainability in general and, in particular, in relation to alternative strategies for water treatment and disposal. This lack of knowledge led to a reluctance on the part of the building regulators to accept sustainable solutions as they did not fit into the usual consent framework. These in turn led to the perception that it would be easier to 'dumb things down' and stick to Code minimums than go to the extra effort of using more innovative, sustainable solutions.

In terms of incentives for sustainable solutions there was not the view that there should be cash rebates or grants, more the idea of 'credit where credit's due'. While the Council supported the project holistically the same charges were applied regardless of efforts made to reduce consumption or dependence. There was a strong feeling that Metrowater did little to nothing to encourage lower water usage. Unit rates and connection charges were the same regardless of use.

Other general criticisms of the process are similar to those aired by all developers regardless of building type. These centre on perceived inconsistencies in how the Building Code is interpreted and the amount of time taken, and lack of feedback from, the consent application process.

4.2 Courtney – Heale residence



Image courtesy of Davis Hawkesworth Architects

This example was a renovation and 50m² extension to a residential dwelling at 57 Moa Road, Point Chevalier. The original house was a brick stucco 1930s bungalow in a Residential 6A zone. The planning consents were granted and building work undertaken in 2003. The owners of the dwelling initiated the discussions with their architect and builder around sustainable design, however this was the first sustainable building project that either the builder or architect had been involved in.

Client Matt Heale and Megan Courtney

Architects Davis Hawkesworth Architects

4.2.1 Sustainable features of the building

The extension and renovation was undertaken with energy and water efficiency as particular focuses for the home owners. In general however they wanted to ensure that the whole project was as environmentally sustainable as possible. As such passive solar design and incorporation of high thermal mass and high levels of insulation in the extension was a significant focus of the design. Materials choice focussed on low embodied energy and sustainable sources so zincalume, plantation cedar and recycled matai were major material choices. Environmental Choice certified paints and floorboard sealant were specified and other indoor materials choices focussed on ensuring a good indoor environment with low VOC emissions. All new appliances were selected on the basis of energy and water efficiency and low flow tap/ shower fittings and energy efficient lighting was used throughout the dwelling. High R value insulation was retrofitted into the rest of the dwelling ceilings and solar tube and passive ventilation systems were retrofitted into the bathroom and kitchen as well as the extension. Mechanical ventilation was fitted to the laundry. The kitchen, laundry and bathroom were co-located for greater pipework efficiency. The owners also worked with the builders to ensure that demolition and construction waste was minimised, with on-site sorting and ensuring that reuse and recycling of materials was taking place. Thermal blinds were used throughout the dwelling and a

high efficiency, low emissions wood burner was installed for heating – though the passive solar design is such that it has turned out that this is not required. A solar hot water system was also installed to replace the existing electric hot water cylinder.

Key sustainability features incorporated within the building are:

- Passive solar design with exposed thermal mass for winter heat storage and mass cooling in summer;
- Higher than Code levels of insulation;
- Solar Hot Water;
- Energy efficient lighting & appliances
- Water efficient fittings and appliances;
- Passive ventilation;
- Materials choices for low embodied energy and sustainability;
- Water efficient landscape design, composting and vegetable garden;
- Demolition and construction waste minimisation



Image courtesy of Davis Hawkesworth Architects

4.2.2 Planning and regulatory process

Resource consent was required for a minor height in relation to boundary infringement, but no other resource consents were necessary. This was a minor infringement, and was largely required as an existing infringement.

The building consent was viewed as a relatively simple matter although a couple of issues arose in relation to the choice of zincalume cladding and a desire to plumb in stormwater to the toilet, shower and washing machine. The use of zincalume cladding proved to be difficult, due to it being considered at that time a non-standard material choice, with concerns that a wall cavity was not provided for in the design. Subsequently on completion, Code Compliance was granted, apparently due to the high standard of workmanship and the successful argument that the nature of the iron having space between the overlapping sheets overcomes the concerns around the zincalume material.

The owners wanted to install a rainwater tank for non-potable uses, but, as discussed below, the experience with Metrowater led them to abandoning this proposal and not including it within their consent application. A rainwater tank for gardening was not considered a viable alternative, as the landscape design focused on native plants suitable for the environment and does not require watering.

4.2.3 Enabling factors which helped the project through the planning process

The dwelling extension was not specifically identified within the resource or building consent process as a sustainable building and the application appeared to be treated in the normal fashion by Council staff.

4.2.4 Barriers to the process or to inclusion of particular features

The owners had a particular focus on water efficiency and wanted to install a rainwater tank to provide for non potable uses of water within the dwelling. The owners identified that they found dealing with Metrowater over this issue particularly difficult. They were actively discouraged from such a proposal – both at the Home Show and when talking subsequently with Metrowater staff about their development. The impression left in their minds was that Metrowater had no interest in water efficiency or demand management, as they were unable to provide any advice on water efficiency measures or options. The owners also wanted to re-use greywater from their dwelling, but after the rainwater tank discussions decided there wasn't any point in trying. Subsequently, when applying for resource consent for their height in relation to boundary infringement, they realised that a rainwater tank, if located in the optimum location adjacent to their bathroom, would also infringe the height in relation to boundary rule, and they have indicated that this has also been a barrier to them pursuing this option since their extension and renovations have been complete.

4.2.5 Suggested changes and improvements to the planning process

The owners were of the view that the process for ordinary citizens to build sustainably is very difficult. They suggested that, to see it widely taken up, the Council would need to be very pro-active and encouraging, rather than neutral to discouraging as is currently the case. They felt that the most helpful thing the Council could do would be to provide free pre-design advice and a free review of building plans from a sustainability perspective. Generally they felt that there is such a paucity of accessible information about sustainable building, that the Council could provide a significant role in providing this. They also suggested that proactive promotion of simple measures by front counter staff eg installation of insulation beyond the Building Code minimums or generally suggesting that people consider water and energy efficiency issues in their designs would be very helpful.

The owners had strong negative views on Auckland City's and, in particular Metrowater's, role in relation to the promotion of water efficiency. Both owners were aware of North Shore City, Rodney and Waitakere City Council promotion of rainwater re-use and subsidy of rainwater tank installation into new and existing homes. Training of Metrowater staff and promotion of water efficiency measures by them were seen as priority actions for the Council.

With regard to incentives for sustainable building, the owners generally felt that provision of assistance and information were the best incentives, particularly provision of information around the return periods for different sustainability measures. They also felt that promotion and branding of sustainable building and the associated energy and water efficiency if particular standards were met was important. At the moment they believe there is a perception that sustainable building is a "fringe or hippy thing" and therefore, though their home is much cheaper to operate, that is not reflected in a value placed on it by the market. The development of a rating tool which linked to rates remission or enabled owners to be able to say that it met a particular sustainability standard was seen as a useful measure in this respect. Both the owners were aware of the NSW Basix tool and its requirement for 40% reduction in water use and 25% reduction in energy use for new residential dwellings. They felt that this kind of measure is what is required in a rating tool.

4.3 Summary of barriers and incentives arising from examples

The key barriers identified through the sustainable home examples are summarised in Table 1 below:

Table 1: Barriers to sustainable building in Auckland City Council identified through examples

Barrier	Explanation
Policy & implementation co-ordination	Policy and implementation areas sometimes not “singing from the same hymn sheet”. Regulatory area generally less supportive of innovative initiatives.
Infrastructure standards	Sustainable solutions often do not fit with the conventional infrastructure standards as required by the Council. Infrastructure standards are often set to ensure consistent infrastructure is built across the city (eg street lighting types) to create ease of maintenance, however these do not currently recognise the range of different situations encountered.
Site coverage rules	Rainwater tanks included in site coverage rules, making compliance difficult.
Conflict between noise and ventilation objectives – District Plan vs. Building Code	The Residential 8 zone has strict noise standards which conflict with the building code and sustainable building requirements for natural ventilation.
Lack of support for alternative materials	Materials not covered in Acceptable Solutions were seen as a high risk by building consent staff, particularly in light of weather tightness issues. In the case study the applicant was initially told they would not get code compliance if they used zincalume as their cladding.
Metrowater lacks specific in house support for sustainable water options	Generally Metrowater was perceived as being at best uninterested and at worst actively discouraging about sustainable water initiatives, particularly rainwater or greywater re-use
Height in relation to boundary controls / yard controls	Where bathrooms are located on the southern side of the house, height in relation to boundary or yard infringements for rainwater tanks can occur, particularly in older areas. Having to apply for a resource consent – both in terms of cost and effort is a significant barrier.
Metrowater charging framework	The Metrowater charging framework does not recognise the benefits of low water use/wastewater production.
Incentive	Explanation
Many “sustainable” building aspects do not require an particular Council consideration or approval	<p>Many aspects of the case studies which could be regarded as sustainable (eg low flow water fittings, high levels of insulation, energy efficient lighting and appliances, water efficient landscape design, demolition and construction waste minimisation) did not require any Council consents or approvals.</p> <p>In addition aspects such as good solar design, or high thermal mass on a flat site, do not require any additional consideration beyond the normal building consent process.</p>

5. IDENTIFIED BARRIERS AND INCENTIVES

5.1 Generic barriers and incentives to sustainable building

There are a number of barriers and incentives to sustainable building that are common to all geographic areas in New Zealand. These are summarised in Tables 2 and 3 below. Those barriers which it is considered that local councils may be able to take a role in addressing are highlighted in Table 5.

Table 2: Nationwide and generic incentives for sustainable building

Generic Incentive	Explanation
Funding assistance	Some funding for sustainable building is available, although eligibility varies e.g. Crown loan scheme (government applicants only), EECA subsidy for energy modelling, EECA subsidy for solar hot water, EECA Energy Wise home grants
NZ Information on sustainable building	Some information already exists and is available on the internet e.g. MFE: www.mfe.govt.nz <i>Value case for sustainable building, Guide to sustainable office fitouts</i> ; BRANZ www.branz.co.nz <i>Easy guide to eco building</i> ; Beacon: www.beaconpathway.co.nz & www.nowhome.co.nz <i>NOW Home brochure</i> and associated monitoring reports; Sustainable Auckland: <i>Sustainable buildings in the Auckland Region</i> . Specific aspects of sustainable building have detailed information eg www.eeca.govt.nz EECA website for energy, www.rebri.org.nz REBRI website for construction waste.
Home Rating Systems	BRANZ has developed the Green Homes Rating tool for detached residential dwellings and certified assessors are listed on their website. The TUSC web based tool www.tusc.org.nz assesses energy and water efficiency in residential homes and is available for self assessment. It recommends ways to improve energy and water efficiency based on the assessment.
Green Building Council	Although currently in the start up phase, the NZ Green Building Council will provide a resource for the promotion of sustainable building and is expected to produce a rating system for commercial office buildings in the near future (end of 2006 for new builds, 2007 for retrofits).
Demonstration Projects	A range of demonstration projects have been developed around the country which have been documented in reports and on various websites e.g. Auckland Sustainable Cities www.sustainableauckland.govt.nz , MFE, BRANZ, Beacon

Table 3: Nationwide and generic barriers to sustainable building

Those barriers which it is considered may be able to be addressed by a local council with regard to its territorial area are highlighted.

Generic Barrier	Explanation
Building type	It is easier in some building types to build sustainably
Capital cost of some technologies	Some technologies e.g. solar hot water are more expensive up front than conventional alternatives
Perceived cost	There is an entrenched belief that sustainable construction costs more
Briefing process	Like other qualitative issues (e.g. good urban design) a detailed briefing process is required.
Design/ construction process	Care is required throughout the design and construction process to ensure appropriate sustainable building methodology is employed consistently.

Generic Barrier	Explanation
Awareness of funding	Lack of awareness of existing funding mechanisms (Crown Loan Scheme, EECA energy modelling subsidy, loan assistance solar hot water).
Measurement and rating	No widely used system to determine how green is green? e.g. Green Homes Scheme has low level of uptake (less than 100 homes nationwide) and only applies to detached dwellings.
Methodology	There is a general over reliance on high tech solutions from architects/ engineers rather than simple & cheap solutions e.g. reducing the area of glazing on southern and western sides to reduce need for complex natural ventilation systems.
Incentives	Lack of financial or regulatory incentives to change current practice
Consumer demand	Lack of consumer demand (although this is increasing steadily)
Inertia	Inertia and existing vested interests that maintain the status quo
Labour	Labour shortages in sustainable construction and construction-related industries e.g. solar hot water heating installation
Information	Lack of reliable & accessible information about products, installation practice, and life-cycle costs e.g. BRANZ information is not well known about/ easily accessed.
Options	Limited availability of sustainable material alternatives
Building Code	Lack of identification of sustainable building technologies as acceptable solutions e.g. composting toilets, atrium assisted natural ventilation, solar hot water
Building Code	Requirement that where a connection to a sewer is available, wastewater disposal is to be by connection to the sewer
Building Code Administration	Review of designs against some key standards is often not undertaken
Health Act	Requires adequate and convenient supply of wholesome water, and this is a constraint on the use of roof water in urban areas as a source of potable water

5.2 Auckland Region barriers and incentives for sustainable building

There are only a small number of barriers and incentives found at the Auckland Regional level, the most significant relating to the Auckland Public Health Service. The regional barriers and incentives are summarised in Table 4 below.

Table 4: Regional barriers and incentives for sustainable building

Barrier	Explanation
Auckland Regional Public Health Service (ARPHS)	View that it is most appropriate that all water and wastewater is reticulated.
Incentive	Explanation
REBRI programme	ARC, Auckland City and MFE sponsored programme around demolition and construction waste.
Healthy homes programme	ARPHS programme to improve existing state housing.
Auckland Regional Policy Statement – Plan Change 6	Some policies around urban design and sustainable building
Regional Air Land and Water Plan	Policies and rules which promote low impact design and sustainable stormwater solutions
Regional Air Land and Water Plan	Promotes conservation of water through water allocation provisions, wastewater re-use and rainfall capture

5.3 Auckland City specific barriers and incentives for sustainable building

Table 5 below summarises the barriers to, and Table 6 the incentives for, sustainable building which have been identified in the policies, plans, practices and through the case studies. Those barriers which it is considered are likely to be common to many local councils are highlighted.

Table 5: Summary of barriers to sustainable building in Auckland City Council policies, plans and practices

Policy, Plan or Practice	Barrier
All district plans	No specific recognition of sustainable building features as desirable in policies and rules
All district plans - residential zones	Yard, building coverage & height in relation to boundary rules – barrier to optimum layout of dwelling in terms of solar design & use of rainwater tanks in residential situations Earthworks rules- no recognition in assessment criteria of positive benefits of high thermal mass concrete slab
All district plans – carparking	Mostly set minimum standards for carparking rather than maximums. Minimum standards provide for larger vehicles. No discretion to provide some spaces for smaller vehicles.
All district plans – carparking & manoeuvring areas – implementation	Often interpreted with little or no flexibility, requiring provision for on-site carparking where there is ample on the street and therefore resulting in unnecessary additional impermeable surface.
All district plans – tree protection rules	Limited recognition of role vegetation can plan in blocking solar access or alternatively in moderating cooler southerly winds
All district plans –intensive residential	Large areas of glazing to allow natural light creating energy inefficiency – no requirement for double glazing in place.
Isthmus Plan – Residential 8 Zone	Emphasis on active rooms facing the street rather than being located for solar orientation. Also creates difficulty in clustering services for kitchen/bathroom/laundry.
Isthmus Plan – Residential 8 Zone	Noise standards forcing mechanical ventilation of units. No requirement for cross ventilation of units.
Isthmus Plan –residential zones	Energy production (eg small wind turbines) not recognised as an activity
Isthmus plan – carparking requirements	Resource consent required to reduce number of on-site carparks
Code of Urban Subdivision and Development	Road design and layout and lot layout requirements do not promote sustainability.
Code of Urban Subdivision and Development	Infrastructure standards are often set to ensure consistent infrastructure is built across the city (eg street lighting types) to create ease of maintenance, however these do not currently recognise the range of different situations encountered.
Building Act administration	Energy efficiency & natural light provisions of the building code not given priority for enforcement

Policy, Plan or Practice	Barrier
Metrowater Development and Connection Standards for Water, Wastewater And Stormwater	No specific provision for sustainable water options as standard measures, extra levels of assurance, detailing & checking required for more sustainable building options. A conventional infrastructure driven approach.
Metrowater Statement of Intent	Focus on sustainable profitability rather than sustainable water management.
Metrowater Statement of Intent	No initiatives or key performance measures around demand management and encouraging sustainable three waters design within development.
Policy & implementation co-ordination	Policy and implementation areas sometimes not “singing from the same hymn sheet”. Regulatory area generally less supportive of innovative initiatives.
Lack of support for alternative materials & other aspects not covered by Acceptable Solutions	Materials or technologies not covered in Acceptable Solutions are seen as a high risk by building consent staff and given higher scrutiny as well as requiring additional technical detailing before approval for use.
Metrowater lacks specific in house support for sustainable water options	Generally Metrowater was perceived as being at best uninterested and at worst actively discouraging about sustainable water initiatives, particularly rainwater or greywater re-use
Metrowater charging framework	The Metrowater charging framework does not recognise the benefits of low water use/wastewater production.

Table 6: Summary of incentives for sustainable building in Auckland City Council policies, plans and practices

Policy, Plan or Practice	Incentive
Isthmus Plan, Residential Design Guide	Assessment criteria includes energy efficiency for Residential 8 and multi-unit residential developments in Residential 6 and 7
Isthmus Plan, Residential Design Guide	On site stormwater mitigation requirements for intensive residential development.
Central Area Plan, Victoria Quarter Plan Changes 1 and 2	Resource management strategy – includes durable building design, adaptable building form, energy, stormwater efficiency, sunlight access.
Central Area Plan	Residential apartment provisions – consider orientation, solar gain, ventilation and noise
Central Area Plan	Maximum provisions for car parking
Gulf Islands Plan	Generally easier framework for alternative solutions for land use activities
Water supply bylaw	Requires all new toilets to be dual flush, allows for dual supply of water, and requires water conservation where water used for cooling purposes.
Development contributions policy	Stormwater contribution calculation based on the amount of impervious area added to the site.
Development contributions policy	\$1000 reduction where rainwater tank installed in new development.
Development	Provision for reductions where exceptional features are included.

Policy, Plan or Practice	Incentive
contributions policy	
Energywise programmes	Internal energy efficiency programme – leadership and demonstration
Energywise programmes	Snug homes programme – low income households
Isthmus Waste Management Plan	Promotion of recovery of construction and demolition materials in council projects.
Isthmus Waste Management Plan	Promotion of the purchase of recovered materials in council projects.
Council building programmes	Some inclusion of sustainable features as demonstration eg Wesley & Oranga Community Centres, Art Gallery extension
Mayoral Taskforce on sustainable building	Leadership, highlights the importance of the issue
Urban Design Action Plan	Also addresses some sustainable building aspects. Urban design panel and urban design reviews can promote some aspects of sustainability.
Property Enterprise Board	Able to be advocate for sustainable building and to facilitate some sustainable building outcomes
Many “sustainable” building aspects do not require an particular council consideration or approval	<p>Many aspects of the case studies which could be regarded as sustainable did not require any Council consents or approvals.</p> <p>In addition aspects such as good solar design, or high thermal mass on a flat site, do not require any additional consideration beyond the normal building consent process.</p>

6. OPTIONS TO OVERCOME BARRIERS

6.1 Auckland City Case Study

When considering the options to overcome the identified barriers to sustainable building within Auckland City, this section provides a preliminary analysis with regard to those aspects under the direct control of Auckland City Council.

Table 7: Options to overcome identified barriers to sustainable building

Barrier	Option to overcome	Ease of doability, cost & likely impact	Priority
1. Specific District Plan issues as identified in Table 7.	Review of District Plans to put in place a framework of objectives and policies and rules as appropriate which promote sustainable building	Moderate to hard to do, moderate to high cost, low-moderate impact	Low
	Review of specific provisions such as yard, height in relation to boundary and building coverage rules to ensure assessment considers benefits of sustainable building options.	Moderate to do, moderate to high cost, low impact	Low
2. Code of urban subdivision & development.	Review of Subdivision and Land Development Code of Practice to ensure that sustainable options are included and promoted as preferred options	Easy to do, low - moderate cost, high impact	High
3. Building Act administration	Training of building (and planning) staff with regard to sustainable building options and how to deal positively with and place priority on these. Where training programmes are not available, working with industry providers and other councils in the region to get such programmes put in place	Easy to moderate ease to do, relatively low cost, high impact	High
	Review of District Plan rules and guidelines around apartment and mixed use design to ensure consistency with building code standards around % glazing, % opening windows, ventilation etc	Easy to moderate ease to do, moderate cost, moderate impact	Medium
4. Metrowater development & connection standards	Review of Metrowater Connection Standards to ensure that sustainable options are included and promoted as preferred options	Moderate to do, low - moderate cost, high impact	High

Barrier	Option to overcome	Ease of doability, cost & likely impact	Priority
5. Metrowater statement of intent	Review of Metrowater Statement of Intent to provide emphasis on achieving sustainable water management and sustainable building goals	Easy to do, low cost, high impact	High
6. Policy & implementation co-ordination	Review consent process to ensure input from policy staff to support sustainable building developments.	Easy to moderate to do (depending on workload, physical locations), low cost, low –moderate impact	High
7. Lack of support for materials & technologies where no Acceptable Solution	Development of internal guidelines/acceptable practices/practice notes around key sustainable building measures.	Easy to do, low cost, moderate impact	High
	Working with appropriate agencies (DBH, BRANZ) to develop Acceptable Solutions for a wide range of sustainable building methods	Easy to moderate ease to do, moderate cost, moderate impact	Medium
8. Lack of Metrowater support for sustainable water solutions	Training of frontline Metrowater staff on demand management and water efficiency options.	Easy to do, relatively low cost, high impact	High
9. Metrowater charging framework	Review of Metrowater charges to better support water efficiency and encourage demand management.	Moderate to do, relatively low cost, moderate impact	Medium
10. Capital costs of some technologies	Direct subsidy or loans for some sustainable features eg rainwater tanks	Easy to do, low-high cost depending on level of subsidy, low-high impact depending on level of subsidy	Medium
11. Perceived costs of sustainable building	Promotion and branding of sustainable building as a desirable outcome and mainstream thing to do (utilise existing council communication methods eg AK City Scene, website, media releases)	Easy to do, low cost, low-moderate impact	High
	Council commitment to sustainable building in own practice – through development and implementation of a sustainable building code for all new council buildings and retrofitting of existing buildings, targeting energy and water efficiency in the first instance. Clear documentation and monitoring of the projects to demonstrate cost	Easy to do, low –moderate cost depending on features, low-moderate impact	High

Barrier	Option to overcome	Ease of doability, cost & likely impact	Priority
	savings and other benefits.		
12. Difficulty of briefing process	Development of a “sustainable building code” for buildings within Auckland. This would include detailed information on the briefing process.	Moderate to do, relatively low cost, moderate impact	Medium
13. Design and construction process	Development of a “sustainable building code” for buildings within Auckland. This would include detailed information on the design and construction process.	Moderate to do, relatively low cost, moderate impact	Medium
14. Awareness of funding	Information on funding opportunities referred to in Council information, links to EECA websites etc	Easy to do, low cost, low-moderate impact	High
15. Measurement & rating	Active promotion of current sustainable building ratings tools such as TUSC and the Green Homes Scheme and highlighting the benefits to home owners of dwellings which have been assessed with these schemes. Preliminary analysis undertaken by this project would indicate the TUSC tool has the potential to be immediately useful in the Auckland City context as it easily accessed and used (on line, doesn't require trained assessor) and provides % improvements in energy and water efficiency which could be used in conjunction with other incentives.	Easy to do, low cost, low-medium impact	High
16. Methodology & awareness of simple solutions	Free design review for sustainable buildings	Easy to do, low-medium cost depending on nature of development and review, high impact	High
17. Financial incentives	Rates remission for homes which meet set sustainability standards	Moderate to Hard to do (need to develop framework, criteria and robust policy), likely to be low cost without regulation, low impact	Low
	Adoption of rating tool such as TUSC for development contributions reductions for water and energy efficiency	Easy to do, relatively low cost (may need to develop tool for AK City conditions), moderate – high impact	Medium
	Development of a discretionary fund for things such as employment of REBRI trained people to assist with demolition/ construction waste minimisation on	Easy to do, relatively low cost, low-moderate impact	Low

Barrier	Option to overcome	Ease of doability, cost & likely impact	Priority
	development projects		
18. Regulatory incentives	Adoption of rating tool such as TUSC as a mandatory feature around water and energy efficiency for new buildings	Hard to do, moderate cost, high impact	Low
	Providing floor area ratio bonuses within district plans to provide incentives for implementing sustainability features	Moderate ease to do, low cost, low-moderate impact	Medium
	Development of a “priority queue” or fast tracking process for sustainable buildings	Moderate ease to do, low cost, low impact	Low
	Development and implementation of in house guidelines and practice notes around discretion when considering minor infringement of rules and in the exercise of assessment criteria – guidelines to identify: a) when sustainable building outcomes are more important than other aspects and therefore should be given more weight; b) when sustainable building features are an acceptable form of mitigation for breach of rules and standards.	Low- moderate ease to do, low cost, low impact	Low
	Development of District Plan provisions to address the new Section 7 energy efficiency and renewable energy generation provisions within the Resource Management Act;	Moderate ease to do, moderate cost, high impact	High
	Advocacy to central government on changes to the New Zealand Building Code including strengthening the concept of “green buildings”.	Easy to do, low cost, low impact but current opportunity	High
19. Lack of consumer demand	Actively promoting to applicants for building and resource consent a simple checklist of ways to make their homes more sustainable. This could relate to the Beacon high standard of sustainability features and include simple measures such as good solar orientation, additional insulation, use of solar hot water systems, double glazing, passive vents in windows, low flow water fittings and rainwater tanks.	Easy to do, low cost, medium impact	High
20. Lack of information	Provision of dedicated staff support for sustainable building to provide advice and information. “Eco Advisor” – targeted at both in house advice (eg to property	Easy to do, low cost, high impact	High

Barrier	Option to overcome	Ease of doability, cost & likely impact	Priority
	section) as well as development community and home owners.		
	Information and sources of further advice on sustainable building in AK City eg information on payback periods, options - existing information referenced for AK City use	Easy to do, low cost if use existing information, medium impact	Medium
	Development of specific Auckland City guidelines and review of existing guidelines to promote sustainable building	Easy to do, low cost, moderate-high impact	High
21. Auckland Regional Public Health Service (ARPHS) views on water and wastewater.	Develop a Memorandum of Understanding with ARPHS around when dual reticulation, rainwater reuse, and greywater reuse are appropriate. This needs to be undertaken within the framework of the extensive research which exists demonstrating the safety of rainwater and greywater reuse for non potable purposes.	Moderate to do, low cost, high impact	High

6.2 Applicability of Auckland City Council case study to other local councils

There are many aspects of the Auckland City Council case study which are considered applicable to other local councils across New Zealand. In terms of those barriers which have been identified as generic, these are applicable to all local authorities. The regional barriers and incentives identified are applicable across the Auckland Region – affecting 1/3 of the nation’s homes. The issues around the Auckland Regional Public Health Authority and their attitudes to alternatives to reticulation and water and wastewater are particularly significant in this regard. Whether these attitudes are held by other Regional Public Health Authorities is unknown, but worthy of investigation.

With regard to the barriers which arise out of the analysis of the Auckland City Council policies, plans and practices, a preliminary evaluation would suggest that many are applicable to other local councils, particularly those in urban situations or those experiencing high growth. Table 8 below identifies the councils for which these learnings are likely to be applicable. Further work is needed to confirm this list.

Table 8: Councils for whom barriers identified in case study are likely to be applicable

North Island Councils
Whangarei City Council
Rodney District Council
North Shore City Council
Manukau City Council
Waitakere City Council
Papakura City Council
Hamilton City Council
Tauranga City Council
Rotorua Lakes City Council
Taupo District Council
Gisborne City Council
Napier – Hastings District Council
Wellington City Council
Kapiti Coast District Council
Porirua City Council
Hutt City Council
South Island Councils
Nelson City Council
Christchurch City Council
Dunedin City Council
Queenstown Lakes District Council

In addition to the above list, many of the barriers are likely to have aspects of applicability to other, smaller, councils that include urban settlements within their jurisdiction.

Table 9 identifies those barriers identified through the case study which are likely to be applicable to most urban councils.

Table 9: Barriers to sustainable building identified within Auckland City Council likely to be applicable to most urban councils ⁷

Barriers within district plans and their administration
No specific recognition of sustainable building features as desirable in policies and rules
Yard, building coverage & height in relation to boundary rules – barrier to optimum layout of dwelling in terms of solar design & use of rainwater tanks in residential situations*
Earthworks rules- no recognition in assessment criteria of positive benefits of high thermal mass concrete slab*
Carparking requirements mostly set minimum standards for numbers of carparks rather than maximums*
Resource consent required to reduce number of on-site carparks
Carparking requirements set minimum standards provide for larger vehicles. No discretion to provide some spaces for smaller vehicles
Carparking requirements often interpreted with little or no flexibility, requiring provision for on-site carparking where there is ample on the street and therefore resulting in unnecessary additional impermeable surface.
Limited recognition of role vegetation can play in blocking solar access or alternatively in moderating cooler southerly winds
On busy roads noise standards forcing mechanical ventilation of apartment units. No requirement for cross ventilation of units.
Energy production (eg small wind turbines) not recognised as an activity
Policy and implementation areas sometimes not “singing from the same hymn sheet”. Regulatory area generally less supportive of innovative initiatives.*
Barriers within codes of subdivision and land development, infrastructure connection standards
Road design and layout and lot layout requirements do not promote sustainability
Infrastructure standards are often set to ensure consistent infrastructure is built across the city (eg street lighting types) to create ease of maintenance, however these do not currently recognise the range of different situations encountered
No specific provision for sustainable water options as standard measures, extra levels of assurance, detailing & checking required for more sustainable building options. A conventional infrastructure driven approach.
Barriers arising from administration of the Building Act
Materials or technologies not covered in acceptable solutions are seen as a high risk by building consent staff and given higher scrutiny as well as requiring additional technical detailing before approval for use.
Energy efficiency & natural light provisions of the building code not given priority for enforcement*

⁷ Those barriers asterisked are likely to be largely applicable in situations where there is high growth and therefore significant additional pressure on timelines for compliance checks.

As many of the barriers identified are applicable to urban councils across the country, so the remedies are also largely applicable. Table 10 below summarises and provides comment regarding the impact for the range of remedies to the identified barriers which is likely to be relevant across the range of urban councils across the country.

Table 10: Assessment of effectiveness of a range of incentives to overcome barriers to sustainable building within local government

Incentive/ Way of overcoming barrier	Likely impact/ effectiveness as an incentive
Review of district plans to put in place a framework of objectives and policies and rules as appropriate which promote sustainable building	Creates a positive framework –in itself will not be a strong incentive, is a way of showing leadership and indicating that this issue is important
Review of district plan specific provisions such as yard, height in relation to boundary and building coverage rules to ensure assessment considers benefits of sustainable building options.	Removes a relatively minor barrier – but one which is particularly relevant for retrofitting and renovation to achieve sustainable building outcomes. Most houses affected are likely to be older – villa, bungalow era dwellings in older suburbs.
Review of Subdivision and Land Development Code of Practice to ensure that sustainable options are included and promoted as preferred options. Review of 3 waters Connection Standards to ensure that sustainable options are included and promoted as preferred options	Highly effective and significant incentive for new development; also has impacts for major retrofits and particular technologies (eg rainwater & greywater re-use). Difficult to achieve sustainable water outcomes and many neighbourhood outcomes in particular without doing this. This is an area that some councils eg Waitakere City Council, North Shore City Council, Christchurch City Council have put a major focus on.
Training of building (and planning) staff with regard to sustainable building options and how to deal positively with and place priority on these. Where training programmes are not available, working with industry providers and other councils in the region to get such programmes put in place	Removes what can be a significant barrier for small and medium scale sustainable housing improvements where homeowner has only a moderate level of commitment. Particularly significant for the retrofit market.
Review of District Plan rules and guidelines around apartment and mixed use design to ensure consistency with building code standards around % glazing, % opening windows, ventilation etc	A relatively minor issue except for councils dealing with apartment style developments – Auckland Region, Wellington Region, Queenstown & Tauranga likely to be where this is the most relevant
Review consent process to ensure input from policy staff to support sustainable building developments.	Mainly an issue for large councils where the number and location and staff can mean policy direction is slow to be implemented through the consent process. Mainly a “smoothing the process” issue.
Development of internal guidelines/acceptable practices/practice notes around key sustainable building measures.	Particularly useful for large/ high growth councils where standard procedures and guidelines mean an easier process for the sustainable building applicant. Will assist in particular with technologies and approaches not currently in common use such as atrium assisted ventilation in apartments, greywater re-use, solar hot water.

Incentive/ Way of overcoming barrier	Likely impact/ effectiveness as an incentive
Working with appropriate agencies (DBH, BRANZ) to develop Acceptable Solutions for a wide range of sustainable building methods	Particularly helpful for smaller councils who will only encounter some technologies occasionally so don't have as much opportunity to develop experience with them. Will also assist in "mainstreaming" things such as solar hot water, as will reduce processing time and complexity of information required by the applicant.
Training of frontline engineering staff on demand management and water efficiency options.	Very important to achieve sustainable water solutions. Particularly relevant in councils which charge for water, as there is already a pricing incentive for retrofitting.
Review of water charges to better support water efficiency and encourage demand management.	Relevant for councils who meter and charge for water – Auckland Region, Tauranga, Nelson at the moment.
Direct subsidy or loans for some sustainable features eg rainwater tanks	Anecdotally unless the subsidy is very high, take-up is low (eg 4-5 per year for rainwater tanks in Waitakere), but this can send the right signals about how important the issue is.
Promotion and branding of sustainable building as a desirable outcome and mainstream thing to do (utilise existing council communication methods eg council newsletters, website, media releases)	A useful and low cost initiative that all councils should be encouraged to do.
Council commitment to sustainable building in own practice – through development and implementation of a sustainable building code for all new council buildings and retrofitting of existing buildings, targeting energy and water efficiency in the first instance. Clear documentation and monitoring of the projects to demonstrate cost savings and other benefits.	An important leadership issue; also enables empirical data to be collected around particular technologies, assists also in growing the industry capacity (architects & builders) in building sustainably.
Development of a "sustainable building code" for buildings within Auckland. This would include detailed information on the briefing, design and construction process.	Best done by developing codes for different building types cf. Waitakere's Better Building Code for council and public buildings and Sustainable Home Guidelines.
Information on funding opportunities referred to in Council information, links to EECA websites etc	Easy and simple thing which adds to the number of sources accessed by the community pointing them to places they can get information.
Active promotion of current sustainable building ratings tools such as TUSC and the Green Homes Scheme and highlighting the benefits to home owners of dwellings which have been assessed with these schemes.	Active promotion of home rating as a desirable thing is a critical step in achieving greater consumer demand for sustainable homes. Ideally one preferred home rating scheme should be developed in New Zealand that all councils sign up to. It's very important that it is easy and cheap to rate houses or take up will be small. In the absence of any central government policy on this issue, individual councils will need to assess the current two schemes (and any others which arise) and determine which is most suitable for them. TUSC looks like the best option in the Auckland Region because it assesses energy and water and Waitakere is

Incentive/ Way of overcoming barrier	Likely impact/ effectiveness as an incentive
	already using it as the basis of development contribution reductions.
Free design review for sustainable buildings	Largely only useful for those already intending to build sustainably. Small incentive for the interested but uninformed also. May be most useful as a learning incentive for the design industry.
Rates remission for homes which meet set sustainability standards	<p>Would be a significant incentive, if the level of remission was sufficient. Particularly useful to encourage retrofits.</p> <p>Requires a decision on criteria – ideally linked to an empirical rating system. Most councils are reluctant to remit Uniform Annual General charges which pay for services such as rubbish, water supply (in non metered areas) and wastewater however these are likely to be the services most positively impacted by sustainable building. As they are often a significant portion of the rates, if Uniform Annual General Charges are not included in remission may not be a strong incentive.</p>
Adoption of rating tool such as TUSC for development contributions reductions for water and energy efficiency	Only targets new development. Waitakere's current approach from 1 July 2006. Monitoring will determine effectiveness, but anecdotally there is a lot of take-up of basic low flow devices in new developments in Waitakere in order to get development contribution reductions.
Development of a discretionary fund for things such as employment of REBRI trained people to assist with demolition/ construction waste minimisation on development projects	Most useful on large developments. Could also assist in developing greater building industry understanding/uptake of more sustainable approaches.
Adoption of rating tool such as TUSC as a mandatory feature around water and energy efficiency for new buildings	Similar to the BASIX approach in New South Wales. Would have a massive impact on new development and have flow on effects for the retrofit market. May not be easily achievable with current RMA framework due to Environment Court process.
Providing floor area ratio bonuses within district plans to provide incentives for implementing sustainability features	Mainly useful in high density fast growing council areas eg centres of major cities. Has been an effective measure to achieve other outcomes (eg heritage protection).
Development of a "priority queue" or fast tracking process for sustainable buildings	Informal approach already undertaken by some councils eg Wellington City. Relatively minor effect as an incentive.
Development and implementation of in house guidelines and practice notes around discretion when considering minor infringement of rules and in the exercise of assessment criteria – guidelines to identify: a) when sustainable building outcomes are more important than other aspects and therefore should be given more weight; b) when sustainable building features are an acceptable form of mitigation	Minor effect. Useful as an interim measure prior to Plan Changes being put into place. Difficulty arises because many positive outcomes (eg good urban design, ecological responsiveness) seek the same priority approach.

Incentive/ Way of overcoming barrier	Likely impact/ effectiveness as an incentive
for breach of rules and standards.	
Development of District Plan provisions to address the new Section 7 energy efficiency and renewable energy generation provisions within the Resource Management Act;	Very important for new development, may be able to be used for large scale retrofits. Potential impact and effectiveness is difficult as no council has yet done this. May be extensive Environment Court litigation so many councils will want to watch some "leaders" introduce measures first.
Advocacy to central government on changes to the New Zealand Building Code including strengthening the concept of "green buildings".	Something everyone should be encouraged to do. The Building Code sets minimum standards and the challenge is to set the bar as high as possible.
Actively promoting to applicants for building and resource consent a simple checklist of ways to make their homes more sustainable. This could relate to the Beacon high standard of sustainability features and include simple measures such as good solar orientation, additional insulation, use of solar hot water systems, double glazing, passive vents in windows, low flow water fittings and rainwater tanks.	Could be significant, particularly in driving consumer demand and understanding.
Provision of dedicated staff support for sustainable building to provide advice and information. "Eco Advisor" – targeted at both in house advice (eg to property section) as well as development community and home owners.	Could be particularly useful for the new home or major retrofit market. MFE funded trial underway with Waitakere, Hamilton and Kapiti Coast Councils and BRANZ will help assess effectiveness.
Information and sources of further advice on sustainable building in the local area eg information on payback periods, options - existing information referenced for local area use	Important
Development of specific local council guidelines and review of existing guidelines to promote sustainable building	Mainly a leadership/ commitment issue. Development of some generic guidelines which councils can "individualise" could be useful. A similar approach has been taken under the Urban Design Protocol.
Develop a Memorandum of Understanding with Regional Health Authorities around when dual reticulation, rainwater reuse, and greywater reuse are appropriate. This needs to be undertaken within the framework of the extensive research which exists demonstrating the safety of rainwater and greywater reuse for non potable purposes.	Critical to achieving a consistent approach around sustainable water solutions. An issue which may be in the longer term best dealt with at a national level.

7. CONCLUSION AND RECOMMENDATIONS

A range of barriers and incentives to sustainable building within Auckland City have been identified. Many of these barriers are “generic” or common to all territorial areas within New Zealand, and many are widely applicable to urban councils. A smaller number are specific to Auckland City. The case study analysis indicates that many of the barriers are significant issues in the development of “real life” sustainable buildings. None of the barriers identified are insurmountable and the report identifies a range of potential actions which on preliminary analysis can be undertaken to address the barriers.

In terms of impact, the barriers within the regulatory documents are considered to be minor, with the exception of the codes of development standards and connections. In Auckland City the most significant barrier is probably around sustainable water solutions, as the current Metrowater approach in terms of lack of staff support, connection standards and the Statement of Intent combines to provide a very significant barrier.

Recommendations have been made to Auckland City Council in a companion report to this one, which recommends the following actions as a high priority for the Council to investigate:

1. Provision of dedicated staff support for sustainable building to provide advice and information. Role targeted at both in house advice (eg. to property section) as well as externally to the development community and home owners. This could be done in conjunction with the MFE/BRANZ funded “eco advisor” pilot programme;
2. Provision of education/information on sustainable building in Auckland City including links to existing websites and publications around sustainable building best practice;
3. Information on funding opportunities referred to in Council information, links to EECA, Consumer Build, MFE, BRANZ websites etc;
4. Promotion and branding of sustainable building as a desirable outcome and mainstream thing to do (utilise existing Council communication methods eg Auckland City Scene, website, media releases)Development of specific Auckland City guidelines and review of existing guidelines to promote sustainable building;
5. Active promotion of current sustainable building ratings tools such as TUSC and the Green Homes Scheme and highlighting the benefits to home owners of dwellings which have been assessed with these schemes.
6. Free design review for sustainable buildings;
7. Regular training of building consent and planning staff around sustainable building practices and techniques. Where training programmes are not available, working with industry providers and other councils in the region to get such programmes put in place;
8. Development of internal guidelines/ acceptable practices/ practice notes around key sustainable building measures;
9. Review consent process to ensure input from policy staff to support sustainable building developments;
10. Actively promoting to applicants for building and resource consent a simple checklist of ways to make their homes more sustainable. This could relate to the Beacon High Standard of Sustainability features and include simple

measures such as good solar orientation, additional insulation, use of solar hot water systems, double glazing, passive vents in windows, low flow water fittings and rainwater tanks;

11. Advocacy to central government on changes to the New Zealand Building Code including strengthening the concept of “green buildings”.
12. Review of the Auckland City Council Codes of Subdivision and Development standards and Metrowater Development and Connections Standards to provide a framework where sustainable building solutions are considered standard, and encouraged ahead of less sustainable options.
13. Training of frontline Metrowater staff on demand management and water efficiency options;
14. Review of Metrowater Statement of Intent to provide emphasis on achieving sustainable water management and sustainable building goals.
15. Development of District Plan provisions to address the new Section 7 energy efficiency and renewable energy generation provisions within the Resource Management Act;
16. Review of the development contributions policy to determine whether there are further remissions which could be put in place
17. Council commitment to sustainable building in own practice – through development and implementation of a sustainable building code for all new Council buildings and retrofitting of existing buildings, targeting energy and water efficiency in the first instance;
18. Develop a Memorandum of Understanding with ARPHS around when dual reticulation, rainwater reuse, and greywater reuse are appropriate. This needs to be undertaken within the framework of the extensive research which exists demonstrating the safety of rainwater and greywater reuse for non potable purposes.

The next steps in this project are to take the learnings from this analysis and develop a tool kit for local government around the barriers and ways to overcome them. This will involve a process of discussing the issues with representatives from some other councils to confirm the relevance of this case study to the wider New Zealand situation.

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Key Interviewees

Bob De Leur	Principal Building Officer, Auckland City Council
Graeme Michie	Project Manager Regulatory Services, Auckland City Council
Sue Evans	Urban Designer Central Area, Auckland City Council
Sarah Coady	Urban Designer Isthmus Area, Auckland City Council
Deepak Rama	Resource Management Planner, Auckland Regional Public Health Service
Cherry Morgan	Healthy Housing Programme, Auckland Regional Public Health Service
Phillip Howard	Green Homes Scheme Assessor
Maggie Lawton	Landcare Research
Stuart Bracey	Housing New Zealand
Chester Buller	University of Auckland
Robert Vale	University of Auckland
Tony Miguel	Group Manager Assets, Waitakere City Council
Megan Courtney	
Matt Heale	

APPENDIX ONE: SCOPE OF BUILDING DESIGN FEATURES CONSIDERED TO BE “SUSTAINABLE FEATURES” IN RELATION TO DISTRICT PLAN ANALYSIS

Feature	Development Type feature is suitable for use in					Implication
	Residential	Multi-unit/ apartment residential	Commercial office	Industrial	Education/Health/ Other specialist	
Passive solar design	Yes all	Yes all	Not always – glare is an issue	Yes all	Depends on function – eg classrooms in schools can be an issue with overheating	<ul style="list-style-type: none"> ▪ 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	Yes	Yes	Yes – this is almost always the best option	<ul style="list-style-type: none"> ▪ 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	Yes all	Yes all	Yes all are needed to avoid potential overheating in highly occupied classrooms	<ul style="list-style-type: none"> ▪ generally double building code minimums
Solar hot water system	Yes all	Yes as shared pre-heat system	Yes	Yes	Yes where sufficient hot water use eg school changing rooms, hospital	<ul style="list-style-type: none"> ▪ Either 1 system per building on north facing room or option of pre-heating for multi-unit development on north facing roof
Multi pane windows (double glazing)	Yes all	Yes all	Yes all	No	Sometimes	
Wind generation	Yes on off grid sites (eg Grt Barrier)	Yes on off grid sites	No	May be appropriate	May be appropriate	<ul style="list-style-type: none"> ▪ height of wind turbine ▪ noise from wind turbine

Feature	Development Type feature is suitable for use in					Implication
	Residential	Multi-unit/ apartment residential	Commercial office	Industrial	Education/Health/ Other specialist	
Energy						
Day - lighting/ provision of atria or lightwells	N/A	Yes depending on depth of building & orientation	Yes depending on depth of building & orientation	Yes depending on depth of building & orientation	Yes depending on depth of building & orientation	
Photovoltaic panels	Yes on off grid sites (eg Grt Barrier)	Unlikely	No	May be appropriate	May be appropriate	<ul style="list-style-type: none"> ▪ North facing roof
Water						
Rainwater tanks	Yes all	Yes all	Yes all	Yes all	Yes all	<ul style="list-style-type: none"> ▪ 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	Yes all	Yes all	Yes all	
Landscape treatment using plants which do not require watering	Yes all	Yes all	Yes all	Yes all	Yes all	
Indoor Environment Quality						
Natural ventilation with minimum airflows	Yes all	Yes - issues where high noise	Yes with smaller buildings, owner occupiers and no acoustic issues	Yes all	Depends	
Low VOC emitting materials	Yes all	Yes all	Yes all	Yes all	Yes all	

Feature	Development Type feature is suitable for use in					Implication
	Residential	Multi-unit/ apartment residential	Commercial office	Industrial	Education/Health/ Other specialist	
Indoor Environment Quality						
Low moisture	Yes all	Yes all – gen. requires mechanical ventilation	NA	NA	NA	<ul style="list-style-type: none"> ventilation of bathroom, kitchen & laundry no unflued gas appliances
Waste						
Provision for Recycling	Yes all	Yes all – needs to be on a building wide scale	Yes all– needs to be on a building wide scale	Yes all– needs to be on a building wide scale	Yes all	
Minimise building waste	Yes all	Yes all	Yes all	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	Yes - though depends on what else is required on roof	Sometimes	Sometimes	
Swales, rain gardens, infiltration pits	Yes	Yes	Yes	Yes	Yes	
Stormwater tanks	Sometimes	Sometimes	Sometimes	Sometimes	Sometimes	<ul style="list-style-type: none"> 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	No	No	In some instances – non reticulated areas	
Greywater re-use	Yes	Yes	No	In some instances	No	

Feature	Development Type feature is suitable for use in					Implication
	Residential	Multi-unit/ apartment residential	Commercial office	Industrial	Education/Health/ Other specialist	
Materials with low life cycle cost	Yes all	Yes all	Yes all	Yes all	Yes all	
Allowance for innovative sustainable materials eg rammed earth, straw bales	Yes all	Yes all	No	In some instances	Yes all	
General						
Cycle storage	Yes	Yes	Yes	Yes	Yes	
Pedestrian focus to building (prominent entry)	Yes	Yes	Yes	Yes	Yes	
Building design life exceeds the Building Code	Yes	Yes	Yes	Yes	Yes	
Minimise earthworks	Yes	Yes	Yes	Yes	Yes	
Minimise impermeable surfaces	Yes	Yes	Yes	Yes	Yes	
Minimise impact on ecological values (eg bush, streams, large trees)	Yes	Yes	Yes	Yes	Yes	
Adaptability to future uses eg provision of home office, high stud ground floor in CBD etc	Yes	Yes	Yes	Sometimes	Sometimes	

Feature	Development Type feature is suitable for use in					Implication
	Residential	Multi-unit/ apartment residential	Commercial office	Industrial	Education/Health/ Other specialist	
Fit with local environment (eg minimise driveway length, retaining walls)	Yes	Yes	Yes	Yes	Yes	
Efficient design eg co-location of kitchen/bathroom for pipework efficiency	Yes	Yes	Yes	Yes	Yes	
Minimise car parking	Yes	Yes	Yes	Yes	Yes	

APPENDIX TWO: NON RESIDENTIAL EXAMPLES OF SUSTAINABLE BUILDINGS IN AUCKLAND CITY

Population Health Building, University of Auckland Tamaki Campus

The Population Health Complex provides a new 'Green Gateway' to the University of Auckland's Tamaki Campus, this new \$20m, 11,000m² four level building project aimed to include a number of sustainable design features. The site gained planning consent in late 2001 and is zone Special Purpose 2 and is located at 261 Morrin Road, Penrose.

Client:	Auckland University
Architect:	Architectus
Engineers:	Connell Mott MacDonald
ESD Consultant:	Connell Mott MacDonald
Contractor/Builder:	Fletcher Construction



Sustainable features of the building

The building creates new major sheltered courtyards, covered ways and linkages to existing buildings for the exposed site. The plan form was developed to encourage as much use of natural light and ventilation as possible. 12-15 metre floor plates were provided linked to atria and courtyards. The courtyards act as sunny summertime meeting spaces whereas the main atrium provides a similar facility in winter. The atrium also assists with natural and smoke ventilation. The two upper floors are naturally ventilated, with the two lower mechanically controlled.

The upper two floors utilise extensive solar shading and exposed thermal mass of a shell beam structure to passively provide natural temperature control. Motorised window openers controlled by the Building Management System (BMS) help with natural ventilation. A high level of individual control in these floors is provided; this allows the occupants to control the artificial lighting, natural ventilation and manually operated blinds via user control panels linked to the BMS.

The design of the building resulted in reduced heating and cooling loads, this allowed spare plant capacity from adjoining buildings could be used to service the building without the need for dedicated plant. The lower two floors of the building use shell beam cores for mechanical ventilation and thermal mass actively which reduces night time cooling in winter and encourages diurnal/overnight pre-cooling in summer. The air floors are 'active' in sealed parts of the building and passive in naturally ventilated parts of the building.

High levels of insulation were used throughout the building (double the current Building Code requirements), forming a super insulated building enclosure.

An advanced lighting control system is used to maximise daylighting potential and to relate lighting use to occupancy. Artificial lighting is provided by T5 fluorescent fixtures, which are programmable via the BMS. The artificial lighting system has an energy load of 11 W/m², which is half the current NZ Standard.

The approach to waste minimisation and recycling concentrated on minimising the initial use of materials, finishes and their future replacement over the life of the building. Plantation timbers have been used throughout the building along with the use of certified materials including paint certified under the Environmental choice New Zealand labelling scheme.

The key sustainability features can be summarised as:

- Narrow floor plates to make extensive use of Natural Ventilation and Lighting;
- Shading to reduce overheating;
- Exposed thermal mass for winter heat storage and mass cooling in summer;
- Efficient lighting systems with automated daylight and occupancy controls;
- High levels of insulation.

Planning and regulatory process

The University's policy is to adopt sustainable design where it can be demonstrated to be practical and viable. In the case for Population Health a sustainable design was entirely appropriate but in general the University looks for long term sustainable solutions that are efficient and provide good environmental conditions for staff and students. Because the Population Health Building incorporated sustainable features and technology readily available 'off the shelf', it should be noted that the Population Health building focused on what were regarded as practical sustainable solutions and it did not test the boundaries as much as other projects, such as the Landcare Research building.

Because the building only made use of practical solutions and standard practice, without going to the lengths of requiring the use of specific waste water schemes for example, there was little Council interaction either way regarding concerns about sustainability. In this sense the Population Health Building is a perfect case study as it uses nothing out of the ordinary (apart from well thought out design) to achieve a good result, with a low level of Council support, or interference.

Resource consent was required for infringements to the volcanic cones height control and because the proposed activity was not provided for in the Tamaki Campus Concept Plan. However, these were addressed through the planning process with no changes required to the design.

Enabling factors which helped the project through the planning process

In addition to the factors mentioned above the construction team employed a Planning Consultant (Haines Planning) to deal with all consent applications. Using this third party facilitated the consents process as it gave both the Council and design/construction team an experienced consultant to interact with.

Barriers to the process or to inclusion of particular features

As stated above there was little input needed from the Council to achieve their goals and in a parallel way there were few features within the building which caused concerns to the Council Regulators. Because of this, no features planned at the design stage had to be excluded for regulatory reasons.

There was a potential problem relating to the natural ventilation strategy used in the building, or more particularly, the atrium. There were questions raised over the dual use of the ventilation system as a smoke extract system and the possibility of smoke/fire spread between otherwise separate areas of the building. However after an extensive peer review process the Council ultimately accepted the dual use of this atrium.

Suggested changes and improvements to the planning process

The design team noted that, in general, there appears to be reluctance on the part of the Council to accept solutions that were out of the ordinary, or were not included in the acceptable solutions available. This was the underlying motivation for the design team in only using standard technologies in the Population Health building. The use of non-standard solutions would often mean the Council would require a peer review, which adds to the project cost and time.

This, in turn, led to a desire to see the Acceptable Solutions expanded to include sustainable building solutions. This ultimately relates to the New Zealand Building Code and it is expected that sustainability is likely to have a greater presence in the Code's upcoming review in 2007. Ultimately, sustainability in building is only going to become more important and it is recognised that the Acceptable Solutions need to be improved. Most industry people appreciate the need for sustainable design in the longer term and accordingly there is a need for the Council to have the tools and an interest to foster it.

An incentive of large cash injections was recognised as being unrealistic, though it was thought that some funding or a loan could be made available for the cases where the payback is short (thus enabling a pay back). Also mooted was some penalty for non use of local resources however that could be counter-productive.

Overall there was a need for some level of expertise which could be made available to demonstrate the advantages of sustainable design on a project by project basis. This would hopefully provide real solutions rather than 'fuzzy talk' in broad terms.

Landcare Research Building, University of Auckland Tamaki Campus



The Landcare Research building contains several features which would normally preclude sustainable design. Despite this the design team were able to produce a solution which is one of, if not the, 'greenest' building in New Zealand. It was important that Landcare Research, being in the business of sustainability, have a building which others could not only see as an example to follow, but also a learning experience from which they could learn and adapt into their own building process.

The 5,000m² building was constructed to house 60 Landcare staff, 25 staff from the Ministry of Agriculture and Fisheries (MAF) plus additional university researchers and completed in 2003. Also housed in the building are the national insect collections and the national fungi collections (with around 6.5 million and 600,000 specimens respectively) in a state of the art facility; laboratories with containment facilities to international standards; and containment and propagation glasshouses.

Sustainable features of the building

The design team set an energy use target of operating costs 60-70% below standard practice or an Energy Use Index of 100kWh/m²/yr compared with 200 kWh/m²/yr for offices and 300 kWh/m²/yr for laboratories. To facilitate this, the building envelope was optimised by using double glazing, higher than code levels of insulation (which has been 'weighted' to areas where it will be most effective) and sensible use of materials to make use of thermal mass. Solar hot water heating is also used in the cafeterias and laboratories.

The largest single energy end-use is the extract systems for the fume cupboards. Heat recovery has been installed on all ventilation systems, fridge/freezer units and some of the fume cupboards to further reduce energy use.

Another aim of the brief was to be virtually water-neutral. This was facilitated through the use of an extensive rainwater recycling scheme. The rainwater collected was used in ground floor toilets and for external use in gardens and irrigation. The power required to pump the system is supplied by a wind turbine on site. The extra cost involved in this system was offset by the reduced requirement for downpipes and connections to the mains or sewers. Carparks and other traditionally 'hard' areas were designed to be porous with excess rainwater running into rain gardens. In order to further reduce water usage composting toilets were used on the first floor, and waterless urinals were used throughout. All washbasins have low flow taps.

Finally the internal fit-out was left intentionally bare to minimise use of materials. Where finishing materials have been used (carpets and flooring systems for example) care has been taken to ensure that products specified are fully recyclable when they come to the end of their life.

Key sustainability features incorporated within the building are:

- Rainwater recycling and greywater systems, powered by an on-site windmill;
- Composting toilets and waterless urinals to reduce dependence on mains water;
- Heat recovery from ventilation and extract systems;
- Exposed thermal mass for winter heat storage and mass cooling in summer;
- Higher than code levels of insulation and double glazing;
- Solar Hot Water;
- Energy efficient lighting systems.

Client: Landcare Research
Architect: Chow Hill Architects Limited
Engineers: Connell Mott MacDonald
ESD Consultant: Robert Vale, Auckland University
Contractor/Builder: Hawkins Construction

Planning and regulatory process

The design team anticipated more concern from the Council than they encountered. The design process incorporated a series of early planning workshops involving all key stakeholders in the design and construction process. This included staff from the Council who assisted with the planning process. This helped in creating a very in-depth process for assessing the sustainability of all aspects of the building as the planning and construction processes took place.

Unlike in other projects there also appeared to be no discrepancy between the policy and regulatory arms of the Council. This helped the planning and construction of the building go through a consistent consent process.

In terms of the planning process it is identified that this is largely because the features generally did not trigger the need for resource consent. Resource consent was required primarily for infringement of the volcanic height control and because the proposed activity was not specifically listed in the concept plan for the Tamaki Campus. However, the stormwater tanks were located in the front yard setback. Within the planning report there is no discussion of the sustainable features, any adverse effects of the infringements were assessed as no more than minor.

Barriers to the process or to inclusion of particular features

The main cause of concern in this area was the use of composting toilets. It was found that, on the whole, the area was poorly understood by members of the Council who were wary of their use despite the fact that the system met all relevant New Zealand and Australian standards. Ultimately however they were not used throughout the building because of practical issues relating to the excavation of the basalt layer under the building for the collection units, which would have been below flood level. This, plus the additional costs associated with excavation, extra pumping, tanking and ventilation, made ground-floor composting toilets impractical and uneconomic. The mix of toilet types meant the building was then connected to the available sewer, thus meeting the requirements of NZBC Clause G13. Landcare also had an on-site soil sterilisation system to treat effluent. It should be noted that

the use of this sort of facility is the exception rather than the rule. Once these design changes were made the Council had no further issues with the use of composting toilets in the building.

A minor issue was the small windmill used for the pumping of the rainwater system. This was considered a little strange but no issues were raised as long as it remained under the height restriction of 12 metres.

Suggested changes and improvements to the planning process

The clients were of the opinion that, for sustainable development and design to become mainstream, councils need actively to promote such an approach through a range of mechanisms, and they also need to coordinate between their planning and consent departments to give a consistent message. While the two branches worked well together in this case, there is always a risk that the planners and the regulators in a council work in separate silos and that they can sometimes work against each other.

An improvement which was viewed as necessary in the greater regulatory sense was a move away from working to minimal Building Code and compliance standards, or that those standards will need to change to encourage more sustainable behaviour. Ideally there would be clear specifications that regulators (and developers) can refer to for specific green technologies. While there is scope within the regulations to work to a higher level of specification most people only adhere to the minimum requirements rather than go beyond it. This is partly due to the lack of information and guidelines mentioned above, and also the lack of financial information as to the costs and benefits of sustainable features.

It was felt that incentives in general will help but they would need to be carefully thought through. Flat payments were not necessarily required; other options were differential rates or a range of approaches. Again concerns were raised about Metrowater. The Landcare building is virtually water-neutral, yet still maintains a mains connection as a dry weather back-up. Unfortunately Metrowater offers no reduction in mains charges, unit rates or even a 'low user' plan as electricity suppliers do.

APPENDIX THREE SUMMARY OF ANALYSIS OF THE AUCKLAND CITY DISTRICT PLANS

Features		Isthmus	CBD (incl. Victoria Quarter)	Gulf Islands
Energy	<p>Passive Solar Gain</p> <p>High Thermal Mass</p> <p>High Levels of Insulation</p> <p>Solar Hot Water System</p> <p>Multi-pane windows (double glazing)</p> <p>Wind Generation</p> <p>Daylighting / lightwells or atria</p> <p>Photovoltaic panels</p>	<p>Network utilities provides for basic utilities, no reason why electricity generated by wind would not be included in this. However, does not mention on-site provision of energy. A required structure for this would be discretionary which is reasonable.</p> <p>Residential provisions acknowledge sunlight as a renewable energy source, for passively heating homes, solar receptors and water heaters.</p> <p>Potential barriers relate to the conflict between urban design, and character provisions and what takes higher priority. These relate to fronting road, window to wall ratio retained, etc.</p> <p>Residential Design Guide identifies energy efficiency as a key element for Residential 8 – and can be used to guide intensive development.</p> <ul style="list-style-type: none"> - Seeks to reduce energy consumption through dwelling design, orientation and layout, building techniques and the use of energy reducing technology. - Good design suggestions include use of solar energy, low energy appliances and lighting, sealing wall, roof and floor openings to reduce heat loss, lightwells, etc. - Includes site layout and consideration of site context as first point, i.e. orientation <p>Business zones reflect residential standards for habitable rooms in terms of daylight and solar gain. But there is nothing specific to energy efficiency in commercial buildings.</p>	<p>Victoria Quarter - Provisions have a strong connection to orientation (north-west outlook) and sunlight access through stepping development.</p> <p>Identifies the opportunity to promote low energy buildings including passive heating and cooling.</p> <p>Design assessment criteria provides for sunlight, and maximising solar access.</p>	<p>Plan seeks to foster continuation of low impact systems for energy supply, by avoiding large scale reticulation in the outer islands until sustainable, efficient and cost effective solutions can be produced. Seeks to foster alternative solutions to energy supply.</p> <p>Recognises the importance of building orientation.</p> <p>No significant barriers to sustainable energy features have been identified. In fact the lacks of reticulated services make these alternatives more readily acceptable than in the urban setting perhaps.</p>

Features		Isthmus	CBD (incl. Victoria Quarter)	Gulf Islands
Water	Rainwater tanks Dual flush toilets & water efficient fittings Landscape treatment	Residential Design Guide identifies the use of appliances and systems which conserve water as a good design suggestion.		Plan seeks to foster continuation of low impact systems for water supply, by avoiding large scale reticulation and seeks fostering alternative solutions to water supply. Encourages alternative technological approaches to water use.
Water				
Indoor Environment Quality	Natural ventilation Low VOC emitting materials Low moisture	<p>General provisions for residential development requiring acoustic privacy.</p> <p>Residential Design Guide addresses noise and ventilation. Good design suggestions include:</p> <ul style="list-style-type: none"> - noise resistant wall, ceiling and floor construction - location of habitable rooms - insulation of plumbing - double glazing - sealing gaps - solid core doors - natural ventilation preferred to mechanical. <p>Business reflects issue of acoustic privacy in mixed use development, and residential interface. Noise controls for residential units in Business zones.</p> <p>Nothing for ventilation in commercial buildings, and in fact the noise requirements would make this difficult.</p>	<p>Victoria Quarter - Policy requiring minimum accommodation unit sizes encourages natural ventilation. Specific standards for ventilation and noise.</p> <p>Design assessment criteria provides for ventilation, and the incorporation of mechanical and electrical systems that optimise energy efficiency.</p>	
Waste	Provision for recycling Minimise building waste Provision for composting	<p>Residential Design Guide identifies that facilities for recycling household waste, and good design suggestions include:</p> <ul style="list-style-type: none"> - use building products which are recycled - provision of bulk rubbish bin service for large developments <p>Business encourages use of brownfield sites, providing incentives for this. Otherwise simply requires provision of solid waste storage facilities (recycling and general).</p>	<p>Victoria Quarter - Adequate storage for recycling and general waste.</p> <p>Design assessment criteria encourage use of durable low maintenance materials, building and demolition to maximise use of waste materials for recycling and reuse.</p>	<p>Waste management and disposal identified as key issue throughout islands. Waste minimisation sought as essential part of any strategy, and options for cleaner production are identified as well as reuse and recycling.</p> <p>Given the constraints of waste management in the islands, the plan appears to be more open to alternatives. However, methods should be based upon securing a minimum environmental impact.</p>

Features		Isthmus	CBD (incl. Victoria Quarter)	Gulf Islands
Waste		District Plan does not provide much opportunity for waste minimisation policy. Councils usually have a separate policy on this.		
Stormwater	Green roofs – extensive and intensive Swales, rain gardens, infiltration pits Stormwater tanks	<p>Required to meet the Code of Urban Subdivision and Development. This can be a barrier depending on how flexible it is.</p> <p>On-site Stormwater Management techniques applying to Residential 8 provided effective imperviousness down to 60%, OSM techniques from ACC manual deemed to meet rule.</p> <p>Residential Design Guide seeks to provide flexibility relating to minimum permeable surface to accommodate alternative solutions such as detention options.</p> <ul style="list-style-type: none"> - paving should be semi-porous to maximise infiltration - use of gobi blocks and other semi-permeable materials for access lanes <p>Business requirements for site to sustain infrastructural servicing needs. If can't meet must be able to demonstrate ability to meet own servicing needs. However, this is through physical provision or financial contribution and is not likely to include sustainable features as a alternative.</p>	<p>Victoria Quarter - Opportunity to encourage development with landscaping and low impact stormwater design principles on-site. Incorporation of on-site stormwater conservation measures should be considered.</p> <p>Only barriers here will be the infrastructure standards that will be required. The policy is there to include sustainable features in design of development.</p>	<p>Stormwater disposal in accordance with bylaws and regional requirements. Criteria that proposal does not create demand for services or infrastructure at cost to wider community.</p> <p>There are no detailed specific provisions, mainly because these issues are most prominent in urban settings. Most sites would deal with stormwater on-site, and given the lack of reticulation generally alternatives would be more readily accepted.</p>
Wastewater	Greywater re-use Composting toilet	<p>Only provisions relevant were requirements to meet code of urban subdivision and development. Therefore meeting servicing requirements.</p> <p>No discussion of alternatives.</p>		<p>Where necessary, small scale alternative sewage disposal systems are appropriate but generally encourages conventional disposal systems. Encourages alternative technological approaches to liquid waste disposal.</p>

Features		Isthmus	CBD (incl. Victoria Quarter)	Gulf Islands
				Disposal of effluent required on land, and in accordance with bylaws and regional regulations.
Materials	<p>Materials with low life cycle</p> <p>Allowance for innovative sustainable materials</p>	<p>Residential provisions seek sympathetic architecture, but do not address materials. However, this could cause a potential barrier if materials do not fit in with the traditional character of the neighbourhood.</p> <p>Plan Change 163 in relation to Residential 1 and 2 seeks same or similar materials of the existing building consistent with traditional character and materials of existing buildings on site and on street.</p> <p>Residential design guide:</p> <ul style="list-style-type: none"> - encourage use of building products which are environmentally friendly - developments designed to contain materials that minimise resource use and consumption <p>Nothing identified in the Business zones.</p>		Seeks that effects on natural and physical resource maintains the future use potential of any renewable resources, and that where non-renewable resources are used the potential for future sustainable use of land is not reduced (not really related to materials but resources').
Car parking	Minimise carparking	<p>Minimum on-site car parking standards apply. Off-street parking is required to meet expected busy periods. Lower levels of off-street parking require resource consent.</p> <p>Financial requirements (additional rates) are also required in areas of historic under provision.</p>	Limits car parking, A maximum amount of car parking is allowed, rather than a minimum. On-site car parking is restricted based on floor area and street-type.	On-site car parking standards apply. Exceptions are provided where there are significant effects on the natural environment, or where parking has traditionally been provided on-street.
General	<p>Cycle storage</p> <p>Pedestrian focus</p> <p>Life of building >50yrs</p> <p>Minimise earthworks</p> <p>Minimise impermeable surfaces</p>	<p>Provisions for controlling earthworks, whether these are particularly minimised more dependent on slope and assessment of proposed earthworks.</p> <p>Impermeable areas also controlled, but not specific minimisation policies.</p>	<p>Bonus floor areas for specific features such as cycle facilities.</p> <p>Victoria Quarter - Seeks redevelopment complementary to surrounding subdivision and street network.</p>	<p>Recognition of significant environmental features, such as ecological corridors, habitat or indigenous species, integration of ecosystems. Given the sensitive environment of the islands.</p> <p>Earthworks necessary for community and educational facilities and multiple dwellings to create minimum</p>

Features		Isthmus	CBD (incl. Victoria Quarter)	Gulf Islands
	<p>Minimise ecological values</p> <p>Adaptability</p> <p>Fit with local environment (i.e. min driveway length)</p> <p>Efficient design (e.g. co-location of kitchen/bathroom)</p>	<p>Fitting in with character of existing neighbourhoods is a general theme throughout the residential areas. Provision of broad and flexible range of development, enabling innovative housing and maintaining flexibility.</p> <p>Residential 8 provides the greatest level of detail in term of intensification, and linkage with design guide.</p> <p>Residential Design Guide identifies the following:</p> <ul style="list-style-type: none"> - pedestrian focus, linkages and transport modes - provision of bicycle parking for residential and visitors - minimum impermeable area requirements to limit stormwater loadings; paving to manage excessive runoff and planted areas for absorption <p>Plan change 153 promotes quality and innovative design solutions for developments of 4 or more residential units.</p> <p>Business objectives and policies for mixed use seek to encourage use of public transport, and improving pedestrian amenity. And residential type activities reflect provisions for on-site provision of cycle facilities.</p>	<p>Opportunity to provide buildings that are adaptable to changing uses over time requires buildings to incorporate adaptable floor space height – particularly at ground level.</p> <p>Improve pedestrian accessibility, by encouraging through links and high pedestrian amenity.</p>	<p>disturbance.</p> <p>A number of provisions to ensure buildings fit within local environment.</p>

APPENDIX FOUR: CASE STUDY NOTES

Building	Description	Zone	Features	Infringements	Activity Status	Relevant Assessment Criteria	Issues raised	Planning Discussion
Landcare 261 Morrin Road, St Johns	Educational facility for research and offices	Special Purpose 2	<ul style="list-style-type: none"> *emphasis on alternative transport modes *low energy & water use *cost saving features *stormwater tanks (7) *ventilation system *water & sewage reduction *reduction in waste 	Activity not listed in concept plan, 12m volcanic sightlines, 12m rolling height, building platform outside designated area, 8m yard setback screening of parking 6x stormwater tanks in front yard setback. instability of ground earthworks (2700m3) (slope 5%), removal of and work within drip line of protected trees	Non-complying	4.3.1.2B - Development control	<ul style="list-style-type: none"> *height exceeded largely because of 11 proposed flues. However, doesn't overshadow therefore minor effect. *volcanic sightline addressed through drawn sightline. *s92 relating to existing wastewater overflow issue, no further significant impacts. *sufficiency of parking given cumulative effect of other developments in the area. Indicated that max. Staff would be 90 people and discussing alternative transport initiatives with EECA, such as car pooling. *height of stormwater storage tanks 1m above FGL 	<p>Although no technical shortfall in parking because of overall availability within the campus, the focus on alternative transport modes was discussed and it was determined that a review condition was required to ensure ongoing suitability. Response to concern regarding how this building relates to the rest of the site.</p> <p>Planning report provides no discussion of the sustainable features, not even as a beneficial effect of the development.</p>
Talbot Park 13 Point England Road, Glen Innes 334 Apirana Avenue	Planned Unit Development - over 100 residential units	Residential 8b Open Space 2 Residential 7b or 7a	<ul style="list-style-type: none"> *Site layout & building envelop addresses orientation of Triplex block, Terraced Houses (living rooms) *energy efficiency through use of terrace & apartments, orientation for solar access & passive solar gain. *some buildings to have rain water tanks to minimise water consumption *noise address to meet Council requirements inside units, techniques suggested by Marshall Day *atrium building has solar water pre-heating; natural ventilation; energy efficient lighting; recycled stormwater plumbed to toilet, 	Planned Unit Development (103 units) - new dwellings in R8 - vegetation alteration (removal and works within drip line)	Restricted Discretionary	7.7.5.2C and 7.7.5.3 - relating to Residential Design Guide (Appendix 10)	<ul style="list-style-type: none"> Financial contribution of almost \$300,000 required for reserves. HNZ requested an exemption, because subject to Development Contributions at the time of Building Consent (\$130,000 - and including stormwater). Requested special assessment (8.9 of DC policy) for exceptional features not recognised in the policy: -100% social housing with 100% public funding -provide for growth -community based activities (i.e. community gardens) -park enhancement works already planned -employment creation <p>Also lodged a s357 objection to</p>	<p>Consistent with objectives and policies of Residential 8 (7.6.8.1):</p> <ul style="list-style-type: none"> - promoting growth within walking distance of transport nodes (ped focus) - promoting innovative design solutions by requiring application of urban design criteria <p>Planners report discusses some sustainable features in terms of the elements of the Residential Design Guide, i.e. energy efficiency. But focus is on urban design.</p> <p>Internal noise environment & forced ventilation.</p>

Building	Description	Zone	Features	Infringements	Activity Status	Relevant Assessment Criteria	Issues raised	Planning Discussion
			irrigation and wash down; flow restrictors for water conservation; dual flush WC; stormwater treated via permeable paving, swales, and rain gardens;				condition about certification of internal noise compliance. Clarification issue. *check whether this occurred? Council expert did not suggest the condition - only to comply with acoustic report.	Development contributions & recognition of on-site alternatives.
Population Health 261 Morrin Road, Tamaki	Educational facility for research and offices	Special Purpose 2	*energy efficient heating & lighting systems *layered façade (shading & solar gain) *high level of insulation *natural light & ventilation *thermal mass of exposed structural floor system *efficient air distribution of mechanical ventilation & air conditioning *use of sustainable materials	instability of ground exceeds 12m volcanic sightlines, exceeds maximum 12m rolling height, doesn't comply with concept plan (building platform outside area)	Non-complying	4.3.1.2B - Development control	*maximum height exceeded particularly because of sun light features on roof. Addressed through the provision of details on sightline to Mt Wellington therefore minor effect.	The planners report made no mention or issue of the sustainable features, apart from the sunlight features exceeding the height. No discussion of issues or benefits. Planning report provides no discussion of the sustainable features, not even as a beneficial effect of the development.
Courtney-Heale 57 Moa Road, Point Chevalier	Residential	Residential 6a	*passive solar heating (north facing/glazing) *high thermal mass *additional insulation *solar hot water *sustainable materials for deck	height in relation to boundary - but existing infringement, only further 400mm.	Discretionary	4.3.1.2B - Development Controls	*wanted to plumb in stormwater to toilet, shower and washing machine but proved too difficult so didn't in the end.	No planning barrier as consent wasn't required.
Waitakere Hospital (as an example of a large non-residential building)	Semi Industrial	Business 4	*natural light and ventilation *accessible *stormwater retention and filtration integrated as water treatment *re-use of existing building and waste strategies	*scale greater than maximum gross floor area for discretionary activity *likely to comply with height of 15m	Non-complying			Difficult to consider this as a theoretical application as it could be anywhere, in any zone. Given that the provisions of the business zones are not identified to have significant barriers or incentives the development is unlikely to require resource consent for anything related to sustainable building features. It would be appropriate for such a development to do a

Building	Description	Zone	Features	Infringements	Activity Status	Relevant Assessment Criteria	Issues raised	Planning Discussion
								plan change to provide a concept plan.

APPENDIX FIVE

Questionnaire for Developers of Sustainable Buildings (or their consultants) and ACC Staff Processing Consents for Sustainable Buildings.

Developers / their consultants

1. Why did you decide to build a sustainable building in Auckland City?
2. Was this the first sustainable building you have been involved in building?
3. What problems, if any, did you encounter with the consenting process for your building by Auckland City Council?

Examples/Prompts

- Were there features which didn't fit well with the planning regime?
- Were there features which had issues under the administration of the Building Code?
- Were there features which had issues under other regulations (eg Subdivision Code of Practice, Health Act)?
- Were there features which were poorly understood by the ACC staff?
- Was there support for the sustainable building framework by the ACC staff?
- Were there issues with another Regulatory Authority (eg Metrowater, ARC)?

4. Were there positive aspects of the consenting process which should be retained and/or built on?
5. Based on your experience, would you build another sustainable building in Auckland City? (If not, why not)
6. Based on your experience are there changes you would like to see to Auckland City Council processes which you think would assist developers of sustainable buildings?
7. Are there other barriers to sustainable building or particular sustainable building technologies which you encountered?
8. Do you think there is a need for incentives to build sustainable buildings or incorporate sustainable building methodologies within Auckland City?
9. If yes to 8, what sort of incentives do you think would be effective?

Auckland City Staff

1. Are you aware of the basic principles of sustainable/green building?

(If not quickly outline – energy efficiency, water conservation, wastewater minimisation, maintaining stormwater quality, minimising stormwater quantity, providing for sustainable solid waste management, use of building materials with low life cycle costs, provision of a high quality and healthy indoor environment quality).

2. Have you been involved in the processing/administration/oversight of the Auckland City Council approvals for the development of a sustainable residential, commercial or industrial building, or one with some sustainable features (eg rammed earth materials, solar panels, composting toilets?)

If Answered Yes to 2 then go to 3.

If answered No to 2 then got to 10

3. Was this the first sustainable building you have been involved in?

(If no find out about other buildings involved in also)

4. What sustainable features did the proposed building have?
5. Were there any guidelines, practice notes etc that you used to help you deal with the administration of the consenting of the building (s)? If yes, how useful was this information?
6. Was there information that you felt you needed to deal with the building or its features which was not available? If yes, what sort of information?
7. Were there features proposed initially by the developer which were not included in the final completed building?

If answered Yes to 4 then go to 8.

If answered No to 4 then go to

8. Why were those particular sustainable features not included in the final building?

(Prompt if necessary eg cost, problem with consent, technological issues)

9. What problems, if any, have you encountered with the consenting process for sustainable buildings?

Examples/Prompts

- Were there features which didn't fit well with the planning regime?
- Were there features which had issues under the administration of the Building Code?
- Were there features which had issues under other regulations (eg Subdivision Code of Practice, Health Act)?
- Were there features which were poorly understood by the ACC staff?
- Was there support for the sustainable building framework by the ACC staff?
- Were there issues with another Regulatory Authority (eg Metrowater, ARC)?

10. What things do you think assist with the consenting process for sustainable buildings which should be retained and/or built on?
11. Do you think the current process and planning framework in Auckland City is supportive of sustainable building development?
12. Are there any changes you would like to see to Auckland City Council processes which you think would assist in the development of sustainable buildings?
13. Are you aware of any barriers within the Auckland City processes to the development of sustainable building or particular sustainable building technologies?
14. Do you think there is a need for incentives to build sustainable buildings or incorporate sustainable building methodologies within Auckland City?
15. If yes to 14, what sort of incentives do you think would be effective?